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Procedurally Fair Provision of Public Projects

An axiomatic characterization

Werner Güth und Hartmut Kliemt

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Abstract (82 words) [1]

Unanimous voting as the fundamental procedural source of political legitimacy grants veto power to each individual. We present an axiomatic characterization of a class of bidding processes to spell out the underlying egalitarian values for collective projects of a "productive state". At heart of such procedures is the determination of payments for all possible bid vectors such that equal "profits" according to bids emerge. Along with other intuitive requirements this characterizes procedurally fair bidding rules for advantageous projects of a collectivity.

JEL Classification: H4, H61, D62, D63, D71

Key words: Unanimity in Collective Decision Making, Buchanan, Wicksell

[1] James M. Buchanan pointed out that "egalitarian procedural contractarianism" might better characterize basic values underlying his position than "contractarian procedual egalitarianism" since ascribing to him substantive instead of procedural egalitarianism would be mistaken. Geoffrey Brennan made helpful suggestions to enhance clarity and readability. Richard Wagner sent us some extended and inspiring comments on the underlying philosophical views about club as opposed to communitarian contractarianism. We are very grateful for all comments. Of course, the conventional disclaimer applies.

1. Introduction

Unanimous voting in a predetermined collectivity of a fixed number of bearers of veto rights is opposed to individualist agreement of a self-select arbitrary number of individuals. In the latter construction of *club-contractarianism* individuals can freely associate to pursue some project or other. Membership in the relevant group is endogenous to the conceptual construction of the contract. Those who agree to act can do so and act without granting a veto to those left out. As opposed to this in *communitarian-contractarianism* membership in the moral community is exogenously determined. It is the foundation for certain veto rights that are themselves not subject to contract and agreement.

It seems obvious to us that the type of contractarianism popular in Public Choice and Constitutional Political Economy is communitarian due to its focus on unanimous decision-making in a pre-defined collectivity (see Buchanan and Tullock 1962, Buchanan 1975). The most prominent case in point is, of course, Buchanan's approach to politics. First, Buchanan believes that it is necessary and sufficient for the normative acceptability of collective decisions that they are based on the agreement of all individual members of a moral community or "polity" ((Kantian) *contractarianism*). Second, since beyond agreement of the members of the "polity" there is no moral standard of right and wrong, criteria of acceptability are procedural rather than substantial (*proceduralism*). Third, all members of the moral community are to be treated as political and legal equals or citizens of the polity (*egalitarianism*) and therefore have equal political rights to veto collective decisions.

To spell out explicitly the implications of *communitarian procedural egalitarianism* (or "cpe") for public projects we use simple axioms to characterize schemes of collective decision making that conjoin (in the spirit of Wicksell 1896/1996) the selection and financing of collective projects. Bidding procedures determine for all bid vectors a "set of projects" and the payments of contributions or compensations assuring unanimous agreement for the implementation of the set of projects. A non-empty set amounts – according to bids – to a Pareto improving change of some implied status quo that is maintained when the project set is empty.

The axioms introduced next characterize specific bidding and compensation cum contribution schemes independently of their truth revealing or incentive properties.

2. Basic model of bidding for a collective measure

Let $i = 1, 2, \dots, n\ (\geq 2)$ denote individuals who are all members of the exogenously fixed community I of participants in a collective decision. The decision is to be binding on all members of I. Assume that the members of the community I participate in the selection of a non-empty subset S of projects from a finite non-empty set of possible projects $\Omega = \{a, b, c, \dots\}; S \neq \emptyset, S \subseteq \Omega, |\Omega| < \infty$.

For each non-empty $S, \emptyset \neq S \subseteq \Omega$, the members of I are assumed to bid $b_i(S) \in \mathbb{R}$. The bid b_i of individual $i \in I$ is a list of the form

$$b_i = (b_i(S) \in \mathbb{R}: \emptyset \neq S \subseteq \Omega).$$

The vector of all such individual bids – the "bid vector" – is accordingly

$$b := (b_1, b_2, \dots, b_n).$$

The following may seem akin to familiar discussions of demand revealing mechanisms in Public Choice (see for "the" overview Mueller 2003). Note however, that in the setting envisioned here everything is described in objective terms, in particular monetary units. Nothing is said about the subjective perceptions, "true" evaluations and preferences. We restrict ourselves to dealing with *game forms rather than games proper*.

