Employment Contracts, Influence Activities, and Efficient Organization Design

Paul R. Milgrom

Stanford University

When changing jobs is costly, efficient employment contracts usually fail to compensate workers for the effects of posthiring events and decisions. Then, when there are executives and managers with authority to make discretionary decisions, affected employees will be led to waste valuable time trying to influence their decisions. Efficient organization design counters this tendency by limiting the discretion of decision makers, especially for those decisions that have large distributional consequences but that are otherwise of little consequence to the organization.

> The inference to which we are brought is that the causes of faction cannot be removed, and that relief is only to be sought in the means of controlling its effects. [JAMES MADISON, *The Federalist*]

I. Introduction

Experience suggests—and most Western economists believe—that decentralized economic authority such as that found in market economies encourages innovation and promotes efficient resource use. The

reasons for these advantages, however, have proved difficult to pin-point. Why can't a centrally planned, socialist economy mimic a de-centralized one whenever that is desirable? Coase (1937) posed the corresponding question for private ownership economies: "Why is not all production carried out by one big firm?"

I shall argue that there are costs, called "influence costs," that at-tend any increase in centralized control, whether in a firm or in a larger economic system. These costs arise because participants inevi-tably care about the decisions that the central authority can make and so tend to spend too much time trying to influence the authority's decisions. That time, of course, is valuable; if it were not wasted on influence activities, it could be used for directly productive activities or simply consumed as leisure.

The fact that centralization entails costs does not mean that cen-tralizing decision authority is never desirable. Central planning and decision making may improve coordination among the diverse actors in an economic system enough to make bearing the attendant in-fluence costs worthwhile. However, when the potential benefits of central control are slight and the influence costs are great, the discre-tion of the central authority should be restricted. Since influence costs tend to be greater when the members of the organization have larger stakes in the decision to be made, efficiently designed organizations limit the discretion of decision makers in those matters that are of little direct importance to the organization (in terms of the potential for improved decision making to advance the organization's objec-tives) but of great importance to individual organization members.

Although the foregoing themes appear to be general ones, I shall limit the formal analysis of them to the important special case in which the organization is a profit-maximizing firm and the interested parties are the firm's employees. This focus forces one to face certain issues squarely. First, why do employees care about the decisions made by their employers? Under the traditional spot contracting equilibrium theory of the labor market, prevailing wages always leave each employee just indifferent between his current (best) job and his next-best job alternative. According to that theory, jobs that are un-pleasant or dangerous pay higher wages than those with more desir-able characteristics. In practice, employers do pay some compensating differentials: Premium wages have often been paid for hazardous duty, overseas assignments, and late-night shifts. Why aren't these practices even more extensive, fully compensating all employees for all variations in job characteristics? Are the uncompensated job char-acteristics found in practice just an unimportant residual? These questions are of central importance for the theory, for if wages did fully compensate employees for all variations in job characteristics,

then employees would have no interest in influencing employer decisions.

I have no evidence to offer concerning the magnitudes of the failure of compensating differential theories, though it is clear from casual observation that for salaried workers pay is normally adjusted only for substantial and long-lived changes in job attributes. The cost of writing detailed contracts provides one partial explanation for this incompleteness of compensating differentials.

In Section II, I offer some alternative explanations. The first is based on an optimal contracting model in which the wage paid can depend on all the attributes of a worker's assignment; the assignment itself is assumed to be determined only after the worker is hired. I assume that there are some restrictions on worker mobility, such as relocation or training costs, that free the employer from the absolute need to compensate employees fully for every variation in their work environment. Still, under the terms of an optimal contract, risk-neutral employers always insure risk-averse employees against income fluctuations, and one might guess that employers would also insure employees against other sources of fluctuations in their welfare. Such a guess would be far off the mark. For example, with any Cobb-Douglas specification of ordinal preferences over working conditions and wages, an optimal contract can specify that *higher* wages be paid to employees enjoying *better* working conditions! More generally, when employees care about both working conditions and consumption and provided that consumption is a normal good, employees will prefer assignments with good working conditions because under an optimal contract poorer working conditions are not fully compensated by higher wages. The magnitudes of these effects depend on employee risk aversion: As risk aversion increases, the optimal wage schedule is transformed toward one with fully compensating differentials.

Two additional contracting models are also analyzed in Section II. In these models, unlike the one just discussed, job characteristics matter to employees only to the extent that they affect income. In each model, I compute the optimal contract and then study the income streams attached to different assignments. In the first, employees are found to prefer assignments that build their human capital because these raise future wages *with no offsetting current wage reduction*. In the second, employees are found to prefer "critical" jobs—defined as those for which quits are especially costly to the employer—because these jobs pay higher wages. In all three models, employees care about events that occur after the date of hiring. And, in all three, an employee's ranking of these events bears no necessary relation to the ranking based on employer net profits.

