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PUBLIC GOODS AND CLUB GOODS

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Abstract

Public goods contrast with private goods. Pure public goods have the unique characteristics of non-excludability and non-rivalry in consumption while private goods are sold to those who can afford to pay the market price. The under-supply equilibrium of a public goods provision is an important aspect of the provision of public goods. The economic theory of clubs represents an attempt to explain the under-supply equilibrium of a public goods provision. It raises many different and controversial issues which impinge on government policy in the public sector. In many respects, a club provision proffers an alternative to a central government provision of local public goods. The salient characteristic of a club, the excludability factor, may militate against an equal and democratic distribution of the club good. At the level of voluntary clubs, with which Buchanan was originally concerned, club theory can critically appraise the efforts at achieving optimal membership of the club and the maximum utility of club members. As the literature introduces increasing problems with cooperation then it behoves law and economics scholars to research and develop non-market and/or non-cooperative solutions to an optimal provision of public goods.
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1. Introduction

Pure public goods as originally defined by Samuelson (1954) have the unique characteristics of non-excludability and non-rivalry in consumption. Public goods contrast with private goods; public goods are non-excludable and non-rivalrous in consumption while private goods are sold to those who can afford to pay the market price. The market price excludes some consumers while the property of rivalrous consumption ensures that not all consumers who can afford to pay the price, actually purchase the private good. The public goods property of non-rivalry ensures that a provision of the good for consumer A entails a provision for consumer B. Likewise, the property of

non-excludability ensures that one cannot exclude consumer B from securing the benefits of the public good, consequently there is no incentive for consumer B to pay the costs of providing the public good. Therefore a consumer may 'free ride' (Kim and Walker, 1984) on the provision of the public good, securing the benefits but not paying the costs of provision.

A lighthouse signal is a classic example of a pure public good, where the provision is both non-rival and non-excludable. Local radio or community radio, theatre performances and untelevised sports events are interesting examples of a local public good, where the provision is non-rival but excludable. The market is not the only mechanism through which goods and services are provided in a modern economy (Coase, 1974); public goods and club goods are characterised by their provision wholly through a political process since by their very nature they are unmarketable.

A primary reason why market failure persists is reflected in the inability of citizens to act cooperatively and it is this lack of cooperation which mandates an allocative role for government in the economy. A public good that becomes excludable is a club good (McNutt, 1996). The economic analysis of clubs pioneered by Buchanan (1965) can be applied to the provision of local public goods, ranging from the supply of decentralised regional public goods (local health boards) to community projects and neighbourhood schemes, such as community sports clubs and residents associations.

In the theory of clubs, however, there is collective consumption but with an exclusion principle, for example, a membership fee. One can think of club goods as public goods *sans* non-excludability. There are economies of scale in that additional members reduce the average cost of the club good. But additional members also lead to crowding which in the long run could be regarded as the introduction of rivalrous consumption. Indeed the club goods have polar extremes as noted by Mueller (1989, p. 131): 'for a pure public good the addition of one more member to the club never detracts from benefits of club membership ... [for] a pure private good, say an apple, crowding begins to take place on the first unit'.

2. Excludability and Non-Rivalry

There are, therefore, two salient properties pertaining to the provision of public goods, namely, non-excludability in supply and non-rivalry in consumption. The latter implies that inter-citizen consumption is mutually exclusive, that is, the consumption by one citizen of the public good will not affect the consumption level of any other citizen. Radio broadcasts, clean air or defence spring to mind as examples of a non-rivalrous public good. Non-excludability is the hallmark of a political system where the central government funding

emanates directly from citizen taxation. However, in the provision of some public goods, either local public goods or club goods, the citizens often prefer to act independently of government. The property of excludability in the supply of the public good is the *sine qua non* of club goods.

A prisoner's dilemma characterisation of the market failure problem would indicate a Pareto inferior outcome as long as a dominant strategy existed for the individual citizen. The incentive to cheat on collective decisions, otherwise known as the free rider problem, illustrates one dominant strategy which undermines the optimal provision of public goods. In the classic tradition of public choice, government intervention *per se* would represent an externality. It is the increasing trend towards local public goods in the provision of public sector output that has facilitated the application of club theory which exhibits a cooperative response to the resolution of a local or regional issue.

Buchanan (1965), who was one of the first scholars to consider the efficiency properties of voluntary clubs, derived the economic conditions under which an optimal provision of a local public good could be attained. This early work outlined a justification for club analysis in the explanation of why clubs would organise. Both Buchanan and Olson (1965) recognised independently that clubs enable members to exploit economies of scale in the provision of the public good and to share in the cost of its provision. They each addressed the issue of membership restrictions, with Olson distinguishing between exclusive clubs and inclusive clubs with *no* membership constraints.

Likewise, Tiebout (1956) had much earlier addressed a club-related issue in his work on population mobility and size of local government. His 'voting with the feet' hypothesis has many direct applications in the area of local public goods. Other scholars, notably Schelling (1969) and McGuire (1974) justified club formation on the basis of 'a taste for association'. This has since been translated in the club literature as the assumption of homogeneity (identical tastes), an assumption which has raised the policy issue as to whether or not mixed clubs are optimal. For example, if mixed clubs are not optimal then the policy of group segregation is optimal whereas the policy of busing, as practised in some US states, is suboptimal. The issue of optimality, however, is not completely resolved across the club literature.

