AN ECONOMIC APPROACH TO PROCESS IN PAY AND PERFORMANCE APPRAISALS

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ABSTRACT

Economic incentive models seem inconsistent with compensation practices and non-economic writings on reward systems. This paper reconciles economic theory with practice and organizational behavior research in this area, by considering interactions between an organization's reward and career systems. These interactions explain many of the complexities and puzzles of compensation practices. The theory is applied to several topics, including the degree of pay for performance, promotion-based rewards, performance appraisals, pay secrecy, and ambiguity in managing motivation. The model also provides a useful integrating framework for organizational behavior research on rewards. Finally, some ways to integrate organizational behavior and economic research are discussed.
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I. INTRODUCTION

Economic models of motivation (agency theory) have made substantial theoretical progress in recent years. However, actual compensation and incentive practices are at odds with much of this work. Furthermore, this large and expanding area of economics has little obvious relationship to non-economic research on reward systems. In the words of Baker, Jensen, and K.J. Murphy (1988),

Many common features of organizational incentive systems are not easily explained by traditional economic theory—including egalitarian pay systems in which compensation is largely independent of performance, the overwhelming use of promotion-based incentive systems, the absence of up-front fees for jobs and effective bonding contracts, and the general reluctance of employers to fire, penalize, or give poor performance evaluations to employees. Typical explanations for these practices offered by behaviorists and practitioners are distinctly uneconomic ...

Whereas economists focus on formal models linking performance and rewards, organizational behavior scholars consistently stress that the process of managing a pay system is equally as important as the formal design of the system. In other words, managing incentives is said to be more than obtaining a performance measure and tying it to compensation in a formulaic way. These writers place equal, if not greater, importance on the psychological interactions between a supervisor and subordinate, individual perceptions, social comparisons, equity, trust, and self esteem. These notion seem foreign to agency theory.
In this paper, I try to reconcile agency theory with actual practices and with the writings of organizational behavior scholars and practitioners on compensation and reward systems. This is done by combining two classic but usually separate strands of economic theory—provision of incentives, and sorting of employees into positions in the organization. When a firm is trying to both allocate employees and motivate them, complications arise which are not present in standard incentive models. I show that these complications are a parsimonious explanation for many of the facts observed about compensation practices, as well as for the main themes in the non-economic literature on reward systems. In doing so, I develop a theory which may help economists begin to understand what is meant by process, and why it is important to incentive systems and the theory of the firm. I also hope to form a rigorous integrating framework for much of the organizational behavior research on reward systems. In addition, the theory generates predictions about how optimal compensation and employee appraisal practices relate to several variables. As such, it provides a useful normative model for the design of some key elements of organizational incentive systems.

The paper proceeds as follows. In Section II, I sketch briefly the traditional economic model of incentives, and contrast it with organizational behavior research and observations of actual practices. In Section III, I develop a theory which extends the traditional economic model. This is used in Section IV to reconcile these seemingly widely disparate views of reward systems. Section V provides some additional applications and insights of the theory. The paper is concluded with discussion of a few broader issues in Section VI.
II. AGENCY THEORY CONTRASTED WITH PRACTICE AND NON-ECONOMIC RESEARCH ON REWARD SYSTEMS

A Brief Introduction to Agency Theory

The intuition behind economic agency theory is simple (see Hart and Holmström (1987) and Holmström and Tirole (1989) for extensive surveys). An employee acts as an agent on behalf of a firm. The outcome of this work, and the worker's actions, are usually not perfectly observable. Therefore, if the employee and the firm have different objectives, there is an incentive problem between the two parties. The solution to this problem, aligning the interests of a firm and a worker, is the goal of agency theory, as well as of much work in organizational behavior and human resource management.

According to economic theory, money is a general unit of exchange, and therefore should play a particularly important role in incentive systems. In essence, it allows the employee to choose his or her own rewards (at least those which can be purchased with money), and therefore has an advantage over other forms of rewards. However, regardless of what form the rewards take, such as pay, status, or recognition, agency theory implies that the motivation problem is addressed by measuring performance and tying rewards to the measures. Thus, in theory, a reward system uses available information to most accurately (and cost-effectively) measure performance and tie pay and other rewards to the outcome of the measurement process. Different employees doing the same job would earn different rewards, depending on performance.

This idea is the basis for an enormous and rapidly growing literature in economics on firm organization. The largest segment has focused on the use of compensation and other rewards as incentives. Models have studied optimal performance measures, risk-sharing between workers and the firm, multi-period incentive compensation schemes, and the implications of different information
structures on the form of optimal contracts, among other topics. Despite the many complications which have embellished agency theory, the general implication is still that organizations will use rewards, especially monetary, in a wide variety of circumstances to give incentives. Managers will distinguish between employees through performance measures or merit ratings, give them feedback on good and bad performance, and differentiate compensation and rewards on this basis. Indeed, this literature generally assumes (or implies) that the core problem of organization is provision of incentives, and therefore that pay for performance should be pervasive.

**Compensation Practices and non-Economic Research**

The reality of organizational practices seems somewhat different. There are several common traits to observed reward systems which are difficult to explain within the traditional agency theory outlined above. First, if anything, pay systems tend to be oriented more toward pay *equality* than toward pay differentiation. Also, managers are often reluctant to distinguish between employees on the basis of performance. Similarly, firms often set up systems which give very little real information to employees about performance. Finally, even when systems exist which can force managers to provide higher levels of information to employees about performance, or to distinguish between them for rewards, they are rarely used in practice. Moreover, organizational behavior research on these issues focuses on variables which are ignored or suppressed in economics. One element is the level of trust in the compensation system. Another is the psychological impact of feedback on employees. These observations are outlined below.

The most striking feature of pay practices from the viewpoint of economics is the lack of substantial differences in pay among those in the same job. This is usually combined with the major differences in rewards tied to *positions*, not individuals; they come with promotions. Numerous studies have documented this tendency. For example, Medoff and Abraham (1980) found in two
companies that, among the 99% of employees in the same position who received the top three performance ratings, the difference in salary between the highest and lowest rated employees was about 5%. In other studies (Medoff, 1978; Medoff and Abraham, 1981), they found little or no relationship between performance ratings and pay, and that most variation in pay was associated with hierarchical position in the firm. Similar findings are reported by Lawler (1971), Rosenbaum (1984), Hedström (1987a,b), McCue (1988), K.J. Murphy (1990b), and Gibbs (1991b).

Another common phenomenon—especially at large firms that use salary "point" systems—is a tendency toward equality of pay designed into the formal compensation system. While a higher performance rating usually means that one receives a higher salary increase, an increase often depends as well on the employee's salary relative to average pay. Lower raises are given to employees with higher relative salaries. Furthermore, those with higher pay often receive their raises spread over longer periods of time. The effect of both is that lower paid workers, ignoring performance differences, tend to "catch up" to average pay levels through higher raises earned more quickly, while it is difficult to maintain above average pay. These effects can sometimes dominate pay differentials based on performance. Such features are designed into the salary increase guidelines of many compensation systems, and recommended by compensation consultants and textbooks (Belcher and Atchison, 1987). Thus, there may be a tendency to pay equality built into the compensation system despite a correlation between merit ratings and pay increases, and despite the fact that such compensation systems are usually billed to employees as merit pay programs.

