THEoretical Studies on IncentiveS 2007-2008

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Today

Bierbrauer, F. (2007),
Optimal Income Taxation and Public Good Provision with Endogenous Interest Groups,
Mimeo, Max Planck Institute for Research on Collective Goods, Bonn.

Literature Review

Public Good literature (Martimort et al J E Surveys 05)

- Second Best Environment : Free riding issue
- Finite number of agents (small economy) : Strategic interaction between players which impact the decision and quantities of public good provision (Ledyard Palfrey Em 99)

Taxation literature

- Taxation Principle (Guesnerie 95): an optimal income tax is an optimal screening mechanism
- Taxation Principle requires Large economy

Aim of the paper

Design a Public good provision and Optimal Income tax schedule in a large economy with two dimension heterogenous agents

In this paper Large economy = no single individual has an impact on the tax system or the decision to provide or not the public good

Design an Optimal Public Good Provision

An indiv. cannot impact the public good provision but a coalition of indiv. can
$\Longrightarrow$ Free rider Problem

Design the Optimal Income Tax Schedule

Efficiency and *Equity* trade-off

The Environment

- Agents heterogeneous in 2 dimensions: Public good taste and Productivity parameter
- Agents report on their public good preference do not impact the public good provision (large economy) individually but they can collectively (collusion)
- Agents labor productivity impact the level of tax paid
- Aggregate uncertainty about public good tastes distribution

The Approach

- Mechanism Design approach to the characterization of an optimal rule for income taxation and public good provision
- Collusion-proof mechanism (Laffont Martimort Em 97, 00)

Conflict

Taxes raised for (i) Direct income transfers (ii) Public good finance
High skilled workers do not benefit of income transfers but always benefit of a public good provision (even if they have a low taste for it)
$\Rightarrow$ High skilled workers could form a coalition and favor the public good provision even in states of nature where it should not be produced

Intuition of the Results

- Make the Public good Provision less attractive in some states for the high skilled agents
- Make the Public good provision more attractive in some states for the low skilled agents

The Model

- Continuum of individuals and preferences of individual j

$$\theta^j Q + u(C) - v(\frac{Y}{w^j})$$

  Separable preferences: public good taste no impact on the consumption leisure trade-off and cannot be used as a screening device
- $Q \in \{0, 1\}$ public project
- θ^j public good taste parameter
- C consumption of private goods
- Y agent's contribution to the economy's output
- w^j productivity parameter (wage rate)
- $L = \frac{Y}{w^j}$ number of hours worked
- u(.) and v(.) are strictly increasing and twice continuously differentiable

- (w^j, θ^j) characteristics of individual j (private information)
- These characteristics realization of a random variable $(\tilde{w}^j, \tilde{\theta}^j)$
- Productivity parameter $\tilde{w}^j$ takes the values w_1 and w_2, $w_2 > w_1$, with probability $\frac{1}{2}$

Information Aggregation Problem

The distribution of public goods preferences among high and low-skilled individuals a priori unknown

- $\widetilde{\theta}^j \in \{\theta_L, \theta_H\}$, $\theta_L < \theta_H$, correlated with $\widetilde{w}^j$ and $\widetilde{s}$ (state of the economy)

- $\widetilde{s}$ takes four possible values, s_{LL}, s_{LH}, s_{HL} and s_{HH} and affects the probability of $\theta^j = \theta_H$ conditional on $\widetilde{w}_j$

	s_{LL}	s_{LH}	s_{HL}	s_{HH}
$\rho_1(s_{xy})$	α_1	α_1	β_1	β_1
$\rho_2(s_{xy})$	α_2	β_2	α_2	β_2

$\rho_t(s_{xy}) := prob(\widetilde{\theta}^j = \theta_H | \widetilde{w}^j = w_t, \widetilde{s} = s_{xy})$, for $t \in \{1, 2\}$
(x refers to the low skilled and y to the high skilled)

- Assume $\alpha_1 < \beta_1$ and $\alpha_2 < \beta_2$
- LLN $\Rightarrow$ conditional probabilities interpreted as the fraction of low-skilled and high-skilled individuals, respectively, who have a high taste parameter

Definition: Social Choice Function (SCF)

A SCF specifies for each state s a public good provision level $Q(s)$, a consumption level $C(w, \theta, s)$ and an output requirement $Y(w, \theta, s)$, for each (w, θ) in the set of characteristics $\Gamma := \{\theta_L, \theta_H\} \times \{w_1, w_2\}$.