3. Public Goods Paradox

To what extent the theory of clubs enables policymakers to escape the under-supply equilibrium in the optimal provision of public goods remains a challenging issue. In other words, the optimal provision of public goods generally is constrained by what can broadly be defined as the public goods paradox, that is, unless the spoils of the public good are divisible there is no

incentive for the individual to participate in its provision. Club theory overcomes the problem of non-excludability in so far as members of the club use the club good. The non-excludability characteristic of a pure public good may constrain the realisation of economies of scale in any interest-group provision of the good unless the gains are divisible.

Table 1
An Economics Typology

	Excludable	Non-Excludable
Rival	Private good	Public good
Non-Rival	Local public good	Pure public good

The public good in Table 1 is characterised as non-excludable and rival. In other words, rivalness in consumption is the distinguishing feature between a public good and a pure public good. The good could be described as a common good in the absence of any rival behaviour between citizens; some examples include air quality, frontier land and outer space. Rivalrous behaviour, however, converts the common good into a public good as frontier land is zoned, air quality control becomes necessary and space stations are constructed.

Once property rights are established the good eventually becomes an excludable and rival private good. For example, if a toll-free congested bridge, a rival and non-excludable good, becomes a congested bridge with Pigou-Knight tolls, the good therefore becomes a rival and excludable private good. There are increasingly few examples remaining (Hummel, 1990) of a pure public good otherwise defined as a public externality. Medical knowledge is one example but the classic examples of national defence, the environment, outer space and unpolluted air are no longer regarded as pure public goods.

Table 2
An Economics A Law and Economics Typology

	Excludable	Non-Excludable
Rival	Private good	Private externality
Non-Rival	Club good	Public externality

To what extent they represent McNutt's (1996) 'collective good' thus warranting a citizen tax, depends upon how acceptable the good is to the citizens and the citizens' effective demand for that good. For example, should *peaceniks* who may regard defence as an unacceptable public good or Gaelic

speakers who may regard the English-language public radio broadcasts as an unacceptable public good, be obliged to pay the requisite fee or charge to have the good supplied? While pollution represents the classic example of an externality, may we suggest pollution control as a modern example of a pure public good. This would include anti-smoking legislation, catalytic converters in car exhausts and CFC legislation. Albeit, the classic lesson from the literature (Van Zandt, 1993) is that an optimal provision of pure public goods may escape the policymaker.

The property of excludability, as noted in Table 2, is the essence of a club theory approach to the provision of public goods. If consumption of the public good is not contingent on payment, individuals have no incentive to reveal their true preferences. The individual becomes a free rider and if all individuals behave likewise the net result is an absence of effective demand for the good. Where consumption is non-rival, for example, exclusion could be easily applied. However, because the marginal cost to previous consumers of adding one extra consumer is zero, the price should be zero. In this case there is no need to exclude. However the administrative costs of the public good provision must be covered somehow and with non-rival consumption in the absence of exclusion, the usual market method cannot determine price.

Musgrave and Musgrave (1980) have argued in favour of the non-excludability characteristic; they have argued that with excludability, non-rivalrous goods can be effectively provided by private production. In a different context Ng (1979, p. 190) emphasised the non-rivalrous characteristic, particularly if we do not regard public production as a necessary and sufficient condition for a public good. Since free riders impact on these conditions it is rather difficult to compute exactly the individual's valuation of a public good. And this is particularly difficult if payment is not contingent to a particular preference revealation. Preference revelation mechanisms (Kormendi, 1980) for example, where individuals pay a price that equates with their revealed preference for the good, are presented as experimental attempts to minimise the problem. Another alternative to the market failure result in the provision of public goods is to be found in the general theory of clubs. Tanzi (1972) had shown that welfare costs may be involved in providing public goods which differ with respect to how individuals are excluded from consuming the good.

4. The Coase Theorem and Property Rights

In standard public goods analysis it is assumed that consumption of the public good can be extended to all consumers at a zero marginal cost. It is also assumed that a free rider problem exists or that individuals (Cohen, 1991) can only be excluded at some positive cost. Loehr and Sandler (1978, p. 27) consider the issue of a 'forced rider' in which people 'are forced to consume,

whether they like them or not' a range of public goods, for example defence. They further comment that 'it is entirely possible that the welfare of some individuals might fall when a marginal unit of the public good is provided'. The Pareto optimality conditions would have to allow for subsidies for these individuals to ensure that the marginal utility to tax price ratios for all individuals are equal. The forced rider may influence the provision of the public good. This could be extended to local goods and services where forced riders may be involved in decision making.

Pigou (1920) had suggested that government intervention was necessary in order to abate the externality problem. The transactions costs of grouping concerned citizens together in order to resolve the externality problem was prohibitive. Coase (1960) argued that in the absence of transaction costs, concerned citizens could resolve the problem, independent of government. Theorem 1, the Coase Theorem and the liability rules amend the public choice analysis of the externality problem.

Theorem 1: In the absence of transactions costs and bargaining costs, concerned citizens will agree to resolve an externality problem and arrive at a Pareto optimal allocation of resources, independent of government.

The apportionment of blame and the allocation of property rights, that is, the right to clean air, the right to pollute, proffer an alternative, indeed a complement, to the introduction of Pigovian taxes. The idea behind liability rules was to apportion blame; an alternative to this procedure in tort law is to establish optimal conditions which may prevent the accident or property rights dispute occuring. The traditional response in public finance was either to compensate the offended party or tax the offending party. This required an apportionment of blame which may have induced unnecessary government expenditure and rent-seeking activity. The costs incurred must be weighted against an inter-citizen or club resolution of the initial dispute.