The empirical use of merit rating systems is also puzzling from the economic perspective. Managers rarely distinguish strongly between employees under such systems. The distribution of ratings is typically both concentrated and biased. For example, in Medoff and Abraham's study (1980), 95% of employees received one of two ratings in both firms; in both cases these two ratings were on the upper end. Both Medoff (1978) and K.J. Murphy (1990a) show similar data. This is
often true even when the firm attaches words with specific meaning, such as "average" or "above average" to ratings. Interestingly, the tendency toward upward bias in ratings is not unique to supervisors. When asked to rate their own performance, a disproportionate percent of subordinates tend to rate themselves as above average (Bassett and Meyer, 1968; Beer and Gery, 1972; Meyer, 1975).

The systems which firms use to give performance feedback rarely force managers to be very informative to employees. Moreover, reward systems which force managers to be informative, and to make real choices about who has performed well and poorly, do exist. However, they are rarely used in organizations. One example is open salary systems (Lawler, 1972). In such systems (NeXt Computer is a rare current example), employees are told not only their pay, but that of other employees, the rules of the salary system, and exactly how their pay was determined. According to Cook (1975), most companies which have experimented with such systems have found them to be failures. On the contrary, many firms have strict explicit rules or strong implicit norms concerning secrecy about pay (Solomon, 1990). Some have been known to fire employees for revealing compensation levels to co-workers.

Another system which could overcome some of these problems with incentive schemes is forced-curve rating systems. Such systems can force managers to distinguish between employees. Again, however, such systems are rare in practice. General Motors tried to implement one in 1987, but found the experience to be a dramatic failure. Merck is an interesting case study (K.J. Murphy, 1990a,b). In 1987, Merck moved to a forced-curve rating system for most managerial employees. Under the old system, managers rated employees on a scale from 1 to 5, including intermediate pluses and minuses, for a total of 13 rankings. Under the forced curve, this was reduced to 5 rankings, and the new system forced managers to give a single rating to 70% of employees. Overall, ratings were more concentrated and thus less informative under the new system than the old.
The organizational behavior literature has two broad strands related to these observations. The first argues that the key problem with reward systems is a lack of trust by employees. If managers withhold information, or the relationship between rewards and performance is unclear, then employees are said to find the system demotivational. It is this view which has led to suggestions of open salary systems or a stress on openness and communication from a manager to a subordinate, (Hamner, 1975; Lawler, 1987). The greater the openness, the more will employees trust the reward system. This, it is argued, leads to greater motivation. The second strand of research argues that encouraging managers to be more open about performance information can be counter-productive. For example, Meyer, Kay and French (1965) concluded that criticism has a negative motivational effect, praise little effect, and that critical appraisals produce poor performance. According to this view, managers should not be too informative and the reward system should not have too tight a link between pay and performance. Beer (1990) argues that:

Managers do not want to differentiate and no system will be successful in making them do it. Managers understand that to make [distinctions between employees] will create several problems ... When managers are forced to make them, as they are when asked to award a merit increase, they rate everyone on the high side. That is because they do not want to damage an employee's self esteem, thereby demotivating the employee ...

Beer (1989) recommends using "smoke and mirrors" in performance appraisals. In other words, he advocates a system in which managers are not too open with employees, but actively use information to manage employee perceptions of performance and therefore motivation.

Thus, on the one hand some researchers have found that a lack of trust can undermine the motivation from the reward system. On the other hand, others have found that communication can also be demotivational. There seems to be an important tradeoff in reward systems between greater trust and potential demotivation resulting from openness of the system. Firms generally seem to
follow the second strand of recommendations more than the first. According to Lawler (1976), "Secrecy about pay rates seems to be an accepted practice in most business organizations." Such practices are defended by some compensation consultants as well. In discussing open salary systems, Cook (1975) advocates discontinuing their use. Much like Beer, he says that, "Some would argue that these people should be oriented to reality. I believe this is wrong and would be counter-productive, but this is the effect that full disclosure of pay levels, raises, etc. would have over time," and that, "full disclosures of pay levels, merit increases and incentive awards could have a devastating effect on individual morale and self-esteem."

Such practices—little pay for performance within a job, little informative feedback about performance, reluctance of managers to give meaningful information to employees about the reward system, secrecy in administering reward systems, and concerns about trust of the incentive scheme—seem far afield from agency theory. The question then becomes, whether the theoretical apparatus of agency theory has any relevance for actual practice, and if so, how it can be reconciled with these observations. In the next section, I present an economic theory which can explain these observations in a simple way, and gives a unified perspective on organizational behavior research on incentive systems.
III. AN ECONOMIC THEORY OF PAY AND PERFORMANCE APPRAISALS

I now develop a theory of incentives that accommodates the observations made above. A more detailed analytical exposition is available in Gibbs (1991a). The essential idea is that a reward system must be taken in its complete context in order to be fully understood, yet typical economic models abstract away from the relevant context. In particular, there are usually other forms of rewards in the organization in addition to those earned through the merit pay system. The most important of these is the promotion system. As noted above, promotions are the chief form of reward differentiation in most firms. The interactions between motivation from the promotion system and from rewards within a job is the focus of this model.

Although it is beyond the scope of this paper to explain why discrete salary changes would accompany promotions or demotions, I sketch one such argument here (see, e.g., Waldman, 1984; Malcomson and MacLeod, 1988; Bernhardt, 1990). Presumably, promotions and demotions come about over time as the firm learns about the capabilities of employees, and as workers develop skills. In economic terms, promotions involve sorting of employees based on differences in capabilities. Therefore, a promotion is a public signal firm of how the firm values an employee. A promotion to a position of higher responsibility signals that the firm believes the employee to have a higher capability. In most labor markets (with the notable exception of certain sectors in Japan), workers can offer their services to other firms at any time. Thus, an employee can capture the value of this signal of ability on the external labor market if the firm does not offer rewards with promotion, at least to the extent that this ability is general rather than firm-specific human capital. In other words, the external labor market constrains firms to offer differences in compensation with different positions—it forces the firm to tie the reward system to the career system, to some degree. This holds because changes in position in the organization are publicly observable.
The reward from receiving promotion can be quite large, since most salary differences are tied to promotions. If promotion decisions are based on performance (as has been argued by many writers, such as Osterman (1984), especially for white-collar occupations) and employees can work harder to improve performance, then promotions may be a major source of motivation in an organization. This is the corporate "rat race." When this is so, other parts of the reward system must be considered in relation to their effect on promotion-based incentives. Therefore, it is important to understand how promotion incentives work, and how merit systems interact with these incentives.¹

To understand the basic insight, consider a foot race analogy. If a runner is far out in front, her motivation to run hard is smaller than otherwise. Running fast may be intrinsically rewarding, but it is also exhausting and risks injury, so such a runner is likely to slack off somewhat. Similarly, a runner who is far behind the lead also has little incentive to run hard. Those with the greatest reason to run as fast as they can are those who are in a tight race for the finish. According to this logic, a neck-and-neck race is more likely to set records than are other races. The same is true in other sports; football teams rarely put in second string players, but play especially hard, in close games (and in games with higher stakes). This logic should apply to motivation in organizations as well, and this is the intuition of the model.

