Selecting Caring Bureaucrats (supplement to Predatory States and Failing States)*

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Abstract

A benevolent ruler's problem of selecting bureaucrats who have some direct concern for the citizens' welfare is modeled in the context of provision of public goods. It is found that the usual mechanism-design solution of distorting the less-caring type's action downward works only if the proportion of the less-caring bureaucrats in the population is sufficiently small. Otherwise the ruler has to pool the bureaucrat types and let the caring bureaucrat keep all of his gain from caring.

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This note concerns a variant of the model in "Predatory States and Failing States: An Agency Perspective" (Dixit 2006, henceforth PSFS). As in that paper, the top-level ruler must use a middle-level agent (bureaucrat) to provide public goods to the citizens and to levy the taxes or fees to cover the costs. There the bureaucrat's cost of providing the public good was private information. Here the bureaucrat's innate concern for the citizens' welfare is private information. Also, in that paper the ruler's objective function was a weighted sum of the ruler's extraction from the economy, and the citizens' and the bureaucrat's welfare. Here I contrast just two extreme cases, one where the ruler is cares only about his take from the economy, and the other where the ruler cares only about the citizens' welfare (or is forced to do so by the constraints imposed by a democratic process or other checks and balances).

The notation largely follows that in PSFS. The bureaucrat supplies a public good K to the citizenry at cost $\frac{1}{2}\gamma K^2$. In PSFS γ was the bureaucrat's private information; here it is common knowledge. The citizens' surplus or utility or social welfare is

$$SW = K - \tfrac{1}{2}\,\delta\, K^2 - (1 + \lambda_C)\, F.$$

F is the fee given to the bureaucrat, and λ_C is the deadweight loss per dollar in making transfers from the citizens to the bureaucrat. PSFS had $\delta = 1$; the generalization here is essentially equivalent to a free choice of unit of K. The citizens' participation constraint is $SW \geq 0$, this being what the citizens can get if the public good is not provided and no fee charged for it.

The bureaucrat's utility is

$$UB = F - (1 + \lambda_B)\, R - \tfrac{1}{2}\,\gamma\, K^2 + \beta\, SW\,,$$

where R is the ruler's take and λ_B the additional cost of transferring each dollar from the bureaucrat to the ruler. The participation constraint is $UB \geq \underline{UB}$. The bureaucrat may also be a citizen, in which case the utility and the participation constraint are interpreted as amounts in excess of the utility or social welfare he would get in his role as a citizen to compensate him for the extra work. Alternatively, the bureaucrat may be a hired outsider, e.g. foreigner or a consultant or an even an NGO.

Note that the bureaucrat's surplus (utility in excess of the participation floor level) is not a part of social welfare. This is natural if the bureaucrat is an outside hire. But if the bureaucrat is a citizen, this is the case in PSFS where the ruler does not care about the bureaucrat's welfare, i.e. $\rho_B = 0$ in the notation used there. The case where the bureaucrat's surplus is included in social welfare can be handled easily; all that happens is that the $(1+\lambda_C)$ in the social welfare expression (1) and in the results like (6) is replaced by λ_C.

Bureaucrats come in two types, selfish, who have $\beta = 0$ and caring, who have a given and known $\beta > 0$. Call the two types L and H respectively, and let ω_L and ω_H be the probabilities that a randomly selected bureaucrat is of the two types. I assume that even the caring or H type does not want to leave money with the citizen and bear the costs of the public good from his own resources, that is, $(1 + \lambda_C)\,\beta < 1$.

Predatory Ruler

This ruler's objective is R. To maximize this he keeps the citizen on the participation constraint, so $SW = 0$. Therefore the bureaucrat's caring parameter becomes irrelevant. Such a ruler will not attempt any revelation but will just hire a bureaucrat at random.

Benevolent Ruler

This ruler wants to maximize social welfare (or else is forced to do so because he faces extremely tight constraints, for example his reelection probability will fall very sharpely if he lets SW go even slightly below the best that is feasible given the technology and information conditions).

We expect such a ruler to keep the citizens off their participation constraint. Therefore I will solve a "relaxed" problem ignoring the citizens' participation constraints and will later consider or impose feasibility conditions under which these constraints are met.

