

A Dynamic Theory of Public Goods*

by
Bruno S. Frey

I. Market Supply and Political Supply of Public Goods

Samuelson's pathbreaking contribution to the theory of public goods¹ made it abundantly clear to the whole academic audience that *the market* is unable to bring about a *Pareto*-optimal supply of public goods. No rational individual would be ready to reveal its preference for the public good, except in special circumstances (see *Olson*², *Buchanan*³).

Against this stands the proof advanced in the "theory of political competition" (originally going back to *Schumpeter*⁴ and *Downs*⁵) that in the case of two parties, a *Pareto*-optimal equilibrium will be achieved. This relates to *all* goods supplied by the political mechanism, be they private or public (in *Samuelson's* definition). Even in this model of pure political competition (closely akin to the model of perfect economic competition; see *Shubik*⁶, *Frey*⁷), however, there is a major problem: In the case of three parties, no equilibrium exists at all and the model leads to unacceptable results in the case of four and more parties (*Selten*⁸). As the concept of political competition does not depend on the number of parties (equal to, or larger than, two), it must be questioned whether this model can be maintained at all.

* I am grateful to *K.W. Rothschild*, *G. Tullock*, *P. Bernholz*, *E. Baltensperger*, *K. Jaeger* and *R.L. Frey* for helpful comments on earlier drafts of this paper.

¹ *P.A. Samuelson*: The Pure Theory of Public Expenditure. "Review of Economics and Statistics," XXXVI (1954), 387-389.

² *M. Olson Jr.*: The Logic of Collective Action. (Cambridge, Mass.: Harvard University Press) 1965.

³ *J.M. Buchanan*: The Demand and Supply of Public Goods. (Chicago: Markham) 1968.

⁴ *J.A. Schumpeter*: Capitalism, Socialism and Democracy (New York: Harper) 1950.

⁵ *A. Downs*: An Economic Theory of Democracy. (New York: Harper) 1957.

⁶ *M. Shubik*: A Two Party System, General Equilibrium and the Voter's Paradox. "Zeitschrift für Nationalökonomie", XXIIX (1968), 341-354.

⁷ *B.S. Frey*: Models of Perfect Competition and Pure Democracy. "Kyklos," XXIII (1970), 736-755.

⁸ *R. Selten*: Anwendungen der Spieltheorie auf die politische Wissenschaft. In: *H. Maier, K. Ritter and V. Matz* (eds.): Politik und Wissenschaft. (Munich: Beck) 1971, 287-320.

The theory of public goods is thus in a most uncomfortable position: it is known for sure that the market is *not* efficient, but there is very little knowledge about whether the political system – not to speak of other social decision-making mechanism – can achieve *Pareto*-optimality.

This paper is concerned with the question of what happens when there is market failure and the political system (above all the government) steps in. This problem has recently received increasing interest by economists (see e. g. Arrow¹).

A simplified model is presented based on a combination of three realistic assumptions:

- (a) The supply of public goods is a time-consuming process, i. e. it cannot be brought about instantaneously.
- (b) The benefits of public goods are (or can be) completely separated from the contribution to the costs of its supply (non-exclusion principle). This separation becomes visible in its full extent only when viewed as a *process* of demand and supply.
- (c) The benefit from public goods cannot be measured objectively (problem of preference revelation).

It should be noted that the last two assumptions are part of the economist's description (or definition) of public goods²; no recourse is taken to psychological or sociological phenomena.

The results suggest that in a realistic model of the political system *there is no reason to expect a Pareto-optimal output of public goods*. The same result is thus reached as in the case of market supply. None of the two social decision-making mechanism considered guarantees efficiency. *It is not in general possible to theoretically deduce whether the actual "political" supply will be larger or smaller than optimal*. These results are in conflict with present theories. The model also shows that there are characteristic *waves or cycles of public goods demand and supply*.

The propositions derived from the model are used to explain the rise, peak, and fall of interest and action with respect to public goods such as aid to developing countries, economic growth, education and – now just passing its peak – environment. The "public goods"-aspect of economic growth e. g. lies in the fact that the increased capital stock brought about by a higher rate of investment benefits the future generation as a whole and therewith *all* members of the present generation caring for the future, irrespective of whether they themselves save or not (see Sen's "isolation paradox"³). The model can also be used to clarify the relationship between theory and observation of party competition and to give a reason for the apparent loss of importance of parties compared to interest groups.

¹ K. J. Arrow: The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Non-Market Allocation. In: R. H. Havemann and J. Margolis (eds.): Public Expenditure and Policy Analysis. (Chicago: Markham) 1970, 59–71.

² R. A. Musgrave: The Theory of Public Finance. (New York: McGraw-Hill) 1959.

³ A. K. Sen: On Optimizing the Rate of Saving, "Economic Journal," LXXI (1961), 479–495.