I now present the formal model. Those who cringe at the sight of equations should not despair; I have tried to give intuition and minimize equations throughout, and present the main results as bullet points. I first analyze a case in which all incentives come from the promotion

¹Throughout the paper, the emphasis is on promotion-based incentives. However, the ideas are equally applicable to any situation in which an employee faces some chance of receiving a discrete reward or punishment, such as demotion, being fired, receiving a choice job assignment, getting the best office, etc.
system, and then consider the implications of adding other forms of rewards. Suppose that employees differ in terms of a parameter, s, which represents their skill or ability. Such ability might be innate, or might be accumulated knowledge from education and on-the-job training. The firm wishes to allocate workers to different positions in the organization, based on differences in skill. In particular, it wishes to sort (promote) those with higher s into a different (higher) level of job in the hierarchy. If a worker's level of s were known in advance, there would be no sorting problem. The firm would merely match workers to positions upon hiring them, and keep them in those positions thereafter. Thus, s must be unknown to the firm in advance; it is assumed that the firm measures performance over time to gauge relative skills of workers. It is also assumed that workers do not know their level of skill s, at least relative to their colleagues or to other criteria the firm uses to decide who to promote. If they did, some form of separating equilibrium contract, in which workers self selected into firms by their ability level, might be possible. For example, a bonding contract in which high s workers received low pay in early periods (or made an up-front payment) and were rewarded by larger pay in later periods after proving themselves, might solve the sorting problem. Indeed, this may explain differences in wage structures across, say, law firms of varying quality. However, within such firms, the organization may still find it important to distinguish between employees for allocation across the hierarchy, and the model will still be relevant.

Employees contribute not only their skill s, but their effort e, in the job. This corresponds to an employee working more carefully, diligently, or harder, and not merely longer hours. Since e is productive, the firm would like the employee to supply effort. However, exertion is costly to employees. Effort is assumed to give the employee disutility C(e), which is increasing in e at an increasing rate; i.e., C’, C” ≥ 0. This means that the harder one works, the more costly would be
additional effort. Therefore, e must be motivated with rewards; this is the incentive problem of concern in agency theory.

Thus the firm has two objectives: measuring ability to allocate the right workers to the right jobs, and motivating effort. In principle, the firm would prefer to be able to measure s and e separately. It could then promote or demote based on skill, and use incentive compensation to motivate the appropriate level of effort. However, since both inputs go into the worker's production, it is assumed that the firm cannot distinguish between s and e. To make this concrete, the performance measure is assumed to be \( q = s + e + \eta \), where \( \eta \) represents measurement error, assumed to have a symmetric distribution around a single mode of 0. Thus the worker's measured performance is affected identically by s and e. This is the essence of the problem; in organizational behavior it is sometimes called the question of promoting for performance or potential. Consider a law firm trying to gauge who to promote to partner. There are two associates, one who is exceptionally bright and did not have to work hard to produce, and the other who is not, but who worked exceptionally hard to produce. The firm would rather promote the former to partner, and motivate her better. However, it may be difficult to tell the two apart—they may have the same measured performance.

An employee's probability of winning promotion depends on his skill s and chosen effort e, since promotion depends on the performance measure q. However, the employee does not know s, nor does he know the firm's estimate of s (which is what ultimately matters to promotion). Therefore, the employee's beliefs about s are important in determining his optimal supply of effort. To model this in a simple way, assume that a worker's subjective beliefs about s may be summarized as a symmetric unimodal distribution with mean \( \bar{s} \). The value of \( \bar{s} \) is a function of the employee's information about performance in previous periods, and will vary across individuals. From the
employee's perspective, there are two types of "luck" involved in performance: the actual value of $s$ relative to the expected value, $s - \bar{s}$, and the measurement error $\eta$. Call the combined "luck" $\varepsilon = s - \bar{s} + \eta$, so that the performance measure is $q = s + \varepsilon + \eta$. Denote the cdf and pdf of $\varepsilon$ as $F(\varepsilon)$ and $f(\varepsilon)$, respectively. Note that $\varepsilon$ is symmetric about and has a single mode at $\bar{s}$, given our assumptions, and if $s$ and $\eta$ are independent. Then, we can write a worker's probability of promotion $p$ as a function of skill and effort, $p = p(s, e)$. Finally, it is convenient to assume that the average value of $s$ across employees in the job equals 0. This is innocuous, as the performance measure can be re-scaled to account for a non-zero average skill level. Thus, $s$ may be interpreted as the employee's best guess about his skill relative to the average worker in his position.

The firm offers a reward for promotion equal to $\Delta EU$, the change in expected lifetime utility which the employee receives on winning promotion, relative to not winning promotion. This is a general way to model the prize, since $\Delta EU$ can include any form of reward the firm offers, including money, prestige, perquisites, or expectations for further advancement. Given these preferences and reward structure, the employee's objective is to choose effort to maximize the expected reward net of the disutility of effort:

$$\max_e \{ p(s, e) \Delta EU - C(e) \}.$$  \hspace{1cm} (1)

The solution to this sets the employee's marginal disutility of effort equal to the gain in utility from winning the prize, times the marginal effect of effort on the chance of winning the prize:

$$C'(e^*) = \frac{\partial p(s, e^*)}{\partial e} \Delta EU.$$  \hspace{1cm} (2)

Equation (2) reveals that incentives from reassignment depend on several factors. The greater the size of the prize ($\Delta EU$), the larger are incentives, as is straightforward to show. Incentives also depend on the sensitivity to additional effort of the chance of winning promotion ($\partial p/\partial e$), and one's
beliefs about relative skill \((s)\). These factors are the focus of the model. \(\Delta EU\) will be discussed briefly in a later section. The second-order condition for an interior solution, which is assumed to exist, is:

\[
\frac{\partial^2 P}{\partial e^2} \Delta EU - C'' \leq 0. \tag{3}
\]

In order to understand the properties of \(\partial p/\partial e\), a specific model of how the firm decides who to promote, based on the performance measure \(q\), is necessary. There are two generally plausible models. The first is one in which a firm has a fixed number of slots to fill with promotees. In this model, workers compete for promotion in a tournament (Lazear and Rosen, 1981). The second is one in which the firm promotes any and all workers whose performance is up to a certain level; this is an absolute standard. These two rules have some different properties (Gibbs, 1991c). For example, in a tournament the number of winners is fixed in advance, and the chance of winning promotion depends on both individual performance and those of colleagues. In a standard, the number of winners is a random variable, but one's chance of winning depends only on individual performance. For the purposes of this paper, however, it turns out that these two models lead to the same basic conclusions. This is because winning in a tournament is essentially like winning in a standard, except that the tournament comparison—performance of colleagues—is a moving target, which adds some randomness to the outcome. To illustrate a tournament and a standard, consider the foot race analogy given above. Most races are tournaments, i.e., against other racers. There are also sports in which the objective is to beat a specified goal, such as par in golf, and performance relative to the goal motivates the athlete. This is the absolute standard model. Readers interested in the tournament case (which is considerably more analytically complicated) may consult my other paper (Gibbs, 1991a); here, the absolute standard case is illustrated.
Let the performance standard for promotion equal $z$. That is, the firm sets a goal $z$ which employees must beat; any that do are rewarded with promotion and the prize $\Delta EU$. Note that the firm's choice of $z$, and the employees' optimal choices of effort $e$ given the standard, determine in equilibrium the expected fraction $p$ who will be promoted. A worker wins promotion whenever $q > z$, or $s + e + e > z$. This happens with probability $\Pr(e > z - s - e) = 1 - F(z - s - e)$. Therefore, $\partial p / \partial e = f(z - s - e)$, and (2) becomes:

$$C'(e^*) = \bar{u}(z - s - e^*) \Delta EU.$$  

(4)

Since $f$ is symmetric and unimodal at 0, the right-hand side of (4) is largest when $z - s - e^* = 0$. In such a case incentives are greatest, because $C'$ is increasing in $e$. This corresponds to a worker who thinks that his equilibrium chance of winning is 1/2, since $p = 1 - F(z - s - e^*) = 1 - F(0) = 1/2$. In other words, the most highly motivated workers feel that in equilibrium it is a "coin toss" whether or not they will be promoted, or that they are just at the margin between winning and losing. For these workers extra effort is most likely to have an effect on the chance of winning, and reduced effort is most likely to make a difference as well. These workers feel that they are just at the margin between winning and losing.

