

Selected Paper
Number 68

Enhancing Productivity through Compensation

The 1988 Towers/Cresap Lecture

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Edward Lazear, the Isidore Brown and Gladys J. Brown Professor of Urban and Labor Economics, is one of the country's most productive labor economists. He published three books in 1988. The first is the sixth edition of *Microeconomic Theory*, a textbook he coauthored with John P. Gould, dean of the Graduate School of Business and Distinguished Service Professor of Economics. He has also done important work in the application of microeconomic theory. *Allocation of Income within the Household*, which he coauthored with Robert Michael, will be published by the University of Chicago Press; and his *Issues in Contemporary Retirement*, with Rita Ricardo-Campbell, will be published by the Hoover Press.

Lazear has published numerous papers in leading economic, law, and business journals. His research is wide-ranging and includes investigations of compensation, male/female wage differentials, job security rules, pension economics, international labor markets, and unionization, among other topics. One of his recent publications was an entry on contract incentives in *The New Palgrave: A Dictionary of Economics*, an important reference work for students of economics and business.

Lazear holds an A.B. and A.M. in economics from the University of California at Los Angeles. He earned the Ph.D. in economics from Harvard University in 1974. He was an assistant professor of economics at the University of Chicago from 1974 to 1978 and has been a member of the faculty of the Graduate School of Business since 1978. He was a fellow of the Institute for Advanced Study, Hebrew University of Jerusalem, 1977-78, and a fellow of the Institute for Advanced Study, Vienna, 1984. He has been a senior fellow of the Hoover Institution since 1985. Lazear is the editor of the *Journal of Labor Economics*, a position he has held since 1983. He is also an associate editor of the *Journal of Economic Perspectives*.

Presented as a lecture on October 6, 1988, at the Monroe Club in Chicago, this Selected Paper is the third in the series of lectures sponsored jointly by Cresap, McCormick and Paget and Towers, Perrin, Forster & Crosby. In Professor Lazear's words, "I'd like to join Dean John P. Gould in thanking Towers/Cresap for their generous support, which gives the faculty at the University of Chicago the opportunity to communicate some of our thoughts to the business community. We find that we learn a great deal from our interactions with you and hope that we can repay you in part by sharing with you some of our ideas. I'd also like to thank the Brown family, who endowed the chair that I now hold and whose encouragement over the years has made much of my research possible."

Enhancing Productivity through Compensation

Compensation can be used to affect productivity. While this is an old idea, I will argue that the way it has been applied in the past may actually be counterproductive. In this case, less is more. Relating compensation too closely to productivity is actually detrimental. Sometimes it is better to allow compensation and output to be less closely related, even if output is easily measured and observed. But the compensation strategy must be carefully crafted so that the deviation between compensation and productivity allows you to improve the quality of the product you offer your clients.

When someone talks about using compensation to affect productivity, the first impulse is to “use a piece rate or other output-related bonus.” After all, salespersons on strict commission seem highly motivated. This line of reasoning has even motivated political leaders to propose pay based on merit rather than seniority. President Reagan and former Secretary of Education Bennett, for example, have pushed for teacher compensation to be tied more closely to performance. Perhaps with good reason. The decline in SAT scores parallels the perceived decline in the quality of American products. Is there any quick way to increase productivity? While some things can be done, I believe so-called “common sense” may lead us

astray. To illustrate, I offer a somewhat embarrassing personal anecdote.