Influence activities and the optimal limitation of executive and management discretion are analyzed in Section III by means of a model in which employees allocate their time between influence activities and some directly productive activity. Although the firm can use its compensation policy to alleviate influence costs, it will sometimes prefer to restrict the decision maker's discretion instead. There are two key parameters in the model that are used to characterize when the discretion of management should be restricted. The first parameter measures the importance of the decision to the organization; it is essentially the excess of the expected payoff from making an informed decision over that from holding unconditionally to the status quo. The second measures the redistributive potential of a change; it is the utility that would be transferred from one employee to another if a change from the status quo were authorized without any compensating wage adjustment. In an efficiently designed organization, management will be allowed no discretion over those decisions that are of little importance to the organization but that have potentially large redistributive consequences.

As an illustration of efficient design, consider American Airlines' procedure for assigning flight attendants to routes. Once a month, flight attendants bid for the routes they prefer, with conflicts resolved on the basis of seniority.[1] Management exercises no discretion over the assignment decision. This is perfectly appropriate: The airline cares little about which attendants are assigned to which routes, but the flight attendants care a great deal. American Airlines' practice, like many standard operating procedures, can be understood as an attempt to avoid the influence activities that would result if management exercised discretion in assigning flight attendants to routes.

Rosenberg and Birdzell (1986) have emphasized the historical importance for Western economic growth of the "immunity [of innovators] from interference by the formidable social forces opposed to change, growth, and innovation" (p. 24). In terms of the theory presented here, the social costs of an incorrect decision to allow experimentation with, say, a new steel-making process or a new sailing ship design were small compared with the potential redistributive consequences of a successful innovation. Thus it was wise or lucky that Western governments established no agencies with authority to review and reject proposed innovations. In contrast to the continuous commercial and industrial development in the West since the Middle Ages, Chinese development under the tight control of its powerful

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[1] For international flights, some positions are reserved for suitably multilingual flight attendants, and only those with certified fluency are permitted to bid for those positions.

scholar-bureaucrats was slow, despite the advanced state of China's science and the capital accumulations of its merchants.[2]

A brief review of some related theoretical literature is given in Section IV, applications are suggested in Section V, and concluding remarks are offered in Section VI.

II. Why Full Compensating Differentials Are Not Paid

Following Coase (1937) and Simon (1951), let us suppose that at the time of contracting neither the employer nor the employee knows precisely what conditions will prevail at the time that work must actually be performed. In an academic job market, a new professor may not know who his colleagues will be, which courses he will teach, what his committee and administrative responsibilities will be, which office and secretary will be assigned to him, who his research assistant will be, and so forth. These characteristics of the job, to be determined after the employment relation begins, will be denoted by x. The employment contract specifies a wage that may be a function of the undetermined characteristics: $w = w(x)$.

To build a simple formal model of this situation, assume that the possible circumstances $\{x_1, \ldots, x_N\}$ and their probabilities $\{p_1, \ldots, p_N\}$ are given exogenously. Let w_i denote the wage paid in circumstances x_i. Suppose that the employee's preferences are given by the von Neumann–Morgenstern utility function $u(x, w)$. For brevity, let us write $u_i(w)$ for $u(x_i, w)$. Assume that each u_i is twice continuously differentiable with $u_i' > 0$. The employer is a risk-neutral expected net profit maximizer; it receives revenues of π_i in event x_i. Suppose that, at the time of contracting, labor market conditions require the employer to offer the agent an expected utility of at least $\bar{u}$. Further suppose that the employee, after signing the contract and learning that the job is x, will quit and reenter the labor market unless $u(x, w(x))$ is at least some reservation level $\hat{u} < \bar{u}$, where $\bar{u} - \hat{u}$ reflects mobility costs. The employer, however, is assumed always to be bound by the contract. An efficient contract, subject to the employee's "no quitting" constraint, solves

$$\text{maximize} \sum_{i=1}^{N} p_i(\pi_i - w_i) \qquad \text{(CP)}$$

[2] Needham (1969, p. 197) holds that "capital accumulations in Chinese society there could indeed be, but the application of it in permanently productive industrial enterprises was constantly inhibited by the scholar-bureaucrats, as indeed was any other social action which might threaten their supremacy."

subject to

$$\sum_i p_i u_i(w_i) \geq \bar{u},$$

$$u_j(w_j) \geq \hat{u} \quad \text{for all } j = 1, \ldots, N.$$

Let us consider a family of problems like (CP), parameterized by $\bar{u}$. Take $\hat{u}$ to be any function of $\bar{u}$ such that $\hat{u}(\bar{u})$ is always less than $\bar{u}$. When does the optimal contract pay full compensating differentials, leaving the employee indifferent among posthiring events?