To see which workers have greatest incentives ($z - s - e^* = 0$), it is necessary to understand the relationship between optimal effort and an employee's estimate of his skill. This is done by differentiating the first-order condition with respect to $s$ and solving for $\partial e^*/\partial s$:

$$\frac{\partial e^*}{\partial s} = \frac{\bar{u}'(z - s - e^*) \Delta EU}{-\bar{u}'(z - s - e^*) \Delta EU - C''(e^*)}.$$  

(5)

The denominator of this is negative by (3), so the relationship between incentives and $s$ depends on the sign of $f'$, or the relationship between $z - s - e^*$ and 0. To get at this, some preliminary results are helpful. Consider the association between $s$ and an employee's expected performance:
\[
\frac{\partial (s + e^*)}{\partial s} = 1 + \frac{\partial e^*}{\partial s}
\]

\[
= 1 + \frac{\bar{u}' \Delta EU}{-\bar{u}' \Delta EU - C''}
\]

\[
= \frac{-C''}{-\bar{u}' \Delta EU - C''}
\]

\[
\geq 0.
\]

Equation (6) is a useful result. It says that even if employees who think they are highly skilled slack off, they always have greater expected performance than those who think they have lower skill. The response of effort to \(s\) is not 1-for-1, so expected performance is monotonic in \(s\). Thus, there will be a unique expected skill level \(s_p\) for which \(z - s - e^* = 0\). A worker with this value of \(s\) has greatest incentives. Refer to this level \(s_p\) as the \textit{skill margin}, since such a worker with this belief \(s\) is just at the win/lose margin.

It is interesting to consider what the skill margin \(s_p\) is. Let the overall fraction of employees who beat the standard and win promotion, on average, equal \(p\). This means that the standard equals the 1-\(p\)th percentile of \textit{expected} performance among employees. Clearly, the employee who thinks he has a 50-50 chance of beating this performance (i.e., has greatest incentives and is at the skill margin), is one whose expected performance \(s + e^*\) is at the 1-\(p\)th percentile among peers. Because performance \(s + e^*\) is monotonic in \(s\) by (6), this worker must also believe that he is at the 1-\(p\)th percentile of skill. This is a nice intuitive result: the worker who thinks that he is just at the win/lose margin, based on his best estimate of his \textit{skill} percentile, has the greatest incentives. To summarize the results to this point:

- Expected performance, which includes both skill and effort, is always greater for those who expect that they have higher skill.
Suppose that the firm sets the standard so that on average a fraction \( p \) are promoted. Then a worker who believes his or her skill to be at the \( 1-p \)th percentile among peers has the greatest incentives.

Define those who think they are below the skill margin as *underdogs*, and those who think they are above as *front-runners*. What are incentives for these workers? According to (6), \( z-s-e^* \neq 0 \) for both classes of employees, so they have lower values of \( f(z-s-e^*) \) than a worker at the skill margin. By (5), this means that they also have lower incentives than the worker at the skill margin. Moreover, for an underdog, as \( s \) falls \( z-s-e^* \) becomes more positive (by (6)), so that incentives decrease in \( s \). For front-runners, as \( s \) falls \( z-s-e^* \) becomes more negative, and incentives also decrease. Putting these results in words summarizes the most important conclusion of the model: the more is a worker a front-runner or underdog (the more does \( s \) diverge from \( s_p \)), the smaller are incentives. Those out in front or behind will slack off. Intuitively, for a front-runner or underdog, there is a gap between her skill and the win/lose margin. In order for a marginal change in effort to make any difference, it would have to be combined with luck (bad for front-runners, good for underdogs) large enough to close the gap. However, the larger is the gap, the more extreme would the luck have to be, and extreme values of luck are less likely.

Now consider the question of how quickly incentives drop off for front-runners and underdogs. First, by definition, \( z-s_p-e\bar{p} = 0 \). Therefore, for any worker \( z-s-e^* = z-s_e^* - (z-s_p-e\bar{p}) = s_p - s + e\bar{p}-e^* \). If there is a front-runner with expected skill \( s_f \) and equal incentives to an underdog with expected skill \( s_u \), then it must be true that \( f(z-s_u-e^*) = f(z-s_p-e^*) \) so that both have the same value for their first-order condition (4). They must have the same marginal return to effort. Since \( f \) is symmetric about zero, this will hold if \( z-s_p-e^* = -(z-s_u-e^*) \). Using the substitution for \( z-s-e^* \), it follows that \( s_f-s_u + e\bar{p}-e^* = s_r-s_p + e^*-e\bar{p} \). Since \( e_p \) is the maximal level of effort, it follows that \( s_r-s_p = s_p-s_u + e^*-e\bar{p} \).
\(2(e^*-e^*) > s_p-s_u\). This means that the front-runner's skill is farther from the skill margin than the underdog's, when they have the same optimal effort. Thus, incentives fall off more slowly for front-runners than they do for underdogs. Intuitively, both have an incentive to reduce effort. For an underdog, this only makes his performance even farther from the win/lose margin, which reinforces the desire to reduce effort. For a front-runner, though, reducing effort brings her closer to the margin, which mitigates the loss in incentives. It takes a larger change in \(s\) to reduce effort by the same amount for a front-runner.

- The more does an employee believe that he is an underdog or a front-runner with respect to the 1-\(p^{th}\) percentile of skill, the smaller will be his incentives.

- Incentives drop off more quickly for underdogs than they do for front-runners.

There is one final property of promotion-based incentives which will be useful in understanding compensation systems. This has to do with the variance of the performance measure, \(\sigma^2\). The maximum value of \(f\), \(f(0)\), is inversely related to the variance of \(\varepsilon\). For example, if \(\varepsilon \sim N(0,\sigma^2)\), then \(f(0) = 1/\sqrt{2\pi} \sigma_\varepsilon\). When the variance is large, extreme values of luck are more likely relative to middle values. The variance of \(\varepsilon\) depends on the variance (or accuracy) of the performance measure, and on the dispersion in the distribution of skills. Changes in either will have different incentive effects for different workers. An increase in performance measure accuracy increases motivation for those at or near the margin, and reduces motivation for those who are more extreme front-runners or underdogs. This is because extreme front-runners or underdogs would need large luck for a change in effort to matter. Greater accuracy makes this less likely to happen.

- Greater accuracy of the performance measure increases motivation for those who believe that they are near the 1-\(p^{th}\) percentile of skill, but reduces motivation for those who are more extreme front-runners or underdogs.
• Smaller variation in skills among workers has the same effects on motivation as greater accuracy of the performance measure.