By the revelation principle, we can without loss of generality consider the ruler's optimal direct truthful revelation mechanism. The bureaucrat is asked to report his care type L or H. Depending on the answer, he is asked to provide the public good and collect the fee in amounts (K_i, F_i), $i = L$, H. These are chosen to maximize expected social welfare

$$ESW = \omega_L \, [\, K_L - \tfrac{1}{2}\,\delta\,(K_L)^2 - (1+\lambda_C)\,F_L\,] + \omega_H \, [\, K_H - \tfrac{1}{2}\,\delta\,(K_H)^2 - (1+\lambda_C)\,F_H\,] \qquad (1)$$

subject to the participation constraints for the two types of bureaucrats:

$$BPC_L: \quad F_L - \tfrac{1}{2}\,\gamma\,(K_L)^2 \geq \underline{UB} \qquad (2)$$

$$BPC_H: \quad F_H - \tfrac{1}{2}\,\gamma\,(K_H)^2 + \beta\,[\, K_H - \tfrac{1}{2}\,\delta\,(K_H)^2 - (1+\lambda_C)\,F_H\,] \geq \underline{UB} \qquad (3)$$

and the incentive-compatibility or truthful revelation constraints:

$$BIC_L: \quad F_L - \tfrac{1}{2}\,\gamma\,(K_L)^2 \geq F_H - \tfrac{1}{2}\,\gamma\,(K_H)^2 \qquad (4)$$

$$\begin{aligned} BIC_H: \quad & F_H - \tfrac{1}{2}\,\gamma\,(K_H)^2 + \beta\,[\, K_H - \tfrac{1}{2}\,\delta\,(K_H)^2 - (1+\lambda_C)\,F_H\,] \\ & \geq F_L - \tfrac{1}{2}\,\gamma\,(K_L)^2 + \beta\,[\, K_L - \tfrac{1}{2}\,\delta\,(K_L)^2 - (1+\lambda_C)\,F_L\,] \end{aligned} \qquad (5)$$

First I set up the full information ideal, so the ICs are not relevant, and the PCs are met with equality. Solving the PCs for the fees,

$$F_L = \underline{UB} + \tfrac{1}{2}\,\gamma\;(K_L)^2\,,$$

and

$$F_H = \frac{1}{1-(1+\lambda_C)\,\beta}\;[\;\underline{UB} + \tfrac{1}{2}\,(\gamma+\beta\delta)\;(K_H)^2 - \beta\;K_H\;]\,.$$

Using this in the objective function (1), we have

$$\frac{\partial ESW}{\partial K_L} = \omega_L\;[\;1 - \delta\;K_L - (1+\lambda_C)\,\gamma\;K_L\;]\,,$$

and

$$\frac{\partial ESW}{\partial K_H} = \omega_H \left\{ 1 - \delta\, K_H - \frac{1+\lambda_C}{1-(1+\lambda_C)\,\beta} \, [\, (\gamma + \beta\delta)\; K_H - \beta \,] \right\}$$
$$= \frac{\omega_H}{1-(1+\lambda_C)\,\beta} \, [\; 1 - \delta\; K_H - (1+\lambda_C)\,\gamma\; K_H \;] \,.$$

Setting these equal to zero and solving,

$$K_L = K_H = K^* \equiv \frac{1}{\delta + (1+\lambda_C)\,\gamma} \,. \tag{6}$$

This is the same full-information optimum as in PSFS, and is independent of the care parameter β.

The resulting social welfare levels are found by substituting for the (K_i, F_i) and simplifying:

$$SW_L^* = \frac{1}{2\,[\delta + (1+\lambda_C)\,\gamma\,]} - (1+\lambda_C)\; \underline{UB}\,,$$

and

$$SW_H^* = \frac{1}{1-(1+\lambda_C)\,\beta} \; SW_L^* \,.$$

I assume that these magnitudes are positive for the problem to be nontrivial. That is, I impose the restriction

$$\frac{1}{2\,[\delta + (1+\lambda_C)\,\gamma\,]} > (1+\lambda_C)\; \underline{UB} \tag{7}$$

on the parameters.

Therefore $SW_H^* > SW_L^*$; the ruler prefers the caring bureaucrat to the selfish type. This happens because the former can be hired for a smaller fee. It is easy to see, by substituting $K = K^*$ in the expressions for the two fees, that the condition for $F_H < F_L$ is exactly the condition (7).

Now let the bureaucrat's care type be private information. If the ruler attempts to implement the full-information optimum, the caring type will benefit by pretending to be uncaring; by doing so he will get the same externality benefit from the citizen's surplus and a higher fee. The ruler must therefore recognize the incentive compatibility constraints and find the appropriate constrained optimum.