THEOREM 1. A solution to (CP) exists and makes the employee indifferent among outcomes and just willing to work ($u_i(w_i^*) \equiv \bar{u}$) for every $\bar{u}$ in the range of u_1 if and only if u_1 is concave and for all i there exists g_i such that

$$u_i(w) \equiv u_1(w + g_i) \quad \text{for all } w. \tag{1}$$

Proof. It is routine to check that (1) and the concavity of u_1 imply that the optimal contract exists and satisfies $u_i(w_i^*) \equiv \bar{u}$; attention is focused on the reverse implication. Regarding w_i^* as a function of $\bar{u}$, the hypothesis is that $u_i(w_i^*(\bar{u})) \equiv \bar{u}$ for all i and all $\bar{u}$ in the range of u_1, that is, $w_i^* = u_i^{-1}$. The first-order necessary conditions for optimality in (CP) imply that, for all i and all $\bar{u}$ in the range of u_1,

$$u_1'(w_1^*(\bar{u})) = u_i'(w_i^*(\bar{u})). \tag{2}$$

Then $w_1^{*\prime}(\bar{u}) = w_i^{*\prime}(\bar{u})$. Hence, $w_1^*(\bar{u}) \equiv w_i^*(\bar{u}) + g_i$ for all $\bar{u}$ in the range of u_1, where the g_i's are constants of integration. Then, for any fixed $w, u_1(w + g_i) = u_1[w_i^*(u_i(w)) + g_i] = u_1[w_1^*(u_i(w))] = u_i(w)$. This holds for all w, as required.

Given the identity just derived, the second-order necessary conditions imply that $u_1''(w_1^*(\bar{u})) \leq 0$ for all $\bar{u}$, which establishes concavity. Q.E.D.

An optimal contract equates a risk-averse employee's marginal utility of income in the different events x; it does not also equate his utilities in the different events unless the employee has ordinal preferences that can be represented by vertically parallel indifference curves in (x, w)–space. This characterization of ordinal preferences is quite restrictive. When it fails, the optimal contract will not leave the employee indifferent among assignments.

Now let us make an obvious but quite important observation: At the optimal contract, the employee's wages w_i^* do not depend at all on the gross profit levels π_i. Consequently, *there is no necessary relationship between the employer's ranking of outcomes and the employee's.* Later, when the possibility that the employee can influence the distribution of x is introduced, this divergence of rankings will become quite important.

Theorem 1 is just a starting point. It tells us that full compensating differentials are rarely paid in a large class of contracting models. The remainder of this section is devoted to the development of examples to illustrate the following points: (1) There is not even a general *tendency* for optimal wage schedules to compensate for job characteristics, so that employee job concerns under optimal contracts may be quite pronounced; (2) increases in risk aversion tend to lead to the payment of fuller compensating differentials; (3) employees may care about job attributes under optimal contacts even when, contrary to the simple model just presented, job attributes are not an argument of employee utility functions; and (4) these models lead to plausible predictions about the kinds of preferences among job characteristics that employees may systematically show.

Example 1: Preference for Good Working Conditions

Let $x \geq 0$ denote either working conditions or on-the-job consumption[3] and let $w \geq 0$ denote the wage or at-home consumption. Suppose that the employee's ordinal preferences have the Cobb-Douglas form $x^{\alpha}w$ and that his coefficient of relative risk aversion for wage gambles is the constant $\beta > 0$, so that the employee is risk averse. These cardinal preferences are represented by $U(x, w) = \alpha \ln(x) + \ln(w)$ in case $\beta = 1$ and by $U(x, w) = (x^{\alpha}w)^{1-\beta}/(1 - \beta)$ in case $\beta \neq 1$. Suppose that the employee's initial reservation utility level is $\bar{u}^{1-\beta}/(1 - \beta)$, with $\bar{u} > 0$ and $\hat{u} = -\infty$. Then the solution to the contracting problem (CP) is $w(x) = \lambda x^{\alpha(1-\beta)/\beta}$ for some constant λ that depends on the parameters α, β, $\bar{u}$, and $(p_1, \ldots, p_N)$. Notice in particular that if $\beta < 1$, then $w(\cdot)$ is actually an increasing function of x: This establishes that there is no general tendency for optimal contracts to pay even partial compensation for unfavorable working conditions.

In this example, the ordinal utility associated with job x can be measured by $x^{\alpha}w(x) = \lambda x^{\alpha/\beta}$; it increases in x for any level of risk aversion. This last observation is a special case of a general result that has been derived by several authors including Chari (1983), Green and Kahn (1983), and Bergstrom (1986). Their result, applied to this model, holds that if on-the-job consumption is a normal good, then the optimal wage contract will always lead employees to prefer jobs with higher x.

In example 1, as the coefficient of relative risk aversion β increases, the ordinal utility measure $x^{\alpha}w(x) = \lambda x^{\alpha/\beta}$ becomes increasingly flat and converges to the constant $\bar{u}$. With increases in risk aversion, the

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[3] Stafford and Cohen (1974) supplied one of the earliest economic treatments of on-the-job consumption in a study of how work effort varies during the workday.

optimal contract pays higher wages in bad jobs and lower wages in good jobs until, in the limit as relative risk aversion tends to infinity, full compensating differentials are paid. The proposition proved below generalizes the example and establishes that, for fixed ordinal preferences represented by a smooth utility function $U(x, w)$ that is concave in w, if increases in risk aversion cause the wages to rise in some jobs and to fall in others, then the wages rise in "poor jobs" and fall in "good jobs."