These results have important implications for the design of incentive systems. The firm has some ability to affect the size of the reward $\Delta E_U$, accuracy of measurement, and degree of variation among employees in the same job. It can also affect an employee's beliefs about his skill $s$, since the firm's measure of $s$ is the one that matters to promotion decisions. Because an employee's beliefs about performance relative to the standard (or in a tournament, relative to co-workers) matter, the employee's perceptions become important to motivation. Over time, employees gain information about their performance to date (and that of colleagues) which they can use to reassess their career chances. To the extent that the firm has knowledge about performance which the worker does not (the widespread use of employee performance feedback systems suggests that this is the case), how it reveals this knowledge will directly affect promotion incentives. Thus, managing incentives becomes a game of information and perceptions between managers and employees. Pay and performance appraisals are two important levers for the firm in this game.
IV. A RECONCILIATION OF ECONOMIC THEORY AND RESEARCH ON REWARD SYSTEMS

The information game approach is a distinct way of looking at incentive schemes in which simple economic intuition quickly unravels. The release of information on performance, in terms of both how much and what kind, becomes a key element of a reward system. Since elements of reward systems such as incentive bonuses and performance appraisals give employees such information, they have motivational side effects, through the career system, which are typically ignored in both economic and non-economic research on motivation. These incentive side effects are complex, and can work in both ways, raising or lowering promotion-based incentives. This perspective yields a rich set of explanations for what we observe in actual incentive practices.

Consider, for example, two employees vying for a promotion. Both believe that they are performing well above the $1-p^{th}$ percentile of performance among their peers; i.e., they think that they have a good chance of winning promotion. Now suppose that the firm gives the first a very high bonus. If she believes that this is a signal about her performance, then this will only reinforce her perception that she is a front-runner. For the purposes of winning promotion, slacking off a little bit is now safer—it is less likely to cause her to lose the new assignment, in her opinion. On the other hand, suppose the firm gives the second employee a lower than expected bonus. If he considers this to be informative of what the firm thinks of his performance, then he will downgrade his assessment of his performance and chance of promotion. This will bring him closer to the margin between winning and losing promotion, in his opinion, and increase his motivation. Similarly, good news received by an employee who thinks he is an underdog may cause him to revise upward his assessment about performance, which may increase motivation if he now believes he is closer to the margin between being promoted and not being promoted. Bad news received by an employee who
believes herself to be an underdog would cause her to feel that she is even more of an underdog, further reducing motivation.

There is a second effect of information on employee motivation which may be just as important as that of selectively releasing information to change the employee's best guess about his relative standing. Information reduces uncertainty—in this model, $\sigma^2$. As argued above, this increases incentives for those near the win/lose margin, but reduces motivation for all others. The greater the information, the more will $\sigma^2$ fall, and the more discouraged or lax will underdogs and front-runners become. Thus, there is an economic value to being vague in performance feedback. Greater accuracy concentrates the distribution $f(\varepsilon)$. In the limit as all is revealed to employees, only those right at the margin have any promotion-based motivation. Since few employees are likely to actually be near that margin, this is a very real possibility.

Reductions in the marginal effect of effort on the probability of promotion can have dramatic effects on incentives. If the promotion is at all valuable, so that $\Delta EU$ is large, then even a small change in $\partial p/\partial e$ in equation (4) can be quite demotivating. Thus the information signaling effects of performance pay or appraisals must be considered carefully in a full analysis of motivation.

An immediate consequence of this argument is that for motivational purposes it is not always optimal to give employees full information about what the firm thinks of their performance. On the contrary, unless the information would cause the employee to believe he or she is closer to the promotion margin, net motivation could decrease if the information were released. This can explain the lack of much pay for performance. Pay for performance tells the employee what the firm's measure of his or her performance is—it is about as clear a signal as the firm could give. Because this is so, the firm may suppress such information by reducing performance-based pay differentials,
and lumping the majority of compensation differences into promotions.\(^2\) This will be true if the negative side effects on promotion incentives outweigh the incentives from short-term pay for performance. Along the same lines, pay secrecy policies would act as a deterrent to employees sharing information and thereby getting a better idea of where they stand. Finally, it is not surprising, in light of this theory, that few firms find the extreme of an open salary system to be productive. Such a system tells employees exactly where they stand with respect to their chance for promotion. Assuming that promotions are a major source of rewards and motivation, this undercuts a central part of the reward system.

It is often remarked that managers are reluctant to make sharp distinctions between subordinates. The most common explanation for this is that it is psychologically difficult to give bad news to employees. An alternative explanation is that managers intuitively understand that certain kinds of feedback can be demotivational, and are thus purposefully vague. For this reason, performance ratings may be concentrated, and feedback uninformative, because supervisors do not wish to demotivate subordinates. Forced curves that require managers to truly distinguish between employees would be rare, for the same reason. Performance appraisal systems, even those with forced curves or other mechanisms to control supervisors, have several ways for supervisors to play this game with their subordinates. The Merck case gives some examples of this. After the forced curve was instituted, it was found that some managers showed an "'it's her turn' syndrome—providing higher ratings in alternative years in an attempt to be fair." Thus, an employee who got a

\(^2\)This does not preclude pay differentials based on variables that are not informative about performance measures used for promotion, such as seniority. For example, many law firms give junior lawyers bonuses for hours worked. This is a measure of effort and probably has little to do with actual quality and potential of the lawyers.
high rating in one year might not in the next, as the rating was rotated to other employees. Clearly, some managers tried to work around the forced curve and reduce the informativeness of the system.

The logic of this argument can be pushed an additional step. Managers not only have an incentive to keep information about performance from employees, they also have an incentive to fool them about their performance if they can convince employees that they are closer to the margin between winning and losing promotion. If a supervisor could credibly convince subordinates who believe themselves to be front-runners or underdogs that they are closer to the margin than they thought, even if this is not the case, these employees will have more motivation. Such bluffing may be hard to make credible in all circumstances, but it seems reasonable that there will be cases where selective or distorted use of information and feedback could alter an employee's beliefs. For example, the firm could give positive feedback to an employee to try to get him to upgrade his assessment of $s$ when it is below the level that gives maximal effort, but for two very different reasons. It may be that the employee has in fact underestimated her ability, and the firm is telling the truth, or the firm may be lying. This possibility will generally mean that the firm has some ability to manipulate beliefs, since it does not always have an incentive to lie and the worker cannot tell if the firm is lying or telling the truth.

To illustrate a potential effect of such firm behavior, consider the upward bias in performance ratings that is often observed. Employee motivation will be greatest when all employees believe that they are near the $1-p^{th}$ percentile of performance. Because underdogs lose motivation more quickly than front-runners, a manager will be more reluctant to give bad news to employees than good news, causing an upward bias in feedback. This can also explain the emphasis in organizational behavior research on demotivation from poor reviews more than from good reviews. Furthermore, it is often the case that $p$ is less than $1/2$, so that $1-p$ is greater than $1/2$. This is always true when the firm has a single slot to offer employees. Under such circumstances, the firm would like all employees to
believe that they are high performers (since 1-p > 1/2). Hence upward-biased performance ratings may also be a consequence of the firm trying to fool employees. This "bluffing" might work both ways. The firm is trying to determine which employees are most qualified for advancement. Employees have an incentive to try to change the supervisor's perceptions of their capabilities. This could account for the observation that employees systematically over-estimate their performance relative to peers when surveyed.\(^3\)

As further evidence of the possibility that firms may distort feedback to manage incentives, consider the studies cited above which found little or no correlation between performance ratings and compensation. Compensation depends on past performance as well as current performance. If an employee has consistently good performance, and therefore high pay, the manager might decide to reduce his or her rating to give a motivational "kick," even if performance is still good. Similarly, a poor performer might be given a better-than-deserved rating simply to be "encouraging." Under such circumstances, it is far from clear that the correlation between pay and ratings would be strongly positive.