This seems adequate since constitutional analysis should focus on constitutions and these are basically game forms. So, for the time being, we shall not enter game theory proper but rather stick to game form analysis and express *cpe*-values concerning such game forms in objective terms by three axioms. In any event, individuals who are involved in a real world procedure -- except for their own private information -- can observe only what can be described in objective terms.

3. Axioms and derivation of rules

The bids $b_i = (b_i(S) \in \mathbb{R}: \emptyset \subset S \subseteq \Omega)$, $i = 1, 2, \dots, n$, are observable in overt behavior. These stated values rather than some subjective private values form the relevant value information for participants in the interaction. All further considerations are "wrb" or "with respect to bids". Let:

$S^* = S^*(b) \subseteq \Omega$, chosen set S^* of projects according to the bid vector b, and

$\forall S, \emptyset \neq S \subseteq \Omega$: $C(S)$, "costs" of the project *S*, *wolg* $C(S) \in \mathbb{R}, C(\emptyset) = 0$,[2]

$\forall b$: $(C(S^*(b)))$, "costs" if according to the bid b vector the set of projects $S^*(b)$ is implemented,

$\forall i \in I$: $c_i(S^*(b), b)$, individual compensation/costs in case of implementing $S^*(b)$

With these preliminary definitions in mind, consider the three axioms for an arbitrary bid vector $b \in \mathbb{R}^n$:

Axiom *P*(rofitability and efficiency wrb):

(a) $If\ \forall S, \emptyset \neq S \subseteq \Omega$: $\sum_{i=1}^{n} b_i(S) < C(S)$
then $S^*(b) = \emptyset$ and $\forall i \in I : c_i(S^*(b), b) = 0$

(b) otherwise $S^*(b)$ with $\sum_{i=1}^{n} b_i\left(S^*(b)\right) \geq C(S^*(b))$ and
$\sum_{i=1}^{n} b_i\left(S^*(b)\right) - C\left(S^*(b)\right) \geq \sum_{i=1}^{n} b_i(S) - C(S)$ for all $S, \emptyset \neq S \subseteq \Omega$
is implemented.

In cases in which the ("external") costs of no non-empty set of projects would be covered by the sum of bids no project will be implemented ($S^*(b) = \emptyset$) and no payments are made ($\forall i \in I : c_i(S^*(b)) = 0$). Otherwise the non-empty set of chosen projects $S^*(b) \neq \emptyset$ is not dominated by a – wrb — "more profitable" set.

Axiom *C*(ost balancing wrb):

If $S^*(b) \neq \emptyset$ then $\sum_{i=1}^{n} c_i(S^*(b), b) = C(S^*(b))$

In case $S^*(b) \neq \emptyset$ the sum of the payments must cover the external cost. We could also speak of a balanced budget requirement (forming a necessary condition of collective action).

Axiom *E*(galitarian symmetry wrb -- see Güth, 2010):

If $S^*(b) \neq \emptyset$ then $\left[\forall i, j \in I: b_i\left(S^*(b)\right) - c_i\left(S^*(b)\right) = b_j\left(S^*(b)\right) - c_j\left(S^*(b)\right)\right]$

[2] External "costs" can be negative if a public project yields positive revenue as for instance in case of exploiting natural resources or making some other gain by the project. Note also, that even then it may be necessary to compensate those who are opposing the project.

According to bids all individuals profit equally from the implementation of a set of projects $S^*(b) \neq \emptyset$. All have equal veto power since arbitrary low bids may be submitted to veto any project. Implicitly $S^*(b) = \emptyset$ amounts to maintaining of the status quo. The latter may be egalitarian or inegalitarian. The egalitarian symmetry wrb is imposed only on changes to the status quo brought about by collective action (eg. politics of the "productive state").