The intuition from long experience with such problems (Mirrlees 1971, Baron and Myerson 1982, Laffont and Tirole 1993) suggests that the H-type will have to be given some rent for truthful revelation, and his incentive constraint will be binding; the L-type's participation constraint will be binding, his action distorted to balance the efficiency of action and the cost of the rent giveaway. To check whether this is correct and how it works out, begin with the

Lemma: If BIC_H holds with equality, and $K^* \geq K_H \geq K_L$, then BIC_L is satisfied, with slack if $K_H > K_L$.

Proof: Simplify (5) holding as an equation, to write

$$F_L - F_H = \frac{1}{1-(1+\lambda_C)\,\beta}\ \left\{\ [\beta\, K_H - \tfrac{1}{2}(\gamma+\beta\delta)\ (K_H)^2\,] - [\beta\, K_L - \tfrac{1}{2}(\gamma+\beta\delta)\ (K_L)^2\,]\ \right\}.$$

Then

$$\begin{aligned}
& [\,F_L - \tfrac{1}{2}\gamma\,(K_L)^2\,] - [\,F_H - \tfrac{1}{2}\gamma\,(K_H)^2\,] \\
= & \ \frac{1}{1-(1+\lambda_C)\,\beta}\ \left\{\ [\beta\, K_H - \tfrac{1}{2}(\gamma+\beta\delta)\ (K_H)^2\,] - [\beta\, K_L - \tfrac{1}{2}(\gamma+\beta\delta)\ (K_L)^2\,]\ \right\} \\
& \quad + \tfrac{1}{2}\gamma\,[(K_H)^2 - (K_L)^2] \\
= & \ \frac{\beta}{1-(1+\lambda_C)\,\beta}\ \left\{\ [\,K_H - \tfrac{1}{2}(\delta+(1+\lambda_C)\gamma)\ (K_H)^2\,] - [\,K_L - \tfrac{1}{2}(\delta+(1+\lambda_C)\gamma)\ (K_L)^2\,]\ \right\},
\end{aligned}$$

and the function $K - \frac{1}{2}(\delta + (1+\lambda_C)\,\gamma)\ K^2$ is increasing for $K \in [0, K^*]$. Therefore for $K^* \geq K_H \geq K_L$ the BIC_L (**??**) is satisfied, and the inequality is strict if $K_H > K_L$. QED

Now solve the relaxed problem that imposes BPC_L and BIC_H as equalities, but ignores BIC_L, BPC_H and $K_H \geq K_L$. Check that the solution satisfies these; then it will also be the solution to the full problem.

The imposed constraints give

$$F_L = \underline{UB} + \tfrac{1}{2}\gamma\ (K_L)^2\,,$$

and

$$F_H = F_L - \frac{1}{1-(1+\lambda_C)\,\beta}\ \left\{\ [\beta\, K_H - \tfrac{1}{2}(\gamma+\beta\delta)\ (K_H)^2\,] - [\beta\, K_L - \tfrac{1}{2}(\gamma+\beta\delta)\ (K_L)^2\,]\ \right\}.$$

Then

$$\begin{aligned}
\frac{\partial ESW}{\partial K_H} &= \omega_H\ \left\{\ 1 - \delta\, K_H + \frac{1+\lambda_C}{1-(1+\lambda_C)\,\beta}\ [\,\beta - (\gamma+\beta\delta)\ K_H\,]\ \right\} \\
&= \frac{\omega_H}{1-(1+\lambda_C)\,\beta}\ \{\ 1 - \delta\, K_H - (1+\lambda_H)\,\gamma\, K_H\ \}
\end{aligned}$$

Setting this equal to zero and solving, we have

$$K_H = \frac{1}{\delta + (1+\lambda_C)\,\gamma} = K^*\,.$$

So the action of the H-type bureaucrat is undistorted, as expected.

Whereas

$$\begin{aligned}
\frac{\partial ESW}{\partial K_L} &= \omega_L\ [\,1 - \delta\, K_L - (1+\lambda_C)\,\gamma\ K_L\,] \\
& \qquad - \omega_H\,(1+\lambda_C)\ \left\{\ \gamma\, K_L + \frac{1}{1-(1+\lambda_C)\,\beta}\ [\,\beta - (\gamma+\beta\delta)\ K_L\,]\ \right\} \\
&= \left[\ \omega_L - \frac{\omega_H\,(1+\lambda_C)\,\beta}{1-(1+\lambda_C)\,\beta}\ \right]\ \{1 - (\delta + (1+\lambda_C)\,\gamma)\ K_L\ \} \\
&= \frac{\omega_L - (1+\lambda_C)\,\beta}{1-(1+\lambda_C)\,\beta}\ \{1 - (\delta + (1+\lambda_C)\,\gamma)\ K_L\ \}
\end{aligned}$$

Now two cases arise depending on whether ω_L is $>$ or $<$ $(1+\lambda_C)\,\beta$.