As a first-year high school student, I joined the track team because I fancied myself a runner. Now my coach had recently read some coaching magazines that must have been written by personnel analysts. From them he acquired the theory that you don't know what you're good at until you try everything. My coach applied this theory to all freshmen, of whom I was one. Each week I competed in a different event and then my turn came to be the pole vaulter. Pole vaulting, of course, is difficult, requiring not only coordination but upper body strength. As a fourteen-year-old, I was 5 feet 10 inches, weighed about 120 pounds, and looked somewhat like the "before" picture in weight-lifting ads. The casual observer could tell I wasn't about to take State in pole vault. Still it was my turn, so I spent my week trying. Every time I vaulted, I would drag the pole behind me and knock over the bar. When the day of the meet finally came, I still had not managed to vault successfully. My solution was to ask the judge whether I was required to use the pole. This, as it turned out, was an unusual request. And after discussion among the judges, it was decided that I had to carry the pole but the style with which it was used was my choice. My "style" involved dropping the pole and hopping over the bar. I fouled out at 2.5 feet. Needless to say, I wasn't asked to compete in that event again.

While the idea of trying people in different activities is sound, in the pole vault case it was taken too literally. Similarly, I fear that many who have tried to use compensation as a motivator have taken what is a sound principle and applied it too literally. I want to argue two ideas. First, it is better in most cases to pay on the basis of relative productivity rather than

absolute productivity. Second, younger workers should receive less than what they are worth and older workers should receive more than what they are worth. Firms that follow these two rules will generally find that incentives are better and productivity is higher.

Relative versus Absolute Productivity

Let's start with some facts. The much-admired and overly discussed Japanese work force receives up to 30 percent of its compensation in the form of bonus pay. But bonus is not based on individual output. It is closer to a group profit-sharing scheme than to an individual incentive plan. Thus the amount that a worker receives in a given year is only loosely tied to that individual's output. The annual wage is closely related to the performance of the firm, but in a large firm it bears little relation to any one worker's output, especially those lower in the firm's hierarchy.

Another piece of evidence comes from some recent work by Jensen and Murphy, who find only a very small effect of a firm's improved performance on the CEO's compensation.' They puzzle over this, suggesting that a closer link would have better incentive effects. I believe that their perplexity results from too narrow an application of incentive theory.

To understand why payment on relative performance is better, consider the metaphor of a tennis match, specifically, the recent Wimbledon final between Wilander and Lendl. Wimbledon is like the internal hierarchical pyramid of a typical firm. There are a large number of players in the earliest round of the tournament, as in an entry-level management

Thus the direct link between compensation and output is broken, and less becomes more. Yet relaxing the relation of compensation to output has motivational effects, and to clarify let me turn to the second point.

The spread between the winner's prize and the loser's prize affects effort. In the Wimbledon example, \$400,000 of prize money was available for the finals. The winner got \$250,000, and the loser got \$150,000. But nothing says that the split has to be 250-150. There are an infinite number of ways to divide up prize money. Consider a couple of extremes for illustration. Start by imagining what would happen if the winner and loser each earned \$200,000. Clearly, there would be an incentive to get to the final round, but, except for issues of pride, contestants would be unconcerned about victory or defeat. In fact, both might opt to stand back at the base line and let the opponent fire away. Why take a chance of injuring yourself, which precludes future competition, when one's compensation is totally unaffected by the outcome of the match? We would expect the quality of play to be quite low under these circumstances, with each player putting out only minimal effort. Now consider another extreme. Let the winner of the finals receive \$400,000 with the loser receiving \$0. Under these circumstances winning has a big effect on the player's compensation, and both individuals would be quite motivated to win the match.

In fact, the spread is not limited to the size of the prize money. In the last example, the spread between the winner's prize and the loser's prize was \$400,000, but it need not be that way. For example, Wimbledon could require each player to ante \$500,000 before playing the match. The loser would forfeit his ante while the winner

ance.³ By rewarding students and allowing them to pick effort levels at a particular cost, they found that they could quickly attain the optimal level of effort with a minimal amount of experimentation. While a laboratory result from a classroom is hardly compelling evidence that this can be done in the labor market, it does show that people are thinking along these lines. This means that implicit in any firm's compensation structure are subtle motivational effects that may be good or bad.