Anonymous Allocation Mechanism

Attention is limited to SCFs that can be reached via an anonymous allocation mechanism.

Revelation Principle (Bierbrauer 2007)

No loss of generality to limit attention to direct mechanisms, i.e. to mechanism where an individual message consists of an announced taste parameter and an announced productivity level.

Definition

A SCF can be reached by a direct mechanism if and only if it is individually ex post IC and feasible = Admissible SCF

Ex post perspective $\Leftrightarrow$ after the resolution of uncertainty about s

- Feasibility: $\forall s$, aggregate consumption including the cost of public good provision must not fall short of aggregate production

$$\frac{1}{2}\sum_{t=1}^{2}(1-\rho_t(s))Y(w_t,\theta_L,s)+\rho_t(s)Y(w_t,\theta_H,s)\geq$$

$$kQ(s)+\frac{1}{2}\sum_{t=1}^{2}(1-\rho_t(s))C(w_t,\theta_L,s)+\rho_t(s)C(w_t,\theta_H,s)$$

  k = aggregate resource requirement of public good provision
- Ex post Individual IC: for every (w,θ) and every $(\hat{w},\hat{\theta})$

$$u(C(w,\theta,s))-v(\frac{Y(w,\theta,s)}{w})\geq u(C(\hat{w},\hat{\theta},s))-v(\frac{Y(\hat{w},\hat{\theta},s)}{w})$$

Taxation Principle (Hammond (1979), Guesnerie (1995))

- An allocation can be reached using an income tax if there exists a function $T : \mathbb{R}_+ \times S \rightarrow \mathbb{R}$ such that, in every state s, an individual's consumption-income pair solves

$$\max u(C) - v(\tfrac{Y}{w}) \text{ s.t. } C = Y - T(Y,s)$$

  and aggregate tax revenues are no less than the cost of public good provision.

The Taxation Principle states that an allocation is admissible if and only if it is decentralizable by means of an income tax.

- Then, Ex post IC $\Leftrightarrow$ that individuals know the tax system that relates pre-tax and after-tax income when confronted with a consumption-leisure trade-off.

SCF chosen in order to maximize expected utilitarian welfare

$$EW := \pi_{LL}W(s_{LL}) + \pi_{LH}W(s_{LH}) + \pi_{HL}W(s_{HL}) + \pi_{HH}W(s_{HH})$$

where W(s) denotes welfare in state s, and the mechanism designer's prior beliefs

$$\pi_{LL} := prob(\widetilde{s} = s_{LL})$$

$$\pi_{LH} := prob(\widetilde{s} = s_{LH})$$

...

Lemma 1 simplifies the mechanism design problem:

Lemma 1

A SCF is admissible if and only if, in every state s, the following two properties hold:

* Equal treatment of tastes: $\forall w_t$ and every pair of taste parameters θ and θ'

$$u(C(w_t,\theta_L,s) - v(\frac{Y(w_t,\theta_L,s)}{w_t}) = u(C(w_t,\theta_H,s) - v(\frac{Y(w_t,\theta_H,s)}{w_t})$$

* Revelation of skill levels: $\forall\theta$ and every pair of productivity levels w_t and $w_{t'}$

$$u(C(w_t,\theta,s)) - v(\frac{Y(w_t,\theta,s)}{w_t}) \geq u(C(w_{t'},\theta,s)) - v(\frac{Y(w_{t'},\theta,s)}{w_t})$$

- The provision rule for the public good $Q(.)$ does not affect individual incentives
  $\Rightarrow$ the allocation of private goods design such that individual with characteristics (w_t, θ_L) is indifferent between $(C(w_t, \theta_L, s), Y(w_t, \theta_L, s))$ and $(C(w_t, \theta_H, s), Y(w_t, \theta_H, s))$ then wlg assume

$$(C(w_t, \theta, s), Y(w_t, \theta, s)) = (C(w_t, \theta', s), Y(w_t, \theta', s))$$

- Notation:
  $(C_t(s), Y_t(s))$ instead of $(C(w_t, \theta_L, s), Y(w_t, \theta_L, s))$ and $(C(w_t, \theta_H, s), Y(w_t, \theta_H, s))$

- Utilitarian welfare in state s becomes

$$W(s) := \overline{\theta}(s)Q(s) + \frac{1}{2}\sum_{t=1}^{2}[u(C_t(s)) - v(\frac{Y_t(s)}{w_t})]$$

where $\overline{\theta}(s) := \frac{1}{2}\sum_{t=1}^{2}(1-\rho_t(s))\theta_L + \rho_t(s)\theta_H$ average of all individual taste parameters in state s.