If $\omega_L > (1+\lambda_C)\,\beta$, the first factor in the last line on the right hand side is positive and the derivative is a decreasing function of K_L. Therefore the optimum is given by the first-order condition, yielding

$$K_L = \frac{1}{\delta + (1+\lambda_C)\,\gamma} = K^* \,.$$

So it is not optimal to distort the action of the L-type bureaucrat. With $K_H = K_L = K^*$, incentive-compatibility requires $F_H = F_L$. The intuition is that the probability of an uncaring bureaucrat is so high that the efficiency cost of distorting that type's action is too high. Instead the ruler has to accept the outcome where the caring bureaucrat gets to keep the entire externality he gets from the social welfare.

If $\omega_L < (1+\lambda_C)\,\beta$, the first factor in the last line on the right hand side is negative. Then $\partial ESW/\partial K_L < 0$ for all $K_L \in [0, K^*]$. This makes it optimal to drive K_L as low as possible. There are sufficiently few L-types that it becomes better to accept the distortion as in much of mechanism design theory.

How low can K_L be driven? Now the participation constraints come into play. Substituting into the expression for the H-type's utility, we find

$$\begin{aligned}
UB_H &= F_H - \tfrac{1}{2}\,\gamma\,(K_H)^2 + \beta\;[\,K_H - \tfrac{1}{2}\,\delta\,(K_H)^2 - (1+\lambda_C)\,F_H\,] \\
&= F_L - \tfrac{1}{2}\,\gamma\,(K_L)^2 + \beta\;[\,K_L - \tfrac{1}{2}\,\delta\,(K_L)^2 - (1+\lambda_C)\,F_L\,] \text{ since } BIC_H \text{ holds with } = \\
&= \underline{UB} + \beta\;\{\,K_L - \tfrac{1}{2}\,\delta\,(K_L)^2 - (1+\lambda_C)\,[\,\underline{UB} + \tfrac{1}{2}\,\gamma\,(K_L)^2\,]\,\} \text{ since } BPC_L \text{ holds with } = \\
&= \underline{UB} + \beta\;\{\;[\,K_L - \tfrac{1}{2}\,(\delta + (1+\lambda_C)\,\gamma)\;(K_L)^2\,] - (1+\lambda_C)\;\underline{UB}\;\}
\end{aligned}$$

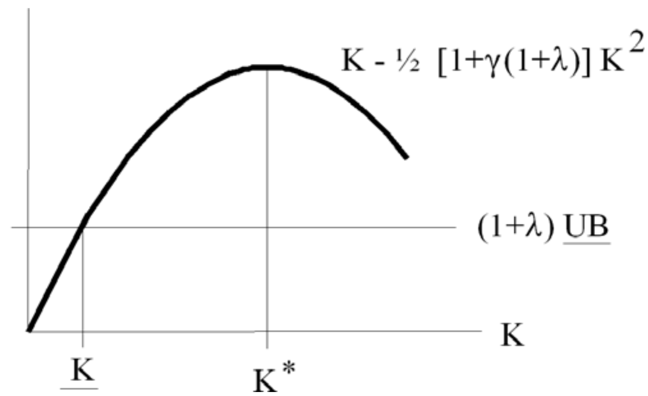
The social welfare from hiring an L-type bureaucrat is

$$\begin{aligned}
SW_L &= K_L - \tfrac{1}{2}\,\delta\;(K_L)^2 - (1+\lambda_C)\;F_L \\
&= K_L - \tfrac{1}{2}\,\delta\;(K_L)^2 - (1+\lambda_C)\;[\;\underline{UB} + \tfrac{1}{2}\,\gamma\;(K_L)^2\;] \\
&= K_L - \tfrac{1}{2}\,(\delta + (1+\lambda_C)\,\gamma)\;(K_L)^2 - (1+\lambda_C)\;\underline{UB}
\end{aligned}$$

Thus both the H-type bureaucrat's participation constraint and the citizen's participation constraint when the bureaucrat is L-type are satisfied when

$$K_L - \tfrac{1}{2}\,(\delta + (1+\lambda_C)\,\gamma)\;(K_L)^2 \geq (1+\lambda_C)\;\underline{UB}\,.$$

The figure shows the function on the left hand side, and the horizontal line of the right hand side for comparison. It shows that the optimal distortion is $K_L = \underline{K}$, at the left hand intersection of the two curves.



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