II. Basic Assumptions of the Model

For all economic goods (at least in Western economies) the following phases of demand and supply may usefully be distinguished:

1. Rise of disequilibrium,
2. Articulation of demand,
3. Reaction to demand,
4. Supply of the good.

It is contended that *these phases occur differently* in the case of *public goods* in contrast to *private goods*. The reason lies in the fact that the possibility of consumption is divorced from payment, i. e. from the contribution to the costs of supply of the public good, while in the latter case a good may only be used if the corresponding price (in perfect competition the marginal production cost) is paid. The cycle in private goods is usually almost invisible, though there are cases in which it can be observed: In Western Germany e. g. there was in the fifties successively a "wave" for food, clothing, housing, and traveling. The "public goods cycle" is on the other hand usually very marked and clearly visible.

Few, if any goods are purely private or public. However, due to market failures (especially externalities), a large number of goods are treated in the political process as if they were (purely) public, i. e. the exclusion principle is *not* applied.

As the model covers both the economic and political sphere, *four instead of the classic two* (households and firms) *decision-making bodies* are considered:

- (a) consumer-voters,
- (b) government,
- (c) (government) bureaucracy,
- (d) producers.

Each of these is assumed to aspire utility maximization which in the case of the government boils down to vote maximization, in the case of bureaucracy to the maximum increase of influence, prestige, and income which in turn are closely related to the size of the budget allocated (see *Niskanen*¹).

III. The phases of the "public goods cycle"

1. The rise of disequilibrium

A disequilibrium in consumption or – more generally – a dissatisfaction with the presently consumed bundle of goods may arise for a great many reasons: income may have risen, relative prices may have changed, new goods (or goods of better quality) may have been introduced or preferences may have shifted. Consumers then desire to adjust the structure and level of their consumption.

¹ *W. A. Niskanen, Jr.*: Bureaucracy and Representative Government. (Chicago: Aldine, Atherton) 1971.

With private goods, each consumer can turn to the market which (in general) will quickly respond to the increase in demand (and price) by inducing producers to supply more. With *public goods*, there exists no market in which these wants can be made visible. At best, there are substitutes for the services of the public good desired. However, these are mostly available to higher income groups and at (strongly) increasing costs only. If e.g. environmental quality deteriorates, relatively few families are able to move to untouched areas.

Not only consumers, but also producers feel the disequilibrium. Their production costs rise due to the lack of the public good, and the demand for those goods used in conjunction with public goods falls.

2. Articulation of Demand

To express their demand, consumer-voters and producers must turn to the *political system*. They must make it clear to the government that an increased supply of the public good concerned yields them large benefits and that a refusal to do so would cost it votes and endanger reelection.

It is the characteristic of this phase that

- (i) benefits are stressed while costs are neglected;
therefore
- (ii) there is practically unanimity on the desirability of supplying the public good;
and therefore
- (iii) there is an *over-demand* for the public good (compared to a situation in which marginal costs are considered). It may be called "political demand".

The reason for the over-demand thus lies in the neglect of costs. They are not relevant for any group *in this phase* because their distribution is yet undecided. Everyone hopes that the others will pay. Even if there are some expectations about the probable method of financing the public good, there are a great many possibilities open to shift the costs between individuals and groups. There is almost no theoretical and even less practical knowledge about the distribution of these future costs, especially if they are paid from general funds financed by ordinary taxes, credits or simply the printing of money. As the cost distribution is strongly affected by the general state of the economy (e.g. indirect taxes can be shifted more easily when there is full-employment), only the actual circumstances when costs have to be paid are relevant. An investment in information must at this stage appear wasteful.

Fig. 1 shows the situation in the context of *Samuelson's* analysis, for simplicity assuming that there exists only the public good concerned.

The pseudo-demand curve is given by the sum of marginal utilities over all individuals (and producers). The *Pareto-optimal* situation is given by X^* , where this sum equals marginal cost. If marginal cost is completely neglected in this phase 2, "political demand" will be at \bar{X} , if only part of the cost is perceived it will be at X' , both being *larger* than optimal.

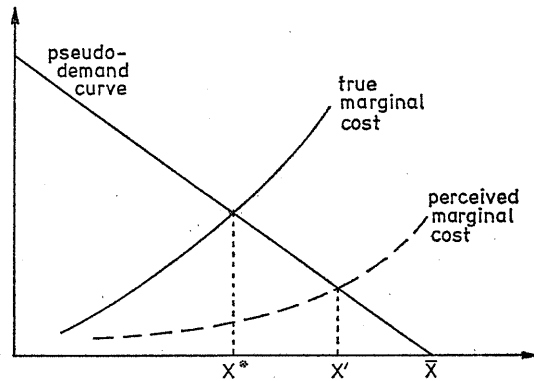


Fig. 1 Optimal (X^*) and political demand (\bar{X} or X') for a public good.

