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Power of Incentives in Private versus Public Organizations

By AVINASH DIXIT*

Government agencies and public enterprises are generally thought to perform poorly because their managers and workers lack the high-powered incentives that are believed to prevail in private firms. This belief motivates many attempts to privatize public services and reform government bureaucracies. In the report of the recent U.S. initiative to reinvent government, Al Gore (1995 pp. 12, 62–66) emphasized the importance of measuring and rewarding “results, not red tape.”

Considerable research on the design of incentives in government agencies also exists (see Susan Rose-Ackerman, 1986; Jean Tirole, 1994). This draws upon the general theory of incentives, whose main application concerns the organization and regulation of private firms. Government firms and agencies are in some ways like large, complex, private firms but differ in other important respects.

Some differences are matters of degree. Government agencies’ outputs are often harder to quantify and measure. The goods and services they supply usually have few close substitutes, making it difficult to use market-based or yardstick competition for incentives. Sometimes this can be done; the Gore report (1995 pp. 95–8, 130–1) stresses the concept and gives examples.

Some government agencies have one advantage over private firms: they provide services to poor, old, or disabled people, and

the managers’ or workers’ own compassion or social concern can motivate their performance without the need for incentives. In fact the workers may go so far in helping their clientele as to clash with the agency’s other objectives; James Heckman et al. (1996) provide an example of this.

In this paper I focus on another very important, almost defining, distinct feature of public organizations: they are answerable to several different constituencies with different objectives. In technical terms they are “common agencies” with several “principals.” In the United States the system of open government has this effect. An agency may be formally answerable only to the executive (say), but in practice Congress, courts, media, and organized lobbies, all have a say. In the European Union the sovereign member countries are principals to the bureaucracy in Brussels.

Thus government agencies are not merely managerial or administrative organizations; they must operate in a framework of *politics*. James Wilson (1989) has identified this as the reason they have weak incentives. This finds support in my formal analysis (Dixit, 1996), which I discuss and generalize below.

The incentives in such public organizations need not be financial; more often they are complex quid pro quos in a larger, multidimensional bargaining game. I develop the theory in the familiar mode of transfers and utilities, but these should be interpreted metaphorically or in a generalized sense.

I. Why Large Organizations Have Low-Powered Incentives

In reality, incentives are low-powered even within private firms. The main reason was

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identified by Oliver Williamson (1985 Ch. 6). The organization performs several tasks, the outputs of which are observable with different degrees of accuracy. Considering each task in isolation, one with a more accurately observed outcome would have a higher-powered incentive because the outcome is a better indicator of the effort one wants to motivate. But considering them together, giving a more powerful incentive to one task draws effort away from other tasks; therefore the existence of some inaccurately observed (or unobservable) dimensions of outcome pulls down the power of incentives for all tasks. For example, the manager of a supply division who is paid by net receipts may use his fixed equipment too intensively or may fail to maintain it adequately. Then the firm must use weak material incentives (salaries) plus costly monitoring to ensure adequate attention to all tasks.

This idea was further developed, formalized, and applied by others, including Bengt Holmström (1989), Holmström and Paul Milgrom (1991), and Tirole (1994). Holmström argues that larger firms perform more tasks, and therefore, they have weaker incentives and suffer a relative disadvantage in activities like innovation that are hard to measure. Larger firms with more market power are also less able to use yardstick competition.

II. How Multiple Principals Influence Public Organizations

I argue that a distinct feature of government bureaucracies is that they must answer to multiple principals. I now develop a model of a common agency to show how the interaction among many principals results in a loss of the power of incentives. I treat the case of moral hazard, where the agent's action is not observable to the principals but all outcomes can be observed by all. The case where the agent has private information (adverse selection) is treated by David Martimort (1995) and yields some similar results.