Let $U(x, w)$ represent the preferences of the less-risk-averse employee and $V(U(x, w))$ the preferences of the more-risk-averse employee. Assume that $U_w > 0$, $U_{ww} < 0$, $V' > 0$, and $V'' < 0$. In the finite state model, we may assume without loss of generality that $V'(u) \to -\infty$ as $u \to -\infty$ and $V'(u) \to 0$ as $u \to +\infty$. The reservation utility levels for the two problems are $\bar{u}$ and $\bar{v}$; no assumption is made about how they are related. When an interior optimum to the two optimal contracting problems is assumed, the marginal utilities of income across assignments are equalized for each of the two agents: $U_w(x, w(x)) = \lambda$ and $V'(U(x, \hat{w}(x)))U_w(x, \hat{w}(x)) = \mu$ for all x, where $w(\cdot)$ and $\hat{w}(\cdot)$ are the respective optimal wage schedules.

THEOREM 2. There exists u^* such that, for all x, $u^* \leq U(x, \hat{w}(x))$ if and only if $w(x) \geq \hat{w}(x)$. That is, as the employee grows more risk averse, the ordinal utility levels associated with each assignment are contracted toward a level u^* by raising wages in assignments with lower utility and reducing wages in assignments with higher utility.

Proof. Fix u^* so that $V'(u^*) = \mu/\lambda$. Then (since U_w is positive and V' is decreasing) $u^* \leq U(x, \hat{w}(x))$ if and only if $\mu = V'(U(x, \hat{w}(x)))U_w(x, \hat{w}(x)) \leq (\mu/\lambda)U_w(x, \hat{w}(x))$, which holds if and only if $U_w(x, \hat{w}(x)) \geq \lambda = U_w(x, w(x))$. Since $U_{ww} < 0$, this holds if and only if $w(x) \geq \hat{w}(x)$. Q.E.D.

Under the additional assumptions that $\bar{v} = V(\bar{u})$ and that $-V''(\cdot)/V'(\cdot)$ is bounded below by a constant r, it can be shown that $U(x, \hat{w}(x)) \to \bar{u}$ as $r \to \infty$; that is, as the lower bound on the coefficient of absolute risk aversion tends to infinity, wages tend to compensate fully for variations in working conditions.

Example 2: Preference to Accumulate Human Capital[4]

This example is a variation on example 1 in which the relevant attribute of the job, contribution to general human capital, is not a direct argument of the worker's utility function.

Suppose that the employee has a two-period life. His productivity in period 1 is p; in period 2 either it is p again or, if he has increased his human capital in the first period, it is $q > p$. There is no firm-

[4] This model and its analysis are adapted from Harris and Holmstrom (1982).

specific human capital, so the worker's productivity does not depend on whether he remains with his initial employer. There are two possible events in the first period. In the first event, which arises with probability r, the employer will assign the worker to a task that increases his second-period productivity to an amount $q > p$. In the second, which occurs with probability $1 - r$, the worker is assigned to a task in which human capital is unchanged, so the worker's second-period marginal product will be p.

At the beginning of the second period, the worker is free to quit the firm and go to work elsewhere for a wage equal to his current marginal product. This mobility imposes a lower bound on the wage the worker can be paid in the second period. However, there are some market frictions: The employee cannot leave during the first period after learning his job assignment.

Let π_j be an increment to the firm's revenues when event j occurs and w_{ij} the corresponding period i wage. Assume that competition among similar firms drives the expected wage over the two-period contract to be equal to the worker's expected marginal product over that period, which is $rq + (2 - r)p$. The model also assumes that the worker can neither borrow nor save (although only the no-borrowing constraint is in fact binding) so that his consumption is equal to his income in each period. Competition among employers will lead them to offer an efficient contract, one that maximizes the worker's utility subject to the maximum expected wage constraint and the constraints on second-period wages:

$$\text{maximize } r[u(w_{11}) + u(w_{21})] + (1 - r)[u(w_{12}) + u(w_{22})] \quad (3)$$

subject to

$$r(w_{11} + w_{21}) + (1 - r)(w_{12} + w_{22}) = rq + (2 - r)p, \quad w_{21} \geq q, w_{22} \geq p,$$

where u is some strictly concave function.