3. Reaction to demand

The demand exerted in the political sphere cannot be overlooked by the government especially as there is such a large amount of unanimity. However, the possibility cannot be excluded that due to lack of information, false expectations or simple mistakes in decision-making, the government does not react to demand. In that case it will lose votes and finally the opposition will take over with a program promising to increase the supply of the public good concerned.

The old or new government, committed to fulfil the political demand, is forced to become active. In view of its goal of vote maximization, it will undertake actions which

- (i) are clearly visible to the electorate,
- (ii) can be undertaken in short time.

These criteria can be met most easily at the *input-side* of the public goods policy. Thus plans, programs, and laws will be formulated and institutions will be founded. (E.g. following the "environmental wave", almost all countries have created ministries for environment.) Another somewhat less worthwhile action consists in the erection of buildings (e.g. universities in the case of the "educational wave"). The prime concern of the government thus does not lie with the *output-side* of the public goods policy, i.e. with actual supply, because that side is difficult to measure and takes considerable time to implement.

4. Supply of the public good

The activities of the government leads to costs which slowly are felt by the electorate. This reverses completely the political situation: in this phase, the *costs of providing public goods are dominating, while benefits are neglected.*

The reason lies again in the defining characteristic of a public good: The (expected) benefits can be enjoyed by everyone regardless of the contribution

to costs. Every individual and group in the society thus attempts to shift the costs upon someone else, even if his *net* benefit from the provision is positive. Everyone tries to evade contributing to costs by pretending that he benefits only little from the public good (which is possible as there is no objective measurement). The opposition against costs also involves a fall in political demand.

At this stage, *conflicts within groups* become apparent. The problem of the *distribution of benefits* will be raised; some sections of consumer-voters realize that they benefit comparatively little from the public good. (There are e.g. reasons to suppose that the higher income groups derive relatively more benefit from an improved environment; see *Baumol*¹).

For producers, the decisive moment has come to make their influence felt. They will use their *pressure groups* in order to have imposed as little cost as possible and will point to the negative effects (especially price rises and sectoral unemployment) if they are forced to pay what *they* themselves consider an unfair share. They will advocate those means of financing which shift costs to the general public.

The government notices clearly that as soon as it comes to costs, the unanimous support of the public goods policy rapidly vanishes and even turns into the opposite. To keep in power it will adopt a strategy in which

- (i) (partial) successes of its public goods policy are stressed;
- (ii) politically well organized and specific interest groups are effectively excluded from the contribution to costs. The government thus trades in many (separate) instances a loss of efficiency in the supply of the public good felt only vaguely by the general electorate against the support of intensely felt special interests.

The government's strategy obviously leads to a decreased supply of public goods compared to initial "political" demand and corresponding plans. There are no forces, however, which drive the politico-economic system to the *Pareto-equilibrium* as *net benefits* (i.e. gross benefits less costs) are in no phase articulated. Keeping to the assumption of the model, it is, moreover, not possible to say whether actual supply will be *larger* or *smaller than optimal*. This contradicts theories applicable to the "political" supply of public goods. These maintain that the supply is either *too large* (*Buchanan* and *Tullock*², *Davies* and *Meyer*³), *too small* (*Downs*⁴) or just *optimal* (*Shubik*⁵, *Hinich* and *Ordeshook*⁶).

¹ *W.J. Baumol*: Environmental Protection and the Distribution of Income. In: "Problems in the Economics of Environment." (Paris: OECD) 1972, 75-81.

² *J.M. Buchanan* and *G. Tullock*: The Calculus of Consent. (Ann Arbor: University of Michigan Press) 1962.

³ *J.R. Davies* and *Ch. W. Meyer*: Budget Size in Democracy. "Southern Economic Journal," XXXVI (1969), 10-17.

⁴ *A. Downs*: Why the Government Budget is too Small in a Democracy. "World Politics," XII (1960), 541-563.

⁵ *M. Shubik*, op. cit.

⁶ *M.J. Hinich* and *P.C. Ordeshook*: Social Welfare and Electoral Competition. "Public Choice," XI (1971), 73-88.

With phase 4, the cycle for a specific public good ends for the time being. Even if the actual supply is smaller than *Pareto*-optimal, a further expansion is blocked due to the reasons outlined. Only if the real forces in the economy lead over time to a further increase in demand, the disequilibrium may get so marked that a further wave is started. In general, however, the subsequent cycle will consist in a different type of public good.

IV. Some Applications

1. Post-War Cycles in Public Goods.

The phases developed do not necessarily follow each other in a *time sequence* (they can be mixed and intersect); they are rather thought to be general "*patterns*". What matters is that *testable propositions* can be derived, and the following empirical hints should serve as indications in what areas such empirical tests might be undertaken.