The costs of providing the public good must include the bargaining costs attributable to the resolution of the ensuing debate on the amount of public good supplied, if at all. The treatment of these bargaining costs are a cental feature in Buchanan and Tullock (1962) whose framework was used by Loehr and Sandler (1978) in considering the impact of bargaining costs in the provision of public goods. They illustrate the net indirect costs imposed on forced riders and the number of individuals required to reach agreement on public provision. They further represents costs imposed upon a person who 'bears some burden under all decision rules with the exception of unanimity'.

In this case if the individual was a forced rider he would agree to the decision only when adequately compensated, that is when net costs are zero where the entire population is in agreement. Loehr and Sandler further

comment that their cost function is 'downward sloping since the greater the proportion of the population needed for agreement, the more likely persons similiar to himself (but not identical to him) will be wooed by the early proponents of the public action'. A point may be reached where the need to form larger and larger coalitions would force bargains between free riders and forced riders. A particularly interesting point in Loehr and Sandler (p. 31) is their comment that the cost curve need not end at zero when unanimity is reached.

In other words, some free riders, they argue, may still exist, even where everyone is in agreement on the policy'. Summation of all individual cost curves in their presentation creates a community cost curve which indicates that more and more decisive groups would imply a higher cost in terms of effort and bargaining. If the decisions have to be made at the point where community costs are at a minimum then we are abandoning Pareto optimality. The solution presented represents a second best solution. McNutt (1996) considered an inter-citizen resolution by adapting an earlier argument in Turvey (1968, p. 310) who had argued that the traditional interpretation of an externality is rather restrictive. How much group B suffers from A's externality depends not only on 'the scale of A's diseconomy but also on the precise nature of A's activity and B's reaction to it'. For example, the victim in Pigou's chimney example could reduce the disutility by installing an indoor clothes-line.

The Pigouvian solution of reducing the amount of smoke contrasts with the alternative solution of either building a higher chimney or using different smokeless fuel. McNutt (1996) shows that by allowing an inter-citizen resolution to a dispute, the cost may be less than the government cost. If citizens can agree on the resolution of an externality problem, the cost to the government of financing the inter-citizen solution may be less than a central government solution. An inter-citizen resolution like the Coase theorem offers an alternative to government action in the resolution of an externality problem. One policy implication of this result applies to traffic congestion in large cities. Rather than impose a tax on car owners who persist in driving to the city at rush hour, car-users should be encouraged to resolve the externalities of long tailbacks, car emissions and queues by acting collectively. Car pools with special motorway lane access, such as the HOV (heavy occupancy lanes with at least three passengers per vehicle) lanes in the US, would be socially more efficient than allowing as many fee paying cars to enter the city limits; citizens would prefer to incur the lower garage parking fee for the pooled car.

5. Tiebout-Oates World

It is useful to re-examine the conditions which independently underpin the Tiebout (1956) and Oates (1972) models of local public goods and adapt the

Loehr-Sandler model in a search for some common ground in a Tiebout-Oates type world. Forced riders, can leave the local neighbourhood; this assumes no relocation constraints; crucial to the question posed here is the failure of individuals to reveal their true preference for local public goods. In his analysis, Tiebout recognised the efficiency in the supply of public goods and further acknowledged that voting process was the only recourse to reveal the preferences of the sharing group. The optimal allocation is determined by a 'voting with the feet' exercise.

Tiebout had presented an earlier framework for the theory of clubs in assuming an infinite number of individuals who form themselves into many clubs of different sizes. Under certain conditions the infinity assumption allows each club to maximise its own benefit without violating Pareto optimality. The Buchanan-Ng framework may be preferable to the Tiebout framework in the case where location of consumers is exogenous, transport is costly and where there are few clubs. In the Tiebout model individuals can vote with their feet, moving to regions according to their preferences for public goods.

Nevertheless, in order to examine this model further we note two assumptions of the Tiebout model, namely (i) consumer-voters are fully mobile and (ii) they have full information on the differences on revenue and expenditure in the local areas. These two assumptions depend on the absence of relocation constraints such as employment, house purchase and school availability. It also presupposes a large number of alternative communities with which the consumer can effectively rank order each community. The remaining assumptions include the following: (iii) there are no external economies or diseconomies of scale in the supply of the public services; (iv) there is an optimal community size for every community service; and finally (v) communities below the optimal size attract the new residents.

This set of assumptions establish the classic Tiebout model and ensure the global optimality of excludable public goods provision. Mueller (1989, p. 157) outlines an illustrative proof of this global property. However the new residents can produce congestion in the new area and the resulting congestion costs and possible negative externalities if the community has grown beyond the optimal size, forces Mueller to conclude that in general the Tiebout model will not produce a Pareto optimal outcome. In his illustration he shows quite clearly how a non-Pareto though stable equilibrium can emerge. Empirical evidence to support the hypothesis has been forthcoming, for example, Cebula (1979) showed that inter-area differences in welfare benefits influenced migration decisions while Aronson and Schwartz (1973) in an earlier and original analysis showed that those towns likely to gain in relative population are those that offer residents equal or better services at an equal or lower tax rate.