This is a concave maximization problem with linear constraints, so its optimal solution is fully characterized by a first-order condition. It is not hard to verify that the unique optimal solution has $w_{21} = q$ and $w_{11} = w_{12} = w_{22} = p$ with Lagrange multipliers of $u'(p)$, $r[u'(p) - u'(q)]$, and zero, respectively, on the three constraints. Thus in each period the employee is paid his current marginal product. An employee who is fortunate enough to be assigned to job 1 acquires valuable human capital but suffers no offsetting wage reduction under the terms of the optimal contract. Consequently, employees prefer job assignments that increase their human capital. The employer's net profit under the contract in event j is precisely π_j, an amount unrelated to the employee's human capital acquisition. So the employee's interests may conflict with the employer's.

Example 3: Preference for "Critical" Jobs

The final example is a simple "efficiency wage" model. According to efficiency wage theories, the productivity of an employee is an increasing function of his wage, so employers may find it optimal to pay a wage exceeding the market-clearing level. Higher wages may increase productivity for a wide range of reasons; for example, they may encourage employees to work more diligently or they may attract better applicants or reduce employee turnover. Several of the important papers in the efficiency wage literature are reprinted in a volume edited by Akerlof and Yellen (1986) together with a helpful survey by the editors.

The purpose here is to note that the same factors that make an employer choose to pay wages in excess of market clearing may also make it choose to pay different wages for different jobs in a way unrelated to employee qualifications so that employees will care about how those jobs are assigned. In particular, it is shown below that wages are positively related to the costs of job turnover since higher wages reduce costly turnover.

Thus assume that the gross profits earned when x_i occurs are π_i if the employee works and $\pi_i - \Delta_i$ if he quits. The agent is assumed to be a risk-neutral expected wage maximizer: His utility is w if he works in job i at wage w, $g + b$ if he is laid off and receives a layoff bonus b, and $g + b_Q$ if he quits and receives bonus b_Q. The variable g—the employee's outside opportunities—is privately observed by the employee after the job is assigned and is drawn from a distribution F with a density function f that is continuous and positive on the interval $(0, \bar{g})$. There is no bonding of employees, and the employer cannot penalize the employee for quitting; that is, $b, b_Q \geq 0$.

To ensure an interior optimum for the contracting problem, assume that $\bar{g} > \max_i \Delta_i > \min_i \Delta_i > 0$. To have the optimum characterized by first-order conditions, also assume strict quasi concavity of the objective (4) below for all values of Δ; this amounts to the assumption that $w + [F(w)/f(w)]$ is increasing in w.

If the employer's only instrument were to set wages w_i to pay in each event and a termination bonus b to pay to departing employees, the employee would quit whenever his outside opportunities were at least $w_i - b$. The problem could then be written in the form

$$\max \Sigma p_i\{(\pi_i - w_i)F(w_i - b) + (\pi_i - \Delta_i - b)[1 - F(w_i - b)]\} \quad (4)$$

subject to

$$\Sigma p_i\left[w_i F(w_i - b) + \int_{w_i - b}^{\bar{g}} (g + b)f(g)dg\right] \geq \bar{u}.$$

The wage policy w_i that maximizes (4) takes the form $w_i = w(\Delta_i)$. Since w_i does not depend on π_i, there is no necessary relation between the interests of the employer and those of the employee. Thus, as in the previous models, arbitrarily severe conflicts of motives can arise between the employer and the employee. The heuristic optimal wage policy satisfies the rearranged first-order condition

$$\Delta_i = (w_i - b) + (1 - \lambda) \frac{F(w_i - b)}{f(w_i - b)}, \tag{5}$$

where λ, the Lagrange multiplier of the single constraint, is the marginal cost of providing an extra dollar of expected income to the employee. It is clear that λ cannot exceed one. Hence, the right-hand side of (5) is increasing in w_i, so wages increase with Δ_i: Employees prefer to occupy "critical" jobs in which turnover is costly to the employer.

In an appendix of the working paper version of this paper (Milgrom 1987), I present a full formal analysis of this problem without the restriction to simple wage policies used above. In the full model, the employee may report his outside opportunities to his employer, but the truthfulness of any report cannot be assured. The employer can take account of the report in setting wages and termination bonuses and in making layoff decisions; it can also randomize on the basis of the report. The upshot is that none of these additional options is useful to the employer and that the heuristic analysis given above yields the right answer:

THEOREM 3. The employer has an optimal policy that requires no randomization or reporting by the employee. The policy establishes a termination bonus b and, for each assignment i, a wage w_i; the employee quits whenever his outside option pays more than $w_i - b$. Under this optimal policy, the wage $w_i = w(\Delta_i)$ is an increasing function of Δ_i.

III. When Does It Pay to Restrict Management Discretion?

We now consider a simple model of influence in which the employee allocates his available time T between two activities, a directly productive activity and an influence activity. If the employee spends time t at the directly productive activity, then his output will be "high" with probability $p(t)$ and "low" with probability $1 - p(t)$. The organization will earn an extra profit of π if output is high. Assume that $p'(t)$ is continuous and strictly positive and $0 < p(t) < 1$ on $[0, T]$.