The *hypotheses* advanced from the "*patterns*" can be *falsified*, if one finds empirical evidence of the following kind:

1. If in a situation of public goods shortage, there exist substitution possibilities in private markets, there is nevertheless *considerable* political demand, however measured. (See phase 1).
2. When the costs of government action arises, there is *no opposition* against the public good provision in the sense that there is *no* intensified struggle about the distribution of costs. (See phase 4.)
3. The interest in public goods provision *stops even if the economic cost is not yet felt* or immediately impending. (See phase 4.) If this is found to be empirically true, the end of a "*wave*" may e.g. be explained by a psychological effect, namely that people get tired to hear about the same problem for too long.

Since World War II, several "*waves*" can be identified in advanced Western countries: aid to developing countries, economic growth, education, and environment (and in the near future possibly internal security). In all these cases the exclusion principle is not applicable, at least not for important aspects. The aid to poor countries given by relatively few countries benefits e.g. (if at all) the whole rich hemisphere and an increase in the quality of environment brought about by the cost contributions of some consumer-voters and groups benefits the whole community. It could also be said that there are strong externalities which are closely related to the public goods concept (see *Mishan*¹).

These "*waves*" of "*goods*" have quite a different content but all of them show characteristic phases of rise, peak, and fall of "*political*" demand. While *outputs* are difficult to measure at least in the case of aid to developing

¹ *E.J. Mishan*: The Postwar Literature on Externalities: An Interpretative Essay. "Journal of Economic Literature," IX (1971), 1-28.

countries, *the input* (measured by the percentage of GNP given by the donor countries) has decreased (*Abbot*¹).

The environmental "wave" now probably at its peak, is predicted to end by *Downs*² who relies, however, on a psychological mechanism, namely that people get bored if the same subject is repeated too often for too long time. The model developed here predicts the same as the costs of environmental policies undertaken now will surely soon be felt. The two theories are, of course, not inconsistent, as constant repetition of a theme is usually accompanied by actions causing costs. The theories are, however, quite different, because (i) *Downs*' psychological mechanism is not restricted to public goods, and (ii) according to our model based on "economic" assumptions only one would expect a "wave" to continue as long as little or no costs (in the sense of a fall of real income of decision-makers) are incurred. (A model including "boredom" as cost argument in the utility function would not allow the falsification of hypotheses as there is little chance to measure it independently.)

2. Theory and observation of party competition

It is often observed that parties have similar programs and also act almost alike when in power. The theory of political competition with two parties is said to correspond well to reality because in equilibrium the same programs are offered (see e.g. *Tullock*³). The model developed here shows, however, that:

- (i) The similarity of party programs and actions applies only to *some issues*, namely those "goods" with strong public good (and/or externality) characteristics. Thus, parties diverge e.g. in issues dominated by distributional considerations.
- (ii) The similarity only applies to the *beginning phases* of a public goods cycle.

Both (i) and (ii) hold irrespective of the member of parties involved, and party programs and actions *diverge* for other issues and phases. Hence, if (i) together with (ii) is observed, it cannot be taken as supporting evidence for two party competition models.

3. Importance of parties and of pressure groups.

Pressure groups are often said to rise in importance relative to parties for public economic decisions in the last few decades (see e.g. *Seasholes*⁴). This

¹ *G. C. Abbot*: Economic Aid as a Unilateral Transfer of Resources. "Journal of Political Economy," LXXVIII (1970), p. 1226.

² *A. Downs*: Up and Down with Ecology. "Public Interest," XXIIX (1972), 38-50.

³ *G. Tullock*: Towards a Mathematic of Politics (Ann Arbor: The University of Michigan Press) 1967, p. 50.

⁴ *B. Seasholes*: Voting, Interest Groups, and Parties (Glenview, Ill.: Scott, Foresman) 1966, p. 47.

may be explained with the model developed accepted that goods with a "public" character or strong externalities increased in the same period (for the problems and results of measurement see *Pryor*¹ and *Musgrave*²): in the early phases of the public goods cycle, there is quasi-unanimity in the population, hence no party has a possibility to win votes by taking a position different from the others, i. e. the "competitive" function is lost. In the fourth phase of the cycle, on the other hand, differentiation is possible, but at this stage in which the conflict between all the groups becomes evident, specialized pressure groups are better equipped to fight for the partial interests then relevant.

It needs no saying that reality is vastly more complex than the model developed, e. g. the phases overlap and there may at the same time be various cycles in an economy. The intention was to show how much insight can be gained by sticking to the three simple "economic" assumptions.

¹ *F. L. Pryor*: Public Expenditure in Communist and Capitalist Nations. (Homewood, Ill.: Irwin) 1968.

² *R. A. Musgrave*: Fiscal Systems. (New Haven: Yale University Press) 1969.