6. A Marginal Decision Curve

McNutt (1996) offered an alternative interpretation to the global condition in a Tiebout-Oates world by considering the idea of a marginal decision (MD) curve. This differs from the average benefit curve employed initially by Mueller (1979); while both curves represent benefit, Mueller's curve assumes that benefit is a function of community size whereas McNutt's curve is a function of the number of internal members (who form an internal group) in the sharing group. The concept of an *internal group* is used to explain the formation of alliances in the provision of public goods. In many instances, for example, the alliance may expressly form to prohibit the supply of public goods as with defence or environmental quality. As illustrated by McNutt (pp. 198-199), the group MD schedules are mirror images of each other which reinforces the point that utility in the club is maximised by dividing the club good equally between each group.

Let us take the example of tulips in a public square; tulips represent a public good, planted in the public square by the local authority. Assume that the tulips, for whatever reason, offend a sub-group of the individuals who spend the day in the square. For this sub-group the tulips represent an externality. The square itself is a public good, but the presence of tulips reduces the utility of this sub-group. Next we introduce the concept of internal member:

Definition: define the sub-group *S* of citizens such that there is an issue *i* which at least one member *j* of the group regards as an externality, then $j \in S$ is defined as an internal member of the set *S*. The set *S* is a proper subset of the set, *C*, of all individuals in the square.

If the committee responsible for planting tulips decides against planting tulips in the square, the internal group is defined as decisive. The significance of an internal group is in its ability to rank local public goods in descending order of preference. The important characteristic of an alliance supplied public good is jointness in supply, that is, the supply includes private benefits as well as public goods. The private good may include cultural or educational benefits but may also include private externalities as with the tulips example.

Club theorists may have underestimated how members of a sharing group become associated. Apart from similiar tastes, there is the possibility of an 'association by alliance', that is an alliance of internal citizens who expressly object to the supply of a public good. How this manifests itself in theory, is as follows: the 'sharing group', that is the group of all citizens who consume the good, is subdivided into group A which derives exactly half as much utility as group B, the internal group, in any provision of a local public good. Group B, an internal group, has a negative impact on the remaining members, $(MD_A) = {}^{1/2}(MD_B)$.

If the rule is to maximise the utility of the sharing group then emphasis will be in the directon of group B. Ironically the utility of the A group will decrease. The dominance of the internal group secures a reduction in the amount of local public good in order to maximise the utility of the sharing group, B. McNutt (1996, pp. 198-199) called this 'the tulips paradox', that is, in the local provision of a public good the presence of a decisive internal heterogeneous group with identical tastes may reduce the supply of the local public good in order to maximise the utility of the larger citizenry group.

7. A Buchanan-Ng Framework

There are two basic models across the literature on club theory, the Buchanan (1965) within-club model and the more general Oakland (1972) total economy model which will be developed in a later section. Buchanan's model is the classic treatment of clubs while the Oakland model is more general in extending club theory to include heterogeneous members, discrimination, variations in the utilisation of the public good and exclusion costs. Neither model, however, guarantees Pareto optimality in the provision of local goods, which ironically is the *raison d'être* of club theory as a methodological study of the allocative efficiency of (impure) public goods.

The assumptions underpinning the Buchanan model include the following: (i) individuals have identical tastes for both private and public goods; (ii) the size of the club good (a swimming pool), hence its total cost, is fixed; and (iii) equal sharing of costs. Mueller (1979) has argued that (iii) follows as an assumption from (i). In a simple model Buchanan determines the optimal size of the club membership. Mueller shows that with some algebraic manipulation, by deducting each individual's share (equal shares) of the cost of providing the good from private income to obtain 'net of public good income' and substituting this into an objective function with the amount of public good and club size as explanatory variables, the Buchanan model obtains the Samuelson condition for the efficient consumption of a public good.

The crucial assumption in the Buchanan model, and in club theory generally, is the assumption of identical tastes and incomes. The Tiebout model shows that it is inefficient to have individuals of differing tastes in the same club. Intuitively, think of ten women golfers in a golf club of 25 players. The result here is akin to Pauly's (1967) result, obtained much earlier, that no stable equilibrium will exist if the women golfers form a winning majority. This is particularly the case if the number of women golfers increased and the threat of exit by the male golfers becomes credible - they could leave and form an alternative club. The dynamics of the situation would suggest that a small membership size is optimal - in other words, there has to be a limited degree

of publicness (an excludability factor) as additional members beyond the optimal membership size will impose a cost on existing members. Congestion may arise on the golf course, reducing the utility of existing members.

According to Ng the relevant Pareto optimality condition requires that any individual in the club must derive a total benefit in excess of the aggregate marginal cost imposed on all other consumers in the club. So the Buchanan-Ng theory is to optimise the membership; alternatively Oakland considers the degree of congestion or overcrowding to be important. Club theory has many interesting applications in the analysis of congestion and in establishing the optimal group size for (say) a local golf club to a local community. Buchanan's economic theory of clubs builds on three rather important assumptions: (i) that the benefits and costs are divisible amongst the club members. As more members join, average costs for the provision of the club declines, but marginal benefits begin to fall as more members contribute to congested levels of membership; (ii) it is costless to the club to exclude members. This conveneintly removes any distortion should exclusion be deemed necessary in order to attain an optimal (MC = MB) membership. Finally it is assumed that (iii) there is no discrimination across members. This is a rather difficult assumption to defend in practice, as in the case of golf clubs and swimming pools where there is evidence of sex discrimination. However, with these three fundamental assumptions, an individual quasi-concave utility function is maximised in order to find the optimal club size and the optimal quantity of the good.