- Feasibility constraint written as

$$\frac{1}{2}Y_1(s) + \frac{1}{2}Y_2(s) \geq kQ(s) + \frac{1}{2}C_1(s) + \frac{1}{2}C_2(s)$$

- (IC) for all t and t', $t \neq t'$,

$$u(C_t(s)) - v(\frac{Y_t(s)}{w_t}) \geq u(C_{t'}(s)) - v(\frac{Y_{t'}(s)}{w_t})$$

Benchmark: Optimal admissible social choice functions

Hypothesis

The distribution of preferences for the public good among high-skilled and low-skilled individuals observable by a policymaker
$\Rightarrow$ The state of the economy s treated as known

- Individuals have private information on their earning abilities
- Problem: choose $Q(s), Y_1(s), C_1(s), Y_2(s), C_2(s)_{s\in\{S\}}$ in order to max EW s.t. feasibility constraints and ICs.

- At an optimal allocation, the total utility realized by an individual j with productivity w_t in state s can be written

$$\theta_j Q(s) + U_t(kQ(s))$$

$C_t(s)$ and $Y_t(s)$ depend only on the revenue requirement $kQ(s)$ in state s ($\Leftrightarrow$ If two states s and s' such that $Q(s) = Q(s')$ then $\forall t$, $C_t(s) = C_t(s')$ and $Y_t(s) = Y_t(s')$)

- The optimal provision rule: provide the public good whenever the average utility gain from public good provision exceeds the average utility loss that results from the increase in the revenue requirement

$$Q(s) = 1 \Leftrightarrow \overline{\theta}(s) \geq \frac{1}{2} \sum_{t=1}^{2} U_t(0) - U_t(k)$$

This provision rule depends on the parameter values $\theta_L, \theta_H, \alpha_1, \beta_1, \alpha_2$ and β_2.
Restriction on parameter:

Assumption 1

The optimal provision rule, $Q^*(.)$, requires to provide the public good in all states except s_{LL}:

$$\min\{\overline{\theta}(s_{LH}), \overline{\theta}(s_{HL})\} \geq \frac{1}{2}\sum_{t=1}^{2} U_t(0) - U_t(k) \geq \overline{\theta}(s_{LL})$$

Assumption 2

The function $v(.)$ satisfies $\forall x \geq 0$:

$$\frac{1}{w_1^2}v''(\frac{x}{w_1}) \geq \frac{1}{w_2^2}v''(\frac{x}{w_2})$$

Proposition 1

Suppose Assumption 2 holds. Then:

$$U_1(0) - U_1(k) > U_2(0) - U_2(k) > 0$$

Interpretation:

- Concavity of u $\Rightarrow$ utilitarian planner would love to give all individuals the same consumption
- He wants the more productive individuals to work harder
  $\Rightarrow$ impossible IC problem prevents the planner from extracting larger tax payments from the more productive (skill private info.)
  $\Rightarrow$ Whenever resources for the public good are needed, higher taxes for the "rich" are not incentive feasible, unless the taxes of the "poor" have been increased already
  $\hookrightarrow$ Public good provision is more harmful for less productive individuals

Under Prop. 1 and H1: 3 possible scenarios

- Sc.1: $\theta_H \geq U_1(0) - U_1(k) > U_2(0) - U_2(k) \geq \theta_L$,
- Sc.2: $\theta_H \geq U_1(0) - U_1(k) \geq \theta_L > U_2(0) - U_2(k)$,
- Sc.3: $U_1(0) - U_1(k) > \theta_H > \theta_L > U_2(0) - U_2(k)$

- Scenario 1: An individual's attitude to public good provision depends only on the taste parameter
- Scenario 3 (opposite of Scenario 1) the heterogeneity in skill levels dominates the heterogeneity in taste parameters
- Scenario 2 (intermediate case)
  ◦ For less productive individuals, the taste parameter determines whether or not they would benefit from public good provision
  ◦ Productive individuals always desire public good provision

Collective Incentive Compatibility and Interest groups

The distribution of preferences for the public good among high-skilled and low-skilled individuals no longer observable

Why is that a problem?