These ideas parallel nicely the organizational behavior and practitioner research on reward systems discussed above. Beer's "smoke and mirrors" recommendation, and Cook's urge that employees should not be "oriented to reality" sound much like the managerial behavior suggested by this model. The conclusion that negative feedback and critical appraisals are demotivational can be interpreted as meaning that under such circumstances employees are finding out that they are underdogs. The loss of self esteem often claimed to result from negative feedback could amount to the employee reassessing down his or her expectations about future prospects. The finding that

\(^3\)Of course, since survey answers are given at no cost, a reasonable alternative hypothesis is that the survey participants have little incentive to give themselves honest ratings.
praise has little motivational effect might be evidence of front-runners slacking off, but more slowly than underdogs.

The tension between the two strands of non-economic research—one advocating open systems to increase trust, while the other advocates less information to increase motivation—fits exactly into the framework of the model. According to the theory, withholding information can increase motivation under certain circumstances, while giving information can increase motivation under others. This suggests that firms will carefully control the amount and type of feedback they give to employees. However, for any reward system to work, employees must believe that there is some link between their actions and their rewards, even if it is not a perfect one. Withholding information undermines this trust. Moreover, if managers sometimes use feedback to "bluff" employees in order to alter their beliefs, this will reduce trust even more. Trust can be integrated into the formal model quite easily; a simple measure of the degree of trust is the size of performance measurement error. Lower trust implies that employees have less faith that their actions are likely to lead to high ratings and rewards. The larger is $\sigma^2$, the less likely will effort make the difference between winning and losing, and the less will employees trust that their actions matter. If trust falls enough, with $\sigma^2$ very small, then the system unravels as motivation falls even for employees near the margin between losing and winning. Raising or lowering this accuracy (and trust) can increase or decrease motivation, depending on the circumstances of different employees. Somewhere between the two extremes of complete openness and complete smoke and mirrors on the part of managers probably lies the system with the greatest motivation.

V. APPLICATIONS AND EXTENSIONS
The theory developed here offers many applications and insights into the study of merit pay and appraisal systems, some of which were outlined above. In this section, some additional applications are developed. The "information game" perspective implies that supervisors can manage motivation of employees through selective release of information and feedback, and perhaps through the use of mis-information to alter the beliefs of employees about their chances for long-term rewards such as promotions. A final step can be taken in this argument. From the firm's point of view, these issues are important to the design of human resource systems for motivating employees. The first part of this section uses this idea to understand the design of compensation and reward, performance appraisal, and control systems. The section concludes with a discussion of equity in compensation systems, and considers when the theory is likely to be most relevant.

**Compensation Systems.** Much has already been said about designing compensation systems in light of the ideas presented here. First, pay for performance within a job can be counter-productive. To some extent, this can be mitigated by policies of pay secrecy, so that employees do not share information with each other and become better informed about their performance relative to each other or the promotion standard. However, such policies are likely to have limited success. Therefore, an alternative may be to limit the use of within-job pay differentiation, and put the bulk of pay differences into promotions. Furthermore, if promotions go on to other promotion games farther up the ladder, it may be important to put them on "equal footing" on promotion, so that they do not have good information about their chances at the later stage. To do so, the firm would suppress differences among winners, giving equal rewards with promotion. This further ties rewards to jobs rather than individuals. Note that this does not mean that there is no use of pay for performance; it only means that the pay for performance is in the form of discrete rewards offered to high performing promotees or penalties to low performing demotees.
Taking this argument to its extreme, we might predict that there would be no differences in pay among those in the same job, to completely minimize information about performance. However, this ignores the fact that sometimes feedback to employees can increase incentives. Therefore, from a design standpoint, there is an economic logic to giving managers the capability (though not forcing them) to differentiate between employees. To the extent that the firm wishes the manager to use "smoke and mirrors" to bluff employees under some conditions, this argument is only reinforced. This may explain why most firms have merit pay systems, even though they do not seem economically important or to be used in straightforward ways. Note that the primary purpose of such "merit" pay in this view is as a signal mechanism for supervisors to use with subordinates. Even small differences in pay can serve as strong signals. Furthermore, since variation in pay exposes employees to additional risk (especially to the extent pay is interpreted as a signal about future prospects), the optimal merit pay signaling system would have only small differences in pay. This is exactly what we usually observe. This signaling role of pay has been recognized, although not extensively analyzed, in organizational behavior. Hamner (1975) mentions the problem of, "management's inability to communicate accurately to the employee the information that they are trying to communicate through the pay raise;" and says that, "There is no doubt that the pay raise is more than money; it tells the employee 'You're loved a lot,' 'You're only average,' 'You're not appreciated around here,' 'You'd better get busy,' etc." No signaling device is likely to be completely credible, especially when the manager has an incentive to sometimes mislead employees. However, it seems both plausible and consistent with what we observe that employees do interpret pay as a signal, even if it is one they do not trust perfectly. Employees commonly exert substantial resources and emotion in gleaning and interpreting pay and other information that may give clues about what the firm thinks of them.
Non-Financial Reward Systems. Organizations offer many kinds of non-financial rewards. These may also be used to signal to employees what the firm thinks of their performance. Thus, getting the best client assignment may have real significance to an employee. Just as was the case with compensation, the firm may wish to both suppress non-monetary rewards, and use them selectively as signals. Many organizations strive to promote "egalitarian" cultures in which status distinctions are minimized. This may be one explanation for such firm behavior. A firm may also try to manage non-monetary rewards so that the bulk of them are tied to promotions. This does seem to accord with practice. It is common that status and other distinctions within an organization are tied to positions, rather than individuals, in the same way that compensation often is.

Performance Appraisal Systems. The central argument of this paper is that the firm, whether it wants to or not, has two personnel objectives confounded through the career and reward systems. One is motivation; the other is training, evaluating, and allocating employees into the right positions over time. This suggests a distinction between two types of information which are important in performance appraisal systems. The first is that kind of central interest here: information about one's future prospects. The second is information about how the employee can improve performance and develop skills. In theory, if the firm can separate these two, it will want to give the employee all of the latter kind possible, while sometimes suppressing the former kind. In practice, though, they may be hard to separate. This is, in fact, the greatest tension in the literature on performance appraisals. In discussing the goals of appraisals, Beer (1987) lumps them into two general categories, evaluation and coaching and development. These seem to be exactly like the two kinds of information discussed here. He notes that these two overall goals are in conflict, and that a firm's approach to performance appraisal involves a balance of this tension. For example, some firms have separate appraisals, at different times of the year, one for evaluation and one for development. Some companies explicitly state on assessment forms that they are not for the purpose of evaluation (e.g., see Thomas, 1976).
Other firms avoid the evaluation aspect of appraisals by having an employee assessed by someone other than a supervisor, perhaps a trained career counselor. Some firms have even tried a novel approach of having one's co-workers evaluate an employee for the purposes of development. None of these are perfect ways to give employees information to help them improve performance, while not revealing information on their chances for advancement. Nevertheless, it is not surprising that such procedures have emerged, as recognition of this tension, and this fact is encouraging support for the theory.

A separate literature on performance appraisals has focused on psychometric measurement issues. However, the theory suggests that this is less important than how appraisal data are *used* by managers and employees. Indeed, Landy and Farr (1980) concluded that the format of an appraisal form had only a minimal effect on the quality of ratings, and called for a moratorium on further research into this issue. As some organizational behavior scholars have argued, appraisal is more than a measurement problem, and the context and process are more important than statistical and formulaic approaches (K.R. Murphy and Cleveland, 1991).