Whether a manager chooses to think about his internal labor hierarchy as a tournament is irrelevant. The fact that workers receive a raise when promoted implies that, like it or not, the firm has already set up an incentive scheme. As long as it is there anyway, and it cannot be ignored, managers should think about the structure more carefully. The tournament metaphor is helpful in this context. Again, even if a firm prefers not to use relative compensation as a motivator, it still does so implicitly as long as all jobs in the firm do not receive the same salaries and promotions are based on relative merit.

What are some of the advantages of using relative compensation as a motivator? The primary advantage is that compensation based on relative performance is insensitive to extraneous events affecting all workers similarly. For example, two salespersons may go out on the same day and put forth very high levels of effort but may end up selling very little because of adverse business conditions. If they were paid a piece rate, their compensation for that day's work would be low. On the other hand, if they are paid on the basis of relative performance,

³ Clive Bull, Andrew Schotter, and Keith Weigelt, "Tournaments and Piece Rates: An Experimental Study," in *Journal of Political Economy* 95 (February 1987): 1-33.

incentives remain and compensation is not affected by business cycle conditions since both face the same depressed market. Workers prefer not to have their compensation vary with events over which they have no control; thus, payment on the basis of relative performance will be preferred by workers under these circumstances.

Another example comes to mind. Workers sometimes view their supervisors as capricious or, at a minimum, having standards that are not common to all supervisors. A story that surfaces occasionally at the University of Chicago Graduate School of Business is about George Stigler, who was once asked to write a letter of recommendation on Milton Friedman. Now George is a man with extremely high standards, but he also has a great deal of respect for Milton. The story goes that George's letter was two lines long. It read, "Milton Friedman is the best economist of the century. Of course, this is a poor century for economists."

Workers who have to be judged by George Stigler will find it somewhat difficult to make a living. However, if George is forced to rank his workers rather than judge their absolute performance, the fact that he is a tough grader becomes irrelevant. He may view all his workers as poor, but there will still be a best and a worst. And that comparison is unlikely to be affected by his stringency.

The inability to judge a particular environment and compensate accordingly is the reason professors grade on a curve. When I write a final exam, I hope to be fair by testing the material covered. But no one is perfect, and some exams are less straightforward than others. By grading on a curve, I remove most of the noise introduced by my inability to construct a perfect exam. Difficult exams tend to be difficult for good students as well as bad stu-

dents. Easy exams tend to be easy for good students as well as bad students. In a production environment the same is true. If workers are expected to meet some standard, no matter how objectively it is set, occasionally the standard will be too high or too low. By judging individuals relative to one another, this extraneous element of arbitrariness is removed.

While there are many arguments to commend an incentive scheme based on relative performance, there is a major disadvantage. Since relative performance evaluations are comparisons, a worker does well not only by making himself look good but also by making his rival look bad. The current presidential campaign is a case in point. Much of the rhetoric and political advertising is designed to reveal the flaws of the opponent rather than the successes of the candidate. The reason is that an election is a relative comparison. Either Bush or Dukakis will win the presidency, and the compensation, both pecuniary and psychic, is at this point pretty much independent of the candidate's absolute level of performance. Only relative comparisons matter. Thus Bush characterizes Dukakis as a big spender who is soft on crime while Dukakis characterizes Bush as a man with poor judgment who surrounds himself with sleaze. Part of that information is useful to the public, but much of it is simply negative half-truths that waste resources and make the voters' information-gathering process more difficult.

In the same way, two assistant vice-presidents competing for the same vice-president slot in a firm have incentives to make each other look bad. For example, one may be reluctant to share some important information with his rival for fear of being scooped. While sharing the information may increase profits within the firm, individuals have an incentive to prevent this

information from getting out. The failure to cooperate is a direct result of the compensation scheme.

How can these adverse consequences be minimized? There are two ways. First, the lines of rivalry must be chosen very carefully. While cooperation within firms is always important, it is more important for certain individuals to cooperate with others. For example, the marketing manager and salesperson on a particular account should cooperate and share information. It is less important that a salesperson on account A share his information with the salesperson on account B if those accounts are almost totally