Under Scenario 2 all high-skilled individuals want to have the public good.
If these individuals convince the mechanism designer that $\rho_2(s) = \beta_2$ (high share of individuals θ_H)
$\Rightarrow$ Public good always provided
$\hookrightarrow$ Collective lie of $\beta_2 - \alpha_2$ individuals whose true taste parameter equals $\theta_L$increase their utilities
$\hookrightarrow$ Collective lie not prevented by individual IC

Laffont Martimort (97,00) framework of collusion

A SCF collectively IC if, for every state s, there *does not exist* a group of individuals J with true characteristics $\{(w_j, \theta_j)\}_{j \in J}$ and an alternative profile of characteristics $\{(\widehat{w}_j, \widehat{\theta}_j)\}_{j \in J}$ such that the following three properties hold simultaneously:

* If the true profile $\{(w_j, \theta_j)\}_{j \in J}$ is replaced by $\{(\widehat{w}_j, \widehat{\theta}_j)\}_{j \in J}$ then the cross-section distribution of characteristics corresponds to state $\widehat{s}$.
* *Unanimity*. In state $\widehat{s}$ all members of J are strictly better off; $\forall j \in J$,

$$\theta_j Q(\widehat{s}) + u(C(\widehat{w}_j, \widehat{\theta}_j, \widehat{s})) - v(\frac{Y(\widehat{w}_j, \widehat{\theta}_j, \widehat{s})}{w_j}) >$$

$$\theta_j Q(s) + u(C(w_j, \theta_j, s)) - v(\frac{Y(w_j, \theta_j, s)}{w_j})$$

* *Stability*. In state $\widehat{s}$, any individual $j \in J$ with characteristics $\{(w_j, \theta_j)\}_{j \in J}$ is indifferent between $(C(w_j, \theta_j, \widehat{s}), Y(w_j, \theta_j, \widehat{s}))$ and $(C(\widehat{w}_j, \widehat{\theta}_j, \widehat{s}), Y(\widehat{w}_j, \widehat{\theta}_j, \widehat{s}))$.

It is assumed that the cross-section distribution of skills is the same $\forall s$
$\Rightarrow$ collective deviations that involve false announcements of skill levels are superfluous
$\Rightarrow$ wlog assume that interest groups manipulate only the distribution of announced taste parameters

Proposition 2

A SCF is collectively IC only if it satisfies the following conditions for a collective revelation of tastes:

* $\forall x, \widehat{x} \in \{L, H\}$ and all $y \in \{L, H\}$

$$\theta_x Q(s_{xy}) + V_1(s_{xy}) \geq \theta_x Q(s_{\widehat{x}y}) + V_1(s_{\widehat{x}y})$$

* $\forall y, \widehat{y} \in \{L, H\}$ and all $x \in \{L, H\}$

$$\theta_y Q(s_{xy}) + V_2(s_{xy}) \geq \theta_y Q(s_{x\widehat{y}}) + V_2(s_{x\widehat{y}})$$

where $V_t(s) := u(C_t(s)) - v(Y_t(s)/w_t)$ the utility that individuals with skill level w_t derive in state s from their consumption-income combination.

- The first collective incentive condition addresses manipulations by low-skilled individuals

    - Suppose the true state of the economy is s_{Ly}
    - Consider a collective deviation: false taste announcement for $\beta_1 - \alpha_1$ low skilled individuals with a low taste parameter
      $\Rightarrow$ An announced state $\widehat{s} = s_{Hy}$
    - Stable Manipulation because it prescribes only false announcements of taste parameters and individuals who differ only in their taste parameters are treated equally
    - From an individual's perspective, announcing a false taste parameter yields the same $C - Y$ combination as a truthful announcement
      $\Rightarrow$ This manipulation is eliminated only if it is not attractive for low skilled individuals

$$\theta_L Q(s_{Ly}) + V_1(s_{Ly}) \geq \theta_L Q(s_{Hy}) + V_1(s_{Hy})$$

- The second constraint rules out manipulations by individuals who are high-skilled.

Proposition 3

Consider a SCF that maximizes EW subject to admissibility and collective ICs. Then, for any state s, there is no collective manipulation that makes low-skilled and high-skilled individuals better off.

Proposition 4

The SCF that maximizes EW subject to admissibility satisfies collective ICs if and only if Scenario 1 is given.

In Scenario 1 , at the optimal admissible allocation, irrespective of their skill level:
◦ all individuals with a low taste parameter oppose public good provision
◦ all individuals with a high taste parameter desire provision
⇒ the mechanism designer gets the information on public goods preferences for free

Implications of collective incentive compatibility

Proposition 3 $\Rightarrow$ the optimal admissible allocation triggers the formation of manipulative interest groups in Scenarios 2 and 3

Now characterization of the optimal allocation that satisfies feasibility, individual IC and also the collective ICs

Focus on Scenario 2

The Optimal admissible allocation violates the second collective IC constraint (the high skilled agents one)

Why?