*Control Systems and Performance Measures.* A related issue is the design and use of accounting control systems. Much of the control literature focuses on accuracy of measures from the accounting system. However, when these data are made available to employees, it is not obvious that greater accuracy is desirable. Therefore, in designing control systems access to the information is an important consideration. A second concern is the goal of the accounting system. Two key uses are as an *information* system and as a *performance measurement* system. As an information system, the purpose is to give employees information necessary to make better decisions. Such information can conflict with the incentive system—it may give employees clues about their performance and

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4 The accounting literature recognizes, of course, that the potential "gaming" of a performance measure is also an important issue.
prospects. In other words, there is a tension in the revelation of information through the accounting system much like the tension between evaluation and development feedback in performance appraisals. A third issue is the nature of performance measures made available to employees. For example, relative performance measures have certain statistical advantages (Holmström, 1982). However, relative measures can also be informative about the employee's promotion opportunities, especially when employees compete for promotions.

**Status, Equity, and Social Comparison Theory.** A common theme in work on reward systems and organizations is the importance of interpersonal comparisons made by employees. This is usually intended as an explanation for the lack of large pay differentials. Various writers argue that individuals have a preference for equality of rewards across individuals, or that individuals have a preference for higher rewards or status relative to their peers (Frank, 1984; M. Meyer and Mookherjee, 1987; Baron and Pfeffer, 1990). Given these tendencies, it is argued, pay differentials can be disruptive or discouraging to employees. The model gives a different interpretation to observations that employees constantly compare their rewards to others in the same job. Since information about performance and prospects is important in deciding what effort to put forth on the job, workers will try to glean such information from whatever source they have. An important source is co-workers' rewards. It is therefore natural that comparisons will be made and will be given importance by employees. In this view, the quest for status and for interpersonal comparisons is explained as an outcome of the reward and career system faced by workers, and is not based on ad hoc assumptions about individuals' preferences.

The parallel with these works can be taken further. Both Frank and Baron and Pfeffer argue that organizational structures can be explained in part as the outcome of the desires of individuals to differentiate themselves. Baron and Pfeffer, in particular, stress that there are two conflicting tensions. The first is a worker's desire to differentiate oneself from others; the second is to be part of
a group of similar people. These two tensions are used to interpret the categorization and allocation of employees within a firm. However, it is possible to generate a similar tension within the framework of the model of this paper. The arguments above took organizational structure as given. Clearly, different hierarchical structures generate different promotion structures, and therefore different incentives. A full analysis would endogenize the hierarchy as well. For example, a promotion contest with more similar contestants would tend to generate greater incentives, since all are more likely to be close to the margin between winning and losing. This is one interpretation for the tendency for groups within a firm to be homogeneous, especially relative to those in other groups.

**WHERE THESE ISSUES ARE LIKELY TO BE MOST IMPORTANT**

It is worthwhile considering where the theory should be most important. This permits a test of the theory against what we already know about compensation practices, as well as providing additional testable predictions. In all cases, the statements in this section should be taken in the usual sense in which economists make comparative static predictions; i.e., statements are made *ceteris paribus*, with all else held equal. These issues should be most relevant where reassignment incentives (promotions, demotions, or firings) are greatest, so that there are potential negative side effects of other rewards.

*Sensitivity of Incentives to Beliefs about Performance.* An important consideration is the sensitivity of motivation to information about performance \( \frac{\partial p}{\partial e} \). If marginal effort (more or less) is unlikely to change the odds of winning promotion substantially, then new information about performance will have little effect on incentives. One determinant of this is the probability of winning promotion. Consider a situation in which there is only a very small probability of promotion (an "un-promotable" position). Incentives from this promotion are likely to be low; changes in effort
are unlikely to affect the outcome. New information on performance is also not likely to make much difference, for the same reason, and thus will have a small effect on incentives. For such positions, if threat of demotion or dismissal is small, there may be more pay for performance or more open feedback to employees. Examples would include CEOs, salespeople (who often do not have much of a career path above them), and perhaps divisional managers. Note that such people are often on the "fringes" of the hierarchy, rather than inside it, and that in such cases greater use of pay for performance does tend to be observed. The simple agency theory which ignores other rewards from the career system is more relevant in these positions. A related case is when the chance of winning promotion is near 1 ("apprentices"). As in the case of unpromotable employees, the chance that a change in effort will make the difference between winning or losing promotion is small. Feedback about performance will therefore have smaller motivational side effects. One possible example is entry level accountants at public accounting firms.

There are, of course, incentive effects through $\sigma_3$ and $\sigma_2$. Smaller values of either generally increase motivation of those near the win/lose margin at the expense of incentives for front-runners and underdogs. The firm can manage these effects through accuracy or vagueness of the performance measure ($\sigma_2$). Less obviously, the firm may be able to manage the dispersion in skills $\sigma_3$ through recruitment policies. If the firm is trying to set up a tight contest for promotion, it may use recruitment policies which select employees who are as similar as possible; in other cases, diversity might be preferred. For example, sports leagues are set up by quality of players. Athletes must meet certain criteria to play in a league. Once in the league, those of similar quality compete against each other for further distinctions. This leads to more exciting games as well-matched teams play harder. The same can be true within an organization.
**Size of the Reward from Promotion.** When the "prize" or "penalty" from reassignment ($\Delta EU$) is large promotion-based incentives are greater, and the effects described here are more relevant. When this is true, we expect to see less pay for performance and more reliance on "closed," uninformative appraisals. The reward from a promotion includes the higher salary, status, and perquisites that come with the job. Thus, *ceteris paribus*, larger salary differentials between levels would be associated with the systems and behavior described here. The reward from reassignment also includes the opportunity to vie for additional advancement up the hierarchy in the future. This is the "option value" of promotions (Rosen, 1986; Gibbs, 1989). This option value may be higher earlier in an employee's career, and lower in the hierarchy, for two reasons. First, any rewards earned may be earned for a longer period if one has a longer career horizon. Second, positions lower in the hierarchy have more levels to aim for in the future. Therefore, the theory predicts a greater tendency toward pay equality and less openness in feedback in lower positions in the firm.

**Value of the Job to the Labor Market.** Rewards have to be tied to promotions only to the extent that the external labor market bids up the value of a promoted employee. One determinant of this is the degree of firm-specific skill in the job. If the job is completely firm-specific, then the employee is unlikely to be able to get attractive offers on the external market, and the firm may be able to separate promotions from rewards and use pay for performance more directly. On the other hand, jobs with general skills, such as accounting, mean that the firm is more constrained to attaching wages to jobs. A related determinant is the job type. A job with a common description such as "product marketing manager" is easily understood and rewarded by the labor market. This suggests that unusual jobs which are difficult for outsiders to understand and value are ones for which the issues raised here are less important.
Observability of Performance. The theory hinges on the assumption that the employee cannot perfectly observe what the firm thinks of his performance. In many circumstances this is reasonable, as employees do not understand the full implications of their work for the rest of the organization. However, in some jobs a worker can observe his or her performance (and that of co-workers, perhaps) relatively well. In those circumstances, there is less private information which the firm holds, and use of more direct pay for performance is predicted. It is important to remember, though, that what ultimately matters to the promotion decision is what the firm's opinion of performance is, and the employee is unlikely to know this perfectly.