The model generalizes that presented in the appendix of Dixit (1996), which in turn builds upon the multi-task model of Holmström and

Milgrom (1991). I shall omit all details of derivation to save space.¹

The agent makes a k -dimensional unobservable (or unverifiable) effort denoted by the vector \mathbf{x} . The result is \mathbf{y} , an observable and verifiable m -dimensional output vector.² The two are linked by

$$(1) \quad \mathbf{y} = \mathbf{F}\mathbf{x} + \varepsilon$$

where \mathbf{F} is an $m \times k$ matrix, and ε is an m -dimensional error vector, distributed normally with mean 0 and variance-covariance matrix Ω .

There are n principals indexed by $i = 1, 2, \dots, n$. If the i th principal pays the agent z_i , that principal's expected utility is

$$E[-\exp\{-r_i(\mathbf{b}'_i \mathbf{y} - z_i)\}]$$

and the agent's expected utility is

$$E\left[-\exp\left\{-r_a(\mathbf{b}'_a \mathbf{y} + \sum_i z_i - \frac{1}{2}\mathbf{x}'\mathbf{C}\mathbf{x})\right\}\right].$$

Thus all players have constant absolute risk aversion, r_i for principal i and r_a for the agent. The i th principal values outputs linearly, and the components of the vector \mathbf{b}_i are his unit valuations of the corresponding components of output. Some principals can actually dislike some types of outputs, so some components of each \mathbf{b}_i can be negative, but I assume the sum of these vectors, denoted by \mathbf{b}_0 , is strictly positive. I also allow the agent to have some concern for output for its own sake, and the components of the vector \mathbf{b}_a are his unit valuations. The quadratic form $\frac{1}{2}\mathbf{x}'\mathbf{C}\mathbf{x}$ is the agent's disutility of effort, and \mathbf{C} is a $k \times k$ positive definite matrix.

¹ The algebra is messy but not difficult to reconstruct; the derivations are in an unpublished appendix available upon request from the author.

² If any components of \mathbf{x} are observable, they can simply be included as components of \mathbf{y} , so the formal model is actually more general.

I assume that the principals use linear payment schemes:

$$(2) \quad z_i = \alpha_i' y + \beta_i.$$

This makes the analysis tractable and yields clear intuitions; for a discussion see Holmström and Milgrom (1991) and Dixit (1996 appendix). The β_i merely serve to split the surplus between the parties and ensure that the agent's participation constraint is met; the interest focuses on the coefficient vectors α_i , which are the marginal rewards promised by the principals to the agent for producing more output.

First suppose the principals act collusively: they set a linear scheme $z = \alpha' y + \beta$ and optimally split the joint surplus among themselves. Define r_0 by

$$(3) \quad 1/r_0 = \sum_i (1/r_i).$$

This r_0 acts as the joint risk-aversion of the principals when they collude and pool risks; it should normally be quite small. Finally, define

$$G = FC^{-1}F'$$

where F and C are as defined above.

With this notation, the agent's choice of effort is given by

$$x = C^{-1}F'(\alpha + b_a).$$

Substituting in the principals' objective, it can be shown that the marginal incentive vector α^j of the principals' jointly optimal scheme satisfies

$$(4) \quad [G + (r_0 + r_a)\Omega](\alpha^j + b_a) \\ = [G + r_0\Omega](b_0 + b_a).$$

This shows how risk-sharing weakens incentives. If the agent were risk-neutral ($r_a = 0$), then (4) would collapse to $\alpha^j = b_0$. The agent's receipt for marginal output would equal the principals' combined valuation; the incentives would have 100 percent power. When the agent is risk-averse ($r_a > 0$), it be-

comes optimal to share some risk with him, and this leads to weaker incentives. As $r_a \rightarrow \infty$ in (4), $\alpha^j + b_a \rightarrow 0$. If the principals are so risk-averse as to make r_0 significant, then the agent bears more risk, and the optimal incentives are more powerful.

Holmström and Milgrom (1991) show how the multidimensional efforts and outputs interact to weaken incentives. I shall take this for granted and focus on the extra effect that arises when the principals cannot collude. Now the situation is a two-stage game; in the first stage the principals choose their (linear) incentive schemes, and in the second stage the agent chooses his optimal action (effort) given the aggregate of the incentives offered. I look for a subgame-perfect equilibrium.