High-skilled individuals suffer so little from an increase in the revenue requirement

$\Rightarrow$ they want public good provision even if they are θ_L

In state s_{LL} : these individuals exaggerate their preferences and convince the mechanism designer that the true state is s_{LH}

$\Rightarrow$ the public good is provided

Response of the mechanism designer:

1. Stick to provision rule Q^* (which is part of the optimal admissible social choice function)
   and distort the accompanying tax system in such a way that the incentive to exaggerate is eliminated

2. Distort the provision rule for the public good.

Example

Implement a provision rule which prescribes to install the public good iff a large fraction of the low-skilled has a high valuation of the public good $\Leftrightarrow$
$Q(s) = 1 \Leftrightarrow \rho_1(s) = \beta_1$
$\Rightarrow$ no need to acquire information on the distribution of preferences among the high-skilled

The solution depends on the intensity of the collective incentive problem

If the mechanism designer sticks to provision rule Q^*

$\Rightarrow$ make states with $Q = 1$ less attractive (ensure that high-skilled individuals do not exaggerate)
$\Rightarrow$ more redistribution whenever $Q = 1$ and less redistribution whenever $Q = 0$

A. If a small adjustment of the transfer scheme suffices to fix the collective incentive problem: Q^* may still be optimal

B. If a "large" distortion of the transfer system is needed
$\Rightarrow$ New collective incentive problem:
Low-skilled individuals start to exaggerate their preferences for the public good because the increase in redistribution has made states with $Q = 1$ more attractive for them
$\Rightarrow$ implementation of Q^* yields two binding collective incentive constraints (very substantive distortion of the income tay system)

Methodology

(i) Solve for the optimal allocation taking the provision rule Q^* as given
How the system of income transfers has to be distorted, whenever public good provision relies on information about the preferences of the rich

(ii) Analyze under which circumstances the choice of such a provision rule is optimal

The optimal income tax, taking Q^* as given

Characterization of the Pareto-frontier in a neighborhood of Q^*

Lemma 2

Denote by $V_1^*(\overline{V}_2, r)$ the value function of the following problem:

$$\max_{\{C1,Y1,C2,Y2\}} u(C_1) - v(\frac{Y_1}{w_1})$$

s.t.

$$\frac{1}{2}[Y_1 - C_1] + \frac{1}{2}[Y_2 - C_2] \geq r \qquad (BC)$$

$$u(C_1) - v(\frac{Y_1}{w_2}) \leq \overline{V}_2$$

$$u(C_2) - v(\frac{Y_2}{w_2}) = \overline{V_2}$$

$\forall r$, V_1^* is a continuous and strictly concave function of $\overline{V}_2$ with a unique maximum. For $\overline{V}_2 = U_2(r)$ - i.e. at the optimal admissible allocation with a revenue requirement of r - V_1^* is strictly decreasing in $\overline{V}_2$.

Proposition 5

Suppose provision rule Q^* is taken as given. Consider the problem of maximizing EW subject to admissibility and the collective ICs.
Denote by $\{V_t^{**}(s)\}_{s \in S}$ the utility levels realized by individuals with skill level w_t at a solution to this problem. There exists $\overline{\theta}_L$ such that if $\theta_L \leq \overline{\theta}_L$, then:

* Whenever the public good is not installed, then, relative to the optimal admissible allocation, low-skilled individuals are worse off and high-skilled individuals are better off $\Leftrightarrow$
$V_1^{**}(s_{LL}) < U_1(0)$ and $V_2^{**}(s_{LL}) > U_2(0)$

* In all states with public good provision, individuals derive the same utility from their consumption-income combination $\Leftrightarrow \forall t \in \{1, 2\}$,

$$V_t^{**}(s_{LH}) = V_t^{**}(s_{HL}) = V_t^{**}(s_{HH})$$

Proposition 5 cont.

- Whenever the public good is installed, then, relative to the optimal admissible allocation, low-skilled individuals are better off and high-skilled individuals are worse off. Formally, let s be such that $Q(s) = 1$, then $V_1^{**}(s) > U_1(k)$ and $V_2^{**}(s) < U_2(k)$.