For an arbitrary vector $b = (b_1, b_2, \dots, b_n) \in \mathbb{R}^n$ axioms E, C, P *imply*:

(a) If $\forall S, \emptyset \subset S \subseteq \Omega$: $\sum_{i=1}^n b_i(S) < C(S)$ then $S^*(b) = \emptyset$ and $c_i(S^*(b), b) = 0, i = 1, 2, \dots, n$.

(b) If $S^*(b) \neq \emptyset$ then

$\forall S, \emptyset \neq S \subseteq \Omega$: $\sum_{i=1}^n b_i\big(S^*(b)\big) - C(S^*(b)) \geq \sum_{i=1}^n b_i(S) - C(S)$ with

(ba) compensation payments

$c_j(S^*(b), b) = b_j\big(S^*(b)\big) - \frac{\sum_{i=1}^n b_i\big(S^*(b)\big) - C(S^*(b), b)}{n}, j = 1, 2, \dots, n$ satisfying

(bb) $c_j(S^*(b), b) \leq b_j\big(S^*(b)\big), j = 1, 2, \dots, n$

Proof:

Axiom *E* allows to set $\Delta := b_i\big(S^*(b)\big) - c_i(S^*(b), b)$.

Aggregating over *i* we get $\sum_{i=1}^n b_i\big(S^*(b)\big) = \sum_{i=1}^n c_i(S^*(b), b) + n\Delta$

Axiom *C* for $S^*(b) \neq \emptyset$ yields

$\sum_{i=1}^n b_i\big(S^*(b)\big) = C(S^*(b)) + n\Delta$

which is equivalent to $\Delta = \frac{\sum_{i=1}^n b_i\big(S^*(b)\big) - C(S^*(b))}{n}$

Axiom P implies $\Delta \geq 0$

This yields $\frac{\sum_{i=1}^n b_i\big(S^*(b)\big) - C(S^*(b))}{n} = b_j\big(S^*(b)\big) - c_j(S^*(b), b) \geq 0$ and thus

$c_j(S^*(b), b) \leq b_j\big(S^*(b)\big), j = 1, 2, \dots, n$; nobody "pays" more than his bid.

Those individuals i who submit $b_i(S) < 0$ for some *S* will – should that *S* become the chosen $S^*(b)$ – get compensated according to their demand, i.e. "negative bid". We assume that individuals after the bidding took place will be forced ("taxed", if you will) to pay according

to these rules. However, since they are free to bid as low as they like, they can always see to it that a project will not be implemented (i.e. veto it).

Under certain provisions it would be possible that individuals are required to post a kind of hostage before participating in bidding as envisioned here. So, if $S^*(b) \neq \emptyset$ will be implemented, they will have already made the "down payment" of what they will have to pay in case the project will be implemented. A credible institutional commitment not to abuse the "down payments" but rather to pay them back if no project is realized would be necessary then.

4. Numerical illustration

Let there be a chosen project $S^*(b)$ and five individuals i=1,…,5 who all bid $b_i\big(S^*(b)\big) = 25$ and five individuals i=6-10 who all bid $b_i\big(S^*(b)\big) = -10$. Moreover, let $C(S^*(b)) = 25$.

The costs must be covered by the bids:

$\sum_{i=1}^{10} b_i\big(S^*(b)\big) = 125 - 50 = 75 > 25 = C(S^*(b))$ so that $\Delta = \frac{50}{10} = 5$.

The contribution-compensation-payments are fixed such that all profit equally:

i=1,…,5 must contribute $c_i(S^*(b), b) := 20$ and i=6,…,10 are compensated by $c_i(S^*(b), b) := -15$

what implies for i=1,…,5 that $b_i\big(S^*(b)\big) - c_i(S^*(b), b) = 25 - 20 = 5$

and for i=6,…,10 that $b_i\big(S^*(b)\big) - c_i(S^*(b), b) = -10 - (-15) = 5$.

In all, we can see that for a group of ten with the assumed numerical values we can fulfill the requirements of profitability, cost-balancing and equal gains. This seems so simple that participants of real world interactions of the type – in the field as well as in the laboratory – will have a rather clear grasp of what is going on in such decision processes.