If the employee spends time s at influence activities and the central decision maker has discretion to authorize a change from the status quo, then the change will be authorized with probability $q(s)$ and the expected increment to profits from added flexibility in decision making will be $I\gamma(s)$. Assume that $q'(s)$ and $\gamma(s)$ are continuous and strictly positive on $[0, T]$. The positive parameter I measures the "importance" of the decision in terms of its potential to improve profits.

The employee's preferences are specified by a utility function that provides utility of $u(w)$ for a wage w in the status quo and $u(w) + k$ for a wage w when a change in conditions is approved ($k > 0$). Assume that u is defined on $[0, \infty)$, that $u' > 0$, and that $u'' < 0$. With these preferences, the employee has no actual aversion to spending time in productive activities. Formally, that distinguishes this model from the moral hazard models studied by Harris and Raviv (1979), Holmstrom (1979), Grossman and Hart (1983), and Holmstrom and Milgrom (1987). However, this is a moral hazard model because if management has discretion to change the status quo, then there is an opportunity cost to other workers' time: Time spent in production is unavailable for influence activities.[5] This is represented by the constraints $s + t \leq T$ and $s, t \geq 0$.

The wage paid may depend on the decision (change or no change) and on the employee's output performance (high or low). There are four possible decision-performance outcomes. Individual outcomes are denoted by i and their corresponding probabilities and wages are denoted by $p_i(s, t)$ and w_i.

When the executive has discretion, a rational, self-interested employee will seek to

$$\text{maximize}_{s,t} \ \Sigma p_i(s, t)u(w_i) + q(s)k \tag{6}$$

subject to $s + t \leq T$ and $s, t \geq 0$. The social objective is given by

$$\Sigma p_i u(w_i) + \lambda[I\gamma(s) + p(t)\pi - \Sigma p_i w_i], \tag{7}$$

where $\lambda > 0$. This objective is a positively weighted combination of the firm's profits and the employee's utility, but it excludes the employee's utility increment k. Excluding k from the social objective represents the assumption that this employee's gain is a loss to some other employee who is accorded equal weight in the social calculus. Thus k denotes the magnitude of the redistributive effect of any decision.

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[5] Holmstrom and Ricart i Costa (1986) have emphasized that moral hazard does not require that employees be averse to hard work. In their model, a manager's career concerns can lead him to make investment decisions different from those his employer would like, which leads the employer to adapt its capital budgeting procedure to alleviate the incentive problem.

Fix a time allocation (s, t) and let $V(s, t)$ be the optimal value of the corresponding "implementation problem":

$$\text{maximize } \Sigma p_i[u(w_i) - \lambda w_i] + \lambda p(t)\pi \qquad (8)$$
$$\{w_i\}$$

subject to (s, t) solves (6). In standard fashion, $V(s, t)$ is an upper semicontinuous function on $[0, T] \times [0, T]$.

With this notation, the social problem can be expressed as $\max_{s,t} V(s, t) + \lambda I \gamma(s)$. The value of this transformed social objective is increasing in I, so the optimal value is increasing in I as well.

When there is no decision maker with authority to alter the status quo, the maximal social payoff is

$$\overline{V} = \max_w u(w) - \lambda w + p(T)\pi.$$

LEMMA. $\overline{V} > \max\{V(s, t) | s + t \leq T, s, t \geq 0\}$.

Proof. First, we claim that $\overline{V} > V(0, T)$. Indeed, $\overline{V}$ is the maximal value of the relaxed version of (8) with $s = 0, t = T$, and the incentive constraint—that (s, t) maximizes (6)—omitted. The unique optimum of the relaxed problem has $u'(w_i) = \lambda$ for all i. But then $(0, T)$ does not maximize (6), so the optimal value of the constrained problem is less than the optimal value of the relaxed problem: $\overline{V} > V(0, T)$.

Next we claim that $\overline{V} > V(s, t)$ for all (s, t) with $t < T$. Indeed, the optimal value of the relaxed version of (8) with the incentive constraint omitted is obtained by setting $u'(w_i) = \lambda$ for all i, which yields the optimal value $\overline{V} + \lambda[p(t) - p(T)]\pi$. Since $\lambda\pi p' > 0$, this is less than $\overline{V}$ for all $t < T$, as claimed.

Finally, since V is upper semicontinuous, there exists a pair (s^*, t^*) such that

$$V(s^*, t^*) = \max\{V(s, t) | s + t \leq T, s, t \geq 0\}.$$

Whatever that pair is, $V(s^*, t^*) < \overline{V}$. Q.E.D.

The optimal value achieved when management has no discretion to authorize a change is $\overline{V}$, and $\max_{s,t} V(s, t) + \lambda I \gamma(s)$ is the optimal value when management does have discretion. In view of the lemma and the boundedness of $\gamma(\cdot)$, it is clear that as I approaches zero it is best to restrict management discretion.