- The following collective incentive constraint for high-skilled individuals is binding, $V_2^{**}(s_{LL}) - V_2^{**}(s_{LH}) = \theta_L$. The collective incentive constraints for low-skilled individuals, $\theta_H \geq V_1^{**}(s_{LL}) - V_1^{**}(s_{HL}) \geq \theta_L$, are not binding.

Interpretation Prop. 5

- Given Scenario 2, the constraint $V_2^{**}(s_{LL}) - V_2^{**}(s_{LH}) \geq \theta_L$ is violated at the optimal admissible allocation (high-skilled individuals exaggerate their preferences for the public good)
  Proposition 5: optimal allocation with this constraint binding
- The mechanism designer deviates along the Pareto-frontier such that: From the perspective of the rich, public good provision becomes less attractive
  $\Rightarrow$ Increased level of redistribution in states with public good provision and less redistribution in states with non-provision

Interpretation Prop. 5 cont.

- Proposition 5 is based on the assumption that θ_L is not too high. The assumption $\theta_L \leq \overline{\theta}_L$ ensures that the collective incentive constraint,

  $$V_1^{**}(s_{LL}) - V_1^{**}(s_{HL}) \geq \theta_L$$

  for low-skilled individuals is not binding. The optimal allocation in Proposition 5 is such that the utility difference $V_1(s_{LL}) - V_1(s_{HL})$ is smaller than $U_1(0) - U_1(k)$
- If the parameter θ_L is small, then $V_1(s_{LL}) - V_1(s_{HL})$ can indeed be decreased without violating the incentive constraint above.
- If θ_L is too large: public good provision and more redistribution in state s_{LH}
  $\Rightarrow$ low skilled individuals have an incentive to exaggerate their preferences in state s_{LL}
  Then, implementation of provision rule $Q*$
  $\Rightarrow$ there are two binding collective incentive constraints

Terminology

- Provision rule $Q*$ faces a **modest** collective incentive problem if the optimal tax system that implements $Q*$ implies that:
  $V_2^{**}(s_{LL}) - V_2^{**}(s_{LH}) \geq \theta_L$ is binding
  $V_1^{**}(s_{LL}) - V_1^{**}(s_{HL}) \geq \theta_L$ is slack.
- $Q*$ faces a **severe** collective incentive problem if these constraints are both binding.

The Optimal Provision rule

Is Q^* part of an optimal allocation?
The necessity to distort the accompanying tax system may imply that a different provision rule turns out to be superior

- If Q^* faces a modest incentive problem, it depends on the planner's prior whether or not Q^* is the optimal provision rule.
  ◦ If π_{LL} is very small. Then, provision rule $Q(s) = 1, \forall s$, leads to a larger welfare level than Q^* because the state in which a deviation from the optimal admissible allocation occurs is very unlikely
  ◦ If all states of the world are equally likely and suppose the parameter θ_L is such that Q^* requires only a small deviation from the optimal admissible allocation
  $\Rightarrow$ adjustments of the transfer system required under Q^* negligible in welfare terms
  $\Rightarrow$ Q^* is superior to any alternative provision rule
- With a severe incentive problem, Q^* will not be chosen

Proposition 6

- If Q^* faces a modest collective incentive problem, then it depends on the parameters of the model, whether or not Q^* is part of an optimal allocation.
- If Q^* faces a severe collective incentive problem, then Q^* is not part of an optimal allocation.

- The optimal provision rule in more detail not characterized
- In total their are six provision rules that are consistent with collective incentive compatibility
- Main results for Scenario 2:
  If provision rule Q^* is chosen, the planner has to accept the necessity of excessive redistribution if the public good is provided, and of suboptimal redistribution if not. However, this may imply that a different provision rule, which does not depend on $\rho_2(s)$, becomes preferable.

Conclusion of the paper

- Under an optimal income tax, an individual's earning ability affects his willingness to pay for public goods
  ⇒ Individuals may lobby for their most preferred expenditure policies
- Taking the manipulative impact of interest groups into account gives rise new set of incentive considerations
  ⇒ Necessitate a distortion of the tax system or the provision rule for public goods
- Whenever information acquisition is desirable in the presence of collective incentive constraints:
  Public good provision implies an increase in redistribution
  (complementarity between redistribution and public good provision)

How to assess these deviations from a welfare perspective?

- It is possible that such a deviation will make one group of individuals better off while hurting another group, i.e. there is no departure from constrained efficiency. However, these deviations place an additional welfare cost on redistribution
- Consequently, one has to tradeoff the utilitarian welfare gains from a more favorable solution to the equity-efficiency tradeoff with those from a more favorable solution to the free-rider problem