5. Concluding discussion

5.1 Formal aspects

The preceding argument may have reminded some readers of Mark Twain's "Life on the Mississippi" (chap 17) where he said that

> "(i)n the space of one hundred and seventy-six years the Lower Mississippi has shortened itself two hundred and forty-two miles. That is an average of a trifle over one mile and a third per year. Therefore, any calm person, who is not blind or idiotic, can see … that seven hundred and forty-two years from now the Lower Mississippi will be only a mile and three-quarters long, and Cairo and New Orleans will have joined their streets together, and be plodding comfortably along under a single mayor and a mutual board of aldermen. There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact."

Though we like this passage we have not been aspiring to derive "wholesome returns" by a "trifling investment". If there is an irony in our argument it is, in a way, quite the opposite: The axioms assume so much that they directly rather than by more indirect logical conjecture imply the conclusions. In the case at hand this is not a serious flaw since the axioms were introduced for the sake of explicating (in the sense of Carnap 1956) pre-analytical concepts. The axioms spell out explicitly in a different and, as we believe, more precise and instructive way what have implicitly been *widely accepted cpe value premises in liberal policy analysis*.

The analysis was in objective terms, in particular monetary units. Nothing has been said about the subjective perceptions and evaluations. We have been dealing with game forms rather than games. After all, constitutions are game forms rather than games so this seems substantively adequate.

5.2 Substantive aspects

Recall that to get to the conclusions derived here, the moral community forming the relevant polity must not be conceptualized as a club to which individual members could be admitted or excluded by contract. Contrary to what Buchanan sometimes and most of his followers most of the time seem to assume, the status of a member of the polity is not to be conceived as endogenous to a first social contract (see Kliemt 1994). Who counts as an individual to be respected by all collective decisions must be exogenously given by a *moral criterion*: In Kantian (communitarian) contractarianism membership in the moral community cannot itself be determined by agreement.

Unless some fundamental value of mutual respect is accepted any group of individuals could legitimately try to impose its will on others as an externality without seeking agreement.[3]

[3] In Kant's original case this would be the community of all rational beings. In the case at hand one may think of a productive state with compulsory membership. Due to compulsory membership and the power to tax it

Buchanan rejects this by endorsing the unanimity rule as expressing his contractarian procedural egalitarianism (cpe).[4] His ideals of pursuing "politics as exchange" fit in here, too. Agreement-seeking by compensations for externalities rather than imposition of collective decisions is the aim of legitimate public choice in the Buchanan-Wicksell-framework.

Using the proposed scheme to raise positive taxes and to pay compensations will not eliminate the notorious "hold out" problem as emergent under the unanimity requirement. We believe, however, that implementing unanimity requirements via rules of bidding as proposed, "hold outs" would be less likely than without such a scheme. Though unstructured negotiation in a group under the proviso that collective action can be taken only after all are agreed might also often lead to agreements, "structured egalitarian bidding" – with the compensation scheme in place – may have so strong "procedural charms" that consent will emerge more frequently if it is implemented.

This might be scrutinized by means of "test-bed" laboratory experiments. Suppose that participants of an experiment must reach unanimous agreement on collective projects under rules that conform with the axioms P, E, C. They are informed beforehand that certain bidding procedures under which they may choose to interact fulfill an egalitarian norm like *E* and the cpe values. As compared to unstructured negotiations this should have two effects: first, individuals who are offered the option to choose structured bidding (with compensations as proposed here) should prefer it rather than unstructured negotiations and second, more projects should be realized in view of the fairness-expectations. These will all amount to Pareto improvements according to overt behavior or bids.

Will it work – beyond the imagined and conceptual – in the real world? In all likelihood a scheme like the preceding will work as a real world institution only in relatively small groups. In the conceptual world of ideals it does work as a tool of clarification without such restrictions.

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can go beyond what individuals can do by organizing "clubs". In line with the Wicksellian ideals of Buchanan this productive state – though having the power to tax -- is ideally restricted to "politics as exchange".

[4] Contractarian respect for the separateness of persons is represented by the requirement of unanimous agreement. Voting is clearly a procedure. Granting the same veto to each and every individual member of the polity expresses egalitarian values.

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