The public good is not a pure public good, but rather there is an element of congestion as individuals consume the good up to its capacity constraint. What arises then is some exclusion mechanism in order to charge consumers a price for the provision and use of the good. Brown and Jackson (1990, p. 80) had commented that the purpose of a club 'is to exploit economies of scale, to share the costs of providing an indivisible commodity, to satisfy a taste for association with other individuals who have similar preference orderings'. For Buchanan and Ng the main club characteristic is membership or numbers of consumers and it is this variable that has to be optimised. For Tiebout an assumption of infinity of individual consumers presupposes costless exit from one region to another and the formation of many clubs. Oakland considered the degree of congestion as an important characteristic in the provision of a club good. There is room for all of the characteristics in a general theory of clubs that seeks to determine a Pareto-optimal distribution of public goods.

What appears not to have been examined in this context is the interpretation of an individual's income elasticity of demand as a proxy for tastes for a public good. In the Tiebout world high-income individuals may migrate to the same area which leaves relatively poorer individuals consuming only the public goods which they themselves can afford to provide. No one really objects to club membership when the public good is tennis courts, squash courts or golf

clubs. To avoid congestion in the club and to achieve economies of scale, a Pareto efficient outcome is arrived at by introducing an exclusion principle. But in a Tiebout world of clubs, right-handed golfers exiting to form an alternative club, is quite different to the world in which high-income individuals migrate to one area and low-income individuals to another area.

As Mueller (1979, p. 144) pointed out 'the voluntary association approach is likely to affect the distribution of income'. If individuals can vote with their feet and have positive income elasticities of demand for public goods they can benefit from living in a community with incomes higher on average than their own. But for the poorer individuals transport and mobility is costly and for the higher-income individuals the formation of interest groups (for example, regional or local environmental lobby) is a concomitant to the provision of the public good. Each militate against an egalitarian distribution of the public good. Any attempt to transfer across from rich to poor 'runs directly into the issue of the proper bounds of the polity and the rights of citizenship' according to Mueller. However, in order to reach levels of efficient voluntary provision in Paretian terms, cooperation is necessary.

8. Precis on General Models

The presumption is that a voluntary provision of the public good will lead to a suboptimal outcome. The general model further assumes the existence of a private good and an impure public good, with the private good acting as a numeraire. The members are heterogeneous, non-members are costlessly excluded and club members determine their utilisation rate of the club good by varying the number of visits (to the public park) and time spent at the club. Optimal provision in this general model, within which both members and non-members are considered in deriving the optimal conditions for a single club, requires, according to Sandler and Tschirhart (1980, p. 1489) 'that the marginal benefits from crowding reduction, resulting from increased provision, equal the marginal costs of provision (MRT)'. This is analogous to the earlier Pareto optimal condition (MRS = MRT) for public goods provision and not unlike the conclusion extracted by Buchanan. The utilisation condition in the general Oakland model requires an equal rate of utilisation for all members, although total toll payments (for utilisation) vary between heterogeneous members.

Oakland's model is identical to the Buchanan model under the following conditions: (i) all members are homogeneous and each consumes the available quantity (say) X of the public good, such that $X_i = X_j$; (ii) for the members S the crowding function must be an identity mapping, that is $C(S) = S$, this reduces the general Oakland utility function to the Buchanan function $U(Y_1,X_1,S)$, where S substitutes for $C(S)$. The insertion of a crowding function into the

utility function is one major difference between the models in club theory. Sandler (1978) argued that by including a crowding function, crowding externalities such as poor view can be considered, (a) increases in the provision of the public good reduces crowding ($dc/dc < 0$) and (b) increases in member use of the good increases crowding, that is ($dc/dx_i > 0$). It has been argued that the general model implicitly assumes cardinality of the utility function. Sandler and Tschirhart (1980, p. 1490) in their review of club theory comment that since 'the general model requires an ordering of the population based upon club preferences', cardinality is implicit.

Cardinality may rule out particular functional forms of the utility function, that may be otherwise appropriate for club analysis, for example the transformation $W = \text{Log}U$. In practice, however, populations cannot be ordered; this applied weakness in the Oakland model has been overcome by Hillman and Swan (1979) who proposed an ordinal representation that does not require an ordering of the population. Their model, a *ceteris paribus* type model, maximises an arbitrary members utility subject to the constancy of other members utility levels. Recall that Buchanan's model maximised individual utility $U(Y, X, S)$ subject to a production:cost constraint $F(Y, X, S) = O$. The Hillman and Swan (1979) result is akin to this basic Buchanan model when (i) $C(S) = S$ and (ii) $F = U[Y, X, C(S)]$. The (ii) condition is *the Buchanan constraint* in the optimization procedure; an analogy requires that the Hillman and Swan constraint be rewritten as $F = U[Y_1, X, C(S)] = O$. This may be unlikely but worthy of further research.

Both Tiebout (1956) and Oakland (1972) represent alternative frameworks to the approach adopted by Buchanan (1965) in accounting for the under-supply of public goods. Oakland looked at the degree of congestion while the Tiebout model is an application of club theory to community size. A Tiebout-Oakland public goods problem would manifest itself for those public goods for which congestion begins at a certain size of community. As the community gets larger, residential density increases (community congestion), reducing the utility of everyone living in the community. Two factors which are important in the context are: (i) that the total number of people may not be an integral multiple of N, the number of workers, that is there may be a fixed population as identified by Pauly (1967); and (ii) the number of communities may be fixed. The one exception, alluded to by Atkinson and Stiglitz (1980), is a frontier society.