Value of Sorting Employees. Underlying this story is the sorting of employees into positions in the firm by capabilities. If this is not an important goal of the firm, however, then the motivation problem might be solved directly (O'Keeffe, Viscusi, and Zeckhauser, 1984). This could potentially be done by "handicapping" high performers and "subsidizing" poor performers. In essence, by changing the odds for employees based on their performance to date, the firm can put all at the margin between winning and losing promotion. However, this solution works by making it less likely that good performers will be promoted, and more likely that poor performers will be promoted, exactly the opposite of the sorting objective. If sorting by ability is important for firm performance, then this is not a useful approach. An example of this might be a law firm, where differences between new recruits are not likely to be large, but where even small differences in ability can have large effects on firm profits. In such a case, the sorting function is extremely important, and sorting and incentive objectives become inter-linked as described here. Moreover, in intermediate periods handicapping punishes hard work, and subsidizing rewards slacking off, so the net incentive effect is unclear when there are several periods in which to motivate employees before reassignment. The potential for handicapping and subsidizing to disentangle sorting and incentives seems limited.
VI. SUMMARY

In this paper, I have attempted to bridge the gaps between economic agency theory and both organizational behavior research and compensation practices. This has yielded some new insights and perspectives on existing research on reward systems, many of which were discussed above. The attempt to reconcile several disciplines and strands of research also highlights some more general issues. These are briefly discussed in this section.

Management by Ambiguity

Woven throughout this paper is an argument that the management of information revelation between the firm and workers is an essential part of an incentive scheme. An overriding issue in the design of a reward system is whether or not to encourage ambiguous systems or to make them as concrete and "un-gameable" as possible. Some observers of management have stressed the need for ambiguity in managing motivation (Buddrus and Vancil, 1979). This has been called "smoke and mirrors." These commentators seem to be arguing that managers should not always be too specific in dealing with employees.

In studying a similar set of issues, Milgrom and Roberts (1988, 1990) and Milgrom (1988) argue that to prevent wasteful influence activities (e.g., office politics), firms may set arbitrary and seemingly inefficient, but concrete, rules. Pay determined by seniority or other uncontrollable variables is one example. This lowers the return to dysfunctional behavior, because such behavior makes no difference. However, it also reduces incentives. The alternative, uncertainty in the system, can also lower the employee's returns to wasteful behavior by making the outcome of such behavior less certain; the dysfunctional behavior focused on here was shirking. Moreover, ambiguity may increase productive incentives at the same time. This possibility is especially relevant when
individual beliefs and expectations are important, and where they may be manipulated by the firm. Managers do have incentives to try to alter and manage employees' beliefs. Systems which do not leave room for ambiguity prevent this. In this context, for example, subjective performance evaluations have an advantage over objective measures. Neither solution (increase or decrease uncertainty) will always dominate the other. It is clear, however, that ambiguity is one important dimension in the design of incentive systems.

**Process and Economics**

There is an implicit theme in many writings on managing and motivating employees, that it is more of an art than a science. Writers from various perspectives often are reluctant to recommend that merit systems be made explicit and mechanical. Rather, there seems to be a not quite articulated desire for subjectivity and dynamic management of these systems. They argue that the process of managing motivation is just as or more important than issues of measurement, accuracy, and design. Yet issues of process have been ignored in agency theory.

This paper has uncovered some new interpretations for the process of incentive schemes. Process issues are more than just the simple, messy, and boring "details" of implementing a well designed compensation scheme, the kind of details that economists ignore. Process in compensation systems may be interpreted in the language of economic theory as "optimal signaling and bluffing in a dynamic game of simultaneous moral hazard and screening," i.e., as managing the beliefs and expectations of individuals within the system to balance the objectives of the career and reward systems. The design of the system has a major impact on how these beliefs form and evolve. This must be considered in designing and implementing the system. Beliefs can be managed in two ways, one in which the world is codified to minimize information games between employees, and one in which the world is left ambiguous in specific ways in order to constrain information games to be
more productive. When ambiguity is chosen, then simple design of a system is insufficient. This is why process is important.

Finally, the paper offers some potential ways for the integration of economics and other modes of research. Economic models often seem abstract and incapable of capturing anything but the broadest features of organizations. However, this perception may be based more on their presentation than on their content. There are at least two ways in which economic models can be made richer and more amenable to comparisons with non-economic research. The first is to recognize the complex strategic behavior which results when individuals differ in their information, beliefs, and objectives. Assymetric information introduces many interesting complications in otherwise simple models. The second way to enhance economic models is to introduce heterogeneous individuals. Since economic models are generally based on stylized representative agents, they often do not capture interesting differences in behavior across people. The model in this paper introduced heterogeneity in skills, and in beliefs about skills. It also included asymmetric information about performance. These simple additions were able to generate a wealth of predictions about behavior across employees and about optimal incentive systems. Such additions are common in economic theory, but the implications of the models are rarely integrated with data from other disciplines. This may be an interesting avenue for research. For example, there is an enormous amount of social psychological research on the behavior of individuals in different organizational contexts. Researchers who have studied these data have generally not used economic interpretations of the data. Because economists are biased to being relatively agnostic about people's preferences, they usually look for behavioral explanations based on rational action, and on differences in opportunities, rather than on specific assumptions about preferences. That was the case with this paper. Terms such as self esteem, trust, and equity were not taken as primitives, but were interpreted
and defined within the model. Such an approach may lead to new insights into what we know about behavior in organizations.

**Conclusion**

Most white collar workers spend the majority of their careers working their way up a promotion ladder. These promotions are based on underlying training and screening of employees with different abilities. Because employees can exert effort to affect their chance of winning promotion, this assignment process may also generate incentives. When vying for a prize, it is rational to try to find out how one is performing relative to competitors or to one's objective. Those who believe that they are sufficiently far out in front or behind may find that slacking off has little effect on their likelihood of winning reassignment; when this is so, motivation will not be high.

Because of this phenomenon, managers and employees are in a constant game of perceptions, trying to guess what the other knows, and to affect the other's beliefs. This game leads to many complexities beyond simple agency models. In particular, an optimal incentive compensation system may look very different from those predicted by simple economic models. Therefore, it is not surprising that, "The management of reward systems ... is where we find the greatest contradiction between the 'promise' of theory and the reality of implementation" (Beer, et al, 1984).

The approach taken here may remind readers of the work of a famous early economist (Machiavelli, 1513). It should be understood that the primary purpose of the paper is to present a positive theory of reward systems. I have suggested that firms and managers may often try to at least "bend the truth," in the interest of motivating workers. This is not to suggest that this is always done consciously. There is an incentive to do so to get higher performance from employees, and this may cause such behavior. The paper has used this perspective to bridge the gulf between economic and non-economic research on reward systems. Most of the puzzles and complex practices of actual
compensation systems are easily explained by the model. The ideas in this paper also resonate strongly with the non-economic literature on compensation and performance appraisals, both academic and practitioner. These writers consistently stress the demotivational effects of merit systems, the emotional stress which employees feel when given poor reviews, and the reluctance of managers to make large distinctions in ratings of subordinates. This concordance with practice and with the knowledge of those who have studied these issues in the field is quite supportive of the theory. The theory cannot be all inclusive, of course. It ignores, for example, the potential intrinsic value to employees of feedback about their performance. However, it is hoped that it does illustrate that the gulf between economics and other disciplines is not as wide as perceived, and that there are large potential gains in understanding organizations which can come from research combining various disciplines.
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