THEOREM 4. There exists a pair of parameters (I, k) such that when these parameters prevail, it is better to eliminate discretion than to provide wage incentives to limit influence activities. Moreover, if (I, k) is such a pair and if $I' \leq I$ and $k' \geq k$, then (I', k') is another such pair.

Proof. The arguments preceding the theorem establish all its assertions except the assertion that if discretion is optimally permitted for the parameter pair (I, k) and if $\hat{k} < k$, then discretion is optimally

permitted for the pair $(I, \hat{k})$. For this, it suffices to show that, for all (s, t) and k, $V(s, t|\hat{k}) \geq V(s, t|k)$, where the notation now notes explicitly the dependence of the optimal value of (8) on the parameter k.

Suppose that $\{w_i\}$ solves (8) for parameter value k and let $\bar{u} = \Sigma p_i u(w_i)$. For $\hat{k} < k$, define $\hat{w}_i$ by $u(\hat{w}_i) = [1 - (\hat{k}/k)]\bar{u} + (\hat{k}/k)u(w_i)$. Let $U(s, t|k, w) = \Sigma p_i(s, t)u(w_i) + q(s)k$ and define $U(s, t|\hat{k}, \hat{w})$ similarly. Then, for all (s, t),

$$U(s, t|\hat{k}, \hat{w}) = \left(1 - \frac{\hat{k}}{k}\right)\bar{u} + \left(\frac{\hat{k}}{k}\right)U(s, t|k, w) \qquad (9)$$

so that if (s, t) maximizes $U(s, t|k, w)$, then it also maximizes $U(s, t|\hat{k}, \hat{w})$.

Since u^{-1} is convex, by Jensen's inequality

$$u^{-1}(\bar{u}) = u^{-1}[\Sigma p_i u(w_i)] \leq \Sigma p_i w_i. \qquad (10)$$

Applying Jensen's inequality and substituting from (10), we get

$$\begin{aligned}
\Sigma p_i \hat{w}_i &= \Sigma p_i u^{-1}\left[\left(1 - \frac{\hat{k}}{k}\right)\bar{u} + \left(\frac{\hat{k}}{k}\right)u(w_i)\right] \\
&\leq \Sigma p_i\left[\left(1 - \frac{\hat{k}}{k}\right)u^{-1}(\bar{u}) + \left(\frac{\hat{k}}{k}\right)w_i\right] \qquad (11) \\
&\leq \Sigma p_i w_i.
\end{aligned}$$

It follows from (9), (11), and the definition of $V(\cdot)$ that $V(s, t|\hat{k}) \geq V(s, t|k)$, as required. Q.E.D.

A number of assumptions have been incorporated into the model to keep things simple, and one may well wonder: How far can these be relaxed? First, the restriction to two output levels (high and low) is plainly dispensable; what is important for the argument is only that the moral hazard problem be severe enough that the first-best is unattainable when management discretion is unlimited.

Second, we have assumed that the $q(s)$ and $\gamma(s)$ functions are given exogenously so that the decision criterion to be used by management is not a choice variable of the problem. If there are several possible decision criteria but these cannot be committed to ex ante (perhaps because it is hard even to describe a standard of evidence that will be required), then once again the decision criterion is not a choice variable, and theorem 4 holds precisely as stated.

Third, the model has been set up with k as a purely redistributional parameter. We would have reached a conclusion similar to theorem 4 if we included k in the social objective in the following way. Let I, formerly a positive parameter, be allowed to take negative values as well. Define a social importance function $\hat{I}(s) = kq(s) + \lambda I\gamma(s)$. The costs of unlimited discretion still depend only on k and the gains only

on $\hat{I}(\cdot)$. Then a result resembling theorem 4 can be obtained in terms of the social importance function $\hat{I}$ and the real parameter k.

Finally, several of the assumptions made here have been relaxed by Milgrom and Roberts (1987b), who studied influence activities by workers seeking a desirable job assignment. Their model includes the possibilities of competition among workers, promotions as rewards for past performance, and decision rules that are chosen in advance by management. Despite these differences, their conclusions reinforce the general finding that central decision makers ought not always be allowed full discretion to make optimal decisions given the facts at hand since that leads to excessive influence activity.

IV. Related Literature

Williamson (1985) and Grossman and Hart (1986) have offered an alternative explanation of the diseconomies of centralized control that emphasizes the hazards that arise from opportunistic behavior by the owner-managers of integrated firms. These theories complement the one presented here, which emphasizes distortions in the behavior of those who inform and advise the executive that accompany increases in executive authority. These two theories are among those integrated into a general transaction costs framework by Milgrom and Roberts (1987a).

The theory here can be viewed as an extension of the rent-seeking theories developed by Tullock (1967), Krueger (1974), Posner (1975), Buchanan (1980), and Bhagwati (1982). These theories hold that government-granted subsidies, tariffs, and monopolies impose welfare losses on society because they lead businesses to waste resources in attempts to win tariff protection or monopoly rights for themselves. The analyses all indicate that government interventions ought sometimes to be limited in order to discourage wasteful rent-seeking activity.