If the communities are fixed, say, to two, an optimal provision of the public good may involve an equal treatment, a result which in Atkinson and Stiglitz (1980) yields a local minimum (maximum) solution with population shortage (excess), hence social welfare could be increased by moving to an unequal treatment. A similiar point was alluded to earlier in the discussion of the marginal decision curve. However, the general theory of clubs with the property of no discrimination of members assumes a group of homogeneous individuals.

The Tiebout world has heterogeneous individuals sorting themselves out into homogeneous populations with homogeneous tastes. Hence doctors and lawyers live in the same neighbourhood and there are golfers in the golf club and swimmers in the swimming club. Health and sports clubs have to acquire an optimal mix of members in order to minimise crowding and queues. A sorting mechanism has to be introduced such as a rota or a time schedule based on membership age. But is the sorting optimal? In answering this question we have to refer to the concept of homogeneity.

9. Homogeneity

In the literature there are at least two interpretations of homogeneity in the club literature; first (i) Tiebout's (1956, p. 419) homogeneity as captured in his work where he commented on 'restrictions due to employment opportunities are not considered'. In mixed communities doctors and lawyers do not have equal incomes since the respective income depends on labour supply. Consequently they are not perfect substitutes and the community needs both; the community is better off if they have the same tastes. Secondly, an Atkinson-Stiglitz (1980, p. 531) type homogeneity, which is a weaker version of the Tiebout homogeneity and argues 'that individuals are [not] always better off forming homogeneous communities with people of identical tastes'. In their argument, they consider a third public good produced as a compromise to a merged community forming from the separate communities. In the merged case the individual can enjoy the benefits of the economies of scale associated with three public goods (equivalent to our average cost reductions in the Buchanan model), but when these benefits are weighted against diminishing returns to labour N (equivalent to the declining benefits in a Buchanan model), the individual is better off.

An interesting dimension arises in the context of a heterogeneous population which can be translated into different marginal valuations. If, for example, the local authority does not tax the individuals according to their respective valuations, by imposing an equal tax, there may not be an optimal provision of the local public good in the merged community. Those who value the public good less, are essentially subsidised by the high-value individuals and receive a windfall gain in the provision of the good. The movement from separate communities to a merged community is not a Pareto improvement. Atkinson and Stiglitz (1980) arrive at a similar result, assuming no diminishing returns to labour, in looking at positive benefits, that is 'everyones taxes [are] cut'. Whether the sorting is optimal or not depends clearly on the assumptions of diminishing returns to labour, the existence of a windfall provision to individuals with lower valuations and on the assumption of homogeneity.

Pauly (1970b) and McGuire (1974) in their generalisation of the earlier work of Tiebout assume an indefinitely large number of individuals, forming clubs of different sizes. Pareto optimality is not violated with the assumption of infinity (uncountable infinity according to Ng, 1979) as each individual can join a club that suits his or her preference, thus maximising the individual (average) benefit or the benefit of the club. The applicability of this infinity framework is, according to Ng (1979, p. 212), suitable for the cases where the number of clubs for the same good is large and the population is mobile; he suggests group segregation in housing the nomadic life and sports clubs.

In the typology of public goods presented in Table 2 earlier, the club good is defined as a non-rival excludable public good. A different usage of rivalry has been discussed in the literature by Starrett (1988, p. 58) in the context of club theory and local communities. The spatial element in local communities, with competing use for a limited (same) space, generates 'club rivalry that is independent from the rivalries we have been discussing'. In what he refers to as a bare bones model, Starrett concludes with an optimality condition which suggests that efficient size will require that average provision cost equal the sum of the various marginal rivalry costs. In the model transport costs play the role of rivalry costs, as Starrett (1988, p. 59) argues 'transportation has no value to the members per se but must be incurred if they want to share the collective good'.

That each individual in the club is equal distance from Starrett's collective good, the assumption of radical symmetry, is dropped in an alternative model which allows for choice in the number of trips to the collective good (for example, the public park) and in the amount of residential land held by each individual. The first-best solution is an unequal division of land as individuals closer to the public good represent an externality to these further out in the residential area. The latter residents have larger tracks of land. Starrett's unsurprising conclusion is a formulation 'that treats equals equally' (p. 60); the reason, apart from the formal rigour of his model, is that in the real world the political system will impose this constraint on society. Of the Lagrangean optimisation results presented by him the one that is of interest is the condition for optimal club size.

Theorem 2: The Henry George Theorem states that if public expenditure is fixed and population varies, the population that maximises consumption per capita is such that rents equal the public good expenditure.

The Starrett (1988, p. 62) result which states that the supply of the public good should equal the pseudo-land rent in the optimal spatial club is in many respects similiar to the Henry George Theorem as derived by Atkinson and

Stiglitz (1980, p. 525). Optimization on club size leads to the Starrett result. In a Henry George world, each citizen had identical tastes, an assumption which is imported by Buchanan into his original club model. Since club rivalry involves spatial separation the marginal cost of rivalry is reflected in the marginal premia on limited space. Starrett concludes 'that in our bare-bones model this premia could be measured in terms of transport costs, [but] differential land rents turns out to be the right measure in broader contexts' (p. 62). The measure is right, relatively speaking, in that it secures an optimal club size. The different approaches within the general theory of clubs highlight the many different characteristics of a club and of a club good. The general theory of clubs offer a solution to the optimal provision of public goods.