Let α^s denote the sum of the principals' α_i in this equilibrium, that is, the aggregate marginal incentives received by the agent when the principals act separately. Suppose that all principals have equal risk-aversion R , so $r_0 = R/n$. Then it can be shown that:³

$$(5) \quad [G + n(r_0 + r_a)\Omega](\alpha^s + b_a) \\ = [G + nr_0\Omega](b_0 + b_a).$$

Compare this with the jointly optimal incentives α^j defined by (4). The two formulas are identical except that all the risk-aversion parameters in (5) are multiplied by n , the number of principals.

The magnification of the agent's risk-aversion is what leads to weak incentives in a common agency. In fact if the principals are risk-neutral, as is often supposed in agency models, this is the only new effect, and it magnifies n -fold any problems with incentives that might exist even with unified principals. The point is not merely that when some principals dislike some objectives there are cancellations when their valuation vectors b_i are added to get b_0 ; that effect if any was already present in (4) where the principals acted jointly.

³ The unpublished appendix (which is available from the author upon request) considers the more general case of unequal risk-aversions and derives a similar but more messy formula.

Rather, there is now an externality among the principals. Each principal can strike a mutually beneficial deal with the agent by offering some insurance (negative marginal payment) for outcomes of tasks that are primarily of interest to other principals. The cost of this, namely, lower effort in those dimensions, is borne by those others. This negative externality is over-provided in Nash equilibrium. The same applies to all principals; therefore incentives are weak all round.

If the competing political principals are risk-averse, they are not able to pool their risk-aversion as in (3). The effect of the principals' risk-aversion in (5) is also multiplied n -fold as compared to (4); this may restore some power to incentives.

But suppose the number of principals n is very large. In (5), nr_0 stays constant at R , the risk-aversion of each principal, while nr_a goes to infinity. Then (5) becomes $\alpha^s + b_a = 0$, and the agent's action is $x = 0$. The principals do not merely provide no extra incentive, leaving the agent to follow his own motivation. If that were the case, a constitutional rule or procedure that endows each government agency with a clear mission, and relies on self-selection to recruit agents dedicated to this mission, would obviate the need for incentives. Rather, in equilibrium the incentives exactly offset the chosen agent's motives, leading to inaction.

Better solutions may be possible at a prior stage where the constitution is written, or rules of the political game are fixed. First, one may restrict the principals' incentive schemes so that each one is allowed to observe and reward only the dimension of output that concerns him. If different kinds of efforts are substitutes in the agent's utility, this makes each principal offer strong incentives in an attempt to attract the agent's effort to his own concerns (see Dixit, 1996 pp. 170–71). Second, it may be possible to group together principals whose interests are better aligned, who can then collude within each group. Devolution of political power to states or localities can achieve this. Third, agencies can be so designed that each performs fewer tasks, thus reducing the externalities among the principals affected by its actions.

III. Politicization of Private Firms

Private firms are supposed to have just one principal, namely, the shareholders. These may be a diverse group, but capital markets with a sufficiently rich menu of assets align their interests. The executive officers and the board of directors have almost total control over the incentives of the managers and the workers. This creates its own agency problems, but they are not of the political multi-principal kind.

Recently in the United States and the United Kingdom a concept of a "stakeholder economy" has evolved, according to which firms are supposed to be responsible not merely to their shareholders, but to a more varied collection of "stakeholders": workers, creditors, the local community, and so forth. If this comes to be accepted and built into the legal and organizational structure of corporations, all these groups will become principals, with firms as their common agents. Such "politicization" of firms will further lower the power of incentives, which is often already low for other reasons.

We have multi-principal politics for a reason, namely, to provide checks and balances against biased or arbitrary exercise of power. This was emphasized in the *Federalist Papers*, especially Numbers 10 and 51; Tirole (1994 section 8) develops some formal analysis. But one should recognize that this benefit comes with an attendant cost, namely, weak incentives, which can lead to indecision or gridlock. In politics, as in economics, the first-best is elusive, and we must accept many unsatisfactory compromises.

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