The analysis here extends these theories in two principal respects. First, this is explicitly a cost-benefit analysis. Because those most affected by a decision are often among those best informed about the alternatives and their consequences, or are at least best motivated to discover and analyze the alternatives and their likely consequences, a reasonable theory must allow the possibility that the activities of rent seekers can lead to better decisions. Second, the scope of the theory is expanded beyond the public sector. There are tremendous payoffs in the private sector from "salesmanship"—both the actual commissions earned by salesmen and the gains to having one's ideas accepted or projects adopted or performance evaluated favorably. This analysis substitutes a broad focus on the costs of centralized authority for the usual narrower focus on the costs of government intervention.

Within firms, influence activities can be controlled by compensation policy, by limiting access to the decision-making process, or by limiting management discretion. In public-sector decision making by regulatory bodies and legislatures—especially in a society in which public access to decision makers is regarded as a matter of right—the corresponding instruments to control lobbying and influence are weaker. Consequently, influence costs are likely to be higher in the public sector than within firms. Thus one argument in favor of small government bureaucracies is that they limit the ability of the government to process decisions and so represent a way to restrict the government's discretionary decision powers.

V. Applications

The approach here points to possible economic explanations for and analyses of phenomena traditionally studied by sociologists as well as to new analyses of some traditional economic problems. Here are just a few examples.

1. *Resistance to change.*—As we have seen, employees in even the best-run firms are rarely indifferent about matters that affect their working conditions or job content. Employees can be expected to resist those changes that threaten to leave them less well off by failing to cooperate in the search for better ways to do business or by subverting changes in the hope of restoring the older order. This rent-seeking theory contrasts with noneconomic theories in the way it identifies the sources of resistance, the kinds of changes that it predicts will be most vigorously opposed, and the strategies that it predicts will be adopted to overcome resistance by successful firms in rapidly changing environments. (See Milgrom and Roberts [1987*b*] for a more extensive analysis.)

2. *Vertical integration.*—When a firm's key suppliers are not perfect competitors (i.e., their prices exceed their marginal costs), they may incur excessive selling costs and impose decision costs on the buyer in their attempts to earn the rents associated with marginal sales. All these costs are influence costs that can be reduced or eliminated by vertical integration (which restricts the buyer's discretion about from whom to purchase). Any gains realized in this way must be balanced against the losses from reduced discretion and the costs of newly centralized authority over other decisions in the integrated organization.

3. *Takeover bids/golden parachutes.*—According to Jensen and Ruback (1983), empirical evidence indicates that the stockholders of the acquirer do not earn conspicuous excess returns. Thus the economic motive for takeovers may well be the increased rents earned by the management of the acquirer, for example, because their in-

creased authority in the merged firm makes their jobs more "critical" in the sense of example 3 of Section II. Mere transfers of the rents earned by the former management to the shareholders and new management do not enhance efficiency, and that part of takeover activity by the acquiring firm and defensive activity by the target firm's management that is simply redistributive is wasteful. Golden parachutes, properly designed, are executive compensation packages that force potential acquirers to reimburse former managers for any lost rents when there is a transfer of control. These discourage inefficient takeovers and reduce both rent seeking by potential acquirers and rent-protecting behavior by existing management. The consequent efficiency gains ultimately benefit the shareholders.

4. *Litigation policy.*—A court trial is a centralized decision process in which the disputants often incur huge costs to effect a redistribution of wealth. As "bright-line" law fades and parties become less sure of the likely outcome of litigation, the discretion of juries and judges correspondingly rises.[6] Damage rules play the role that wages played in this study of influence within firms: Rules limiting damages reduce influence costs at the expense of other objectives such as paying "just" compensation or creating efficient incentives for contractual performance.

VI. Concluding Remarks

The economic environment described here differs markedly from the neoclassical, perfectly competitive spot contracting environment in which buyers are indifferent at the margin about what they buy, sellers are indifferent about incremental sales, and workers are indifferent about employer decisions. Instead, people care about decisions and attempt to influence them. When decision makers are honest and rational, influence takes the form of suggesting alternatives and supplying information, opinion, and analysis; when they are not, influence may take more insidious forms. Efficient organization design seeks to do what the system of prices and property rights does in the neoclassical conception: to channel the self-interested behavior of individuals away from purely redistributive activities and into well-coordinated, socially productive ones. The success that a society's in-

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[6] Even those who are firmly bound to pursue a fixed objective or to adhere to a fixed set of rules have discretion to the extent that they may exercise judgment in interpreting and applying rules, admitting and evaluating evidence, resolving ambiguities, etc. For judges and juries, conflicting precedents and novel circumstances result in increased discretion for decision making, which makes it possible for interested parties to profit from what I have dubbed "influence activities."

stitutions have in achieving this objective is a major determinant of its economic welfare.

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