10. Future Research and Controversies

In this final section we look at some of the more interesting areas of research within the public and club goods literature, areas of recent controversies indeed which have arisen across the literature. Many of the issues have an important bearing on the optimal provision of local public goods and consequently on local public finance.

10.1 Membership Homogeneity

Membership homogeneity has to be one of the more controversial issues within the club literature, particularly from a public policy perspective. For example, if mixed clubs with heterogeneous membership are found to be non-optimal, as outlined in our earlier discussion, serious policy implications for group housing or education schemes may arise. The literature is divided on the optimality of mixed clubs, with Ng (1973b) and Oakland (1972) arguing for the optimality of clubs and Berglas and Pines (1978), Helpman (1979), McGuire (1974) and Stiglitz (1977) arguing in favour of homogeneous clubs. The latter group, according to Sandler and Tschirhart (1980, p. 1492), 'have recognised that mixed clubs may be desirable when strong scale economies require a larger membership than possible with homogeneity'.

Mixed clubs, however, are not Pareto optimal due to an important assumption: the equal cost sharing assumption which states that in a mixed club, albeit all members pay the same membership fee, those members with higher valuations of the public good have a higher total payment as they use (visit the park) the good more frequently. Conversely mixed clubs are shown to be efficient when there are no second-best constraints imposed. Hence, by invoking second-best constraints requiring all members to share club costs equally, as alluded to in our argument on windfall gains or requiring all members to use the club equally irrespective of tastes as in McGuire (1974) and

Porter (1977), mixed clubs can always be shown to be less desirable than homogeneous clubs. It is the set of second best constraints that relegates the mixed clubs to second place in the efficiency comparisons. A scale of membership fees may (paradoxically) encourage the intense user of the good to use it less and while her less frequent user revisits frequently.

10.2 Pareto Optimality

Neither the within-club Buchanan model nor the Oakland economy model, ensure Pareto optimality. As Sandler and Tschirhart (1980, p. 1493) conclude '[within-club] may fail when the membership size is large relative to the entire population, [general model] will fail when multiple clubs are desirable'. The multiple clubs translates into a variable number of clubs and this requires that both the optimal number and optimal size of clubs be determined simultaneously. A rather different slant on the optimality controversy is whether or not Buchanan, in his original article, failed to consider Pareto optimality. Ng (1973b,
p. 294) has argued that Buchanan did fail to give Pareto optimal conditions in maximising the 'average net benefits instead of total net benefits'; Ng (1979, p. 212) in defending his position has reiterated that his analysis aims 'at Pareto optimality or maximising total benefits of the whole population'. Both Berglas (1976) and Helpman and Hillman (1977) criticised Ng's (1973b) attack on Buchanan and questioned whether or not Ng had maximised total benefits of one club, which in general is non-Pareto optimal.

The Buchanan-Ng framework on clubs which concentrates on each particular club, is preferable, according to Ng (1979, p. 212), to 'the more general model (wherein) *these* conditions are not satisfied' (our italics). The conditions referred to are generally the infinity conditions outlined in our discussion. In contrast Berglas (1976) defended Buchanan on optimality and Helpman and Hillman (1977, p. 295) suggested that the issue is very much dependent 'on a recognition of the different types of club problems analysed' and a realisation of the difference between maximizing average net benefits (for the members) and maximising total net benefits for the club. Buchanan proceeded with the former, whereas Ng proceeded with the latter 'in maximising total net benefits for the entire economy' (p. 1493) according to Sandler and Tschirhart (1980). Other scholars have considered the issues arising from exclusion costs, member discrimination and the analysis of an efficient membership fee or toll for optimal club provisions. The interested reader is directed to the review by Sandler and Tschirhart (1980) and Mueller (1989) and the bibliographies contained therein.

Game theory has helped to shed some light on the issues raised in the club literature and in particular Pauly (1967) to whom we referred earlier, defined the optimum club size as that size for which average net benefits are maximised. This is at variance with the non-game arguments by Ng (1973b), Helpman and Hillman (1977) and the Oakland general model. A direct

comparison between the game and non-game outcomes is complicated by the different assumptions used. In particular the game approach does not admit the interdependency between the membership and the provisions which characterises the classic Buchanan type model; nor does it consider a simultaneous solution to membership, provision of the good and finance. In many cases the club fee is decided ex-post. The approaches do converge on the optimum number of clubs in the homogeneous case.

Pauly (1970a, p. 60) divided a mixed population into homogeneous groups, with each group divided into multiple clubs where average net benefits are maximised. He proved that the core was non-empty and existed 'if the clubs consist of identical members with equal payoffs and that clubs with higher average pay-offs have fewer members'. There has been an increase in game theoretic contributions, for example, Cornes and Sandler (1986), Sandler and Posnett (1991) and notaby Sugden (1981, p. 118) who has argued that where there is 'a consistent theory of non-Nash, utility-maximising behaviours, even less of the public good would be supplied than in a Nash equilibrium'. The conclusion is that public goods would never be supplied at all.

10.3 Profit-Maximising Clubs

However there are two more recent controversial developments to which we would like to turn our attention. The first concerns the issue of profit-maximising clubs, alluded to in the classic survey by Sandler and Tschirhart (1980). Berglas and Pines (1978) have demonstrated that a perfectly competitive industry with identical firms (each firm acts as a club) supplying the shared club good would achieve the same efficiency conditions as those of a private co-operative.

Hillman (1978) found that the non-discriminating monopolist provided smaller output and charged a higher price and operated more crowded facilities than the non-profit cooperative. In contrast Hillman and Swan (1979) have shown that a discriminating monopolist will always achieve an effecient outcome. Ng (1973a) argued that a government was necessary in order to achieve the efficient outcome, defined as maximising total benefits. He continued to argue, in the spirit of our earlier discussion, that since members under a monopolist will maximise net benefit rather than total benefit an efficient outcome is not attained in the absence of a centralised government.

Ng apparently underestimated the impact of short-run political objectives in guiding a government-run club, as later outlined by Sandler (1978). Scotchmer (1985, p. 39) has argued that with a homogeneous population, profit-maximising clubs will achieve an equilibrium that is 'within epsilon' of being efficient. There is entry in response to profits and with incumbent clubs making a conjectural variation on 'the price and facility response in other clubs when it changes its strategy', the number of clubs will be too large. The strategy space is defined by facility X and price P, not facility X and the member N. With the strategy space (X, P) each club believes that it can get

more clients at the expense of other clubs. The set of strategies is a Nash equilibrium if no club can charge (X, P) such as to make more profit, with the zero conjectural variation assumptions. The strategy space (X, N) is abandoned because the Nash equilibrium requires the assumption, deemed unlikely by Scotchmer (1985, p. 27), that 'the other [clubs] will change their prices in whatever manner necessary to maintain the clientiele'.

The earlier profit-maximising club literature explored by Berglas (1976) and Wooders (1980) had assumed that there was an efficient size sharing group and the conclusion has been that provided entry forces profits to zero, a club equilibrium will be efficient. However, these firms are competitive in the sense of being a 'utility-taker', whereas Scotchmer (1985) departs from this in arguing that firms take as fixed the strategies of other firms. It is essentially a non-cooperative game and the equilibrium is cast as a Nash equilibrium. For members the utility available in other clubs will change as membership changes.

10.4 Multi-Product Clubs

A further area of research which was introduced in the wake of new material on contestability theory is the idea of a multi-product club, footnoted initially by Sandler and Tschirhart (1980, p. 1513). In particular, they had suggested a role for the concept of economies of scope defined simply as complementarity in production. Within the literature, however, some scholars have considered this issue already, although the joint products include a private good and an impure (or indeed pure) public good. Examples would include the Samuelson constraint and the Henry George Theorem. However, in the area of local government, where communities and cities share multiple club goods, this application may prove to be useful. Berglas and Pines (1978) did, however, present a multiproduct club model, but did not consider the concept of economies of scope.

The essence of this assumption in any industry-type analysis is that the two products cannot independently be provided at a cheaper cost than joint production. It is important to recall that the relationship in the club literature between the average cost curve and the number of clubs is related to the definition of a single product monopoly. The condition of sub-additivity in the cost function had already been used in the club literature by Pauly (1970a, p. 55) in his argument that 'club characteristic functions may be sub-additive'. The many variants to the economic analysis implicit in Buchanan's original model have advanced our understanding of club theory and have helped to incorporate club theory into the economic analysis of local public finance.

11. Concluding Comment

The economic theory of clubs represents an attempt to explain the under-supply equilibrium of a public goods provision. It raises many different and controversial issues which impinge on government policy in the public sector. In many respects, a club provision proffers an alternative to a central government provision of local public goods. The salient characteristic of a club, the excludability factor, may militate against an equal and democratic distribution of the club good. At the level of voluntary clubs, with which Buchanan was originally concerned, club theory can critically appraise the efforts at achieving optimal membership of the club and the maximum utility of club members.

Game-theoretic approaches to public goods provision may give scholars the latitude within which they could abandon the conventional postulate of individual utility maximisation and critically evaluate how rational behaviour can be encouraged in the individual for the voluntary provision of the public good. Arguably, it is in the arena of an interchange between club provision and an interest group provision of a local public good that the contestable issue of sub-additivity may arise. The externalities, both private and public, to a certain degree may discourage rational individuals from contributing more in order to attain a Paretian outcome.

If the literature identifies increasing problems with cooperation then it behoves law and economics scholars to adopt an approach which will research and develop non-market and/or non-cooperative solutions to an optimal provision of public goods. This approach will contribute positively to an evaluation of the economics of the provision of excludable club goods. The approach will also precipitate a much wider debate on the policy issues of local neighbourhood supply and provision of public services; it may also impact on the theory of public goods provision generally by focusing more on the (intra-interest group) economies of organisation *per se* in an attempt to explain the under-supply equilibrium of a public goods provision.

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Club goods (also artificially scarce goods) are a type of good in economics, sometimes classified as a subtype of public goods that are excludable but non-rivalrous, at least until reaching a point where congestion occurs. These goods are often provided by a natural monopoly. Club goods have artificial scarcity. Club theory is the area of economics that studies these goods.[1]. YouTube Encyclopedic. 1/1. Views: 34 085. âœª Club Goods. Transcription. â™ª [music] â™ª - [Prof. Alex Tabarrok] In the previous video we covered public goods, which are nonexcludable, and nonrival. Let's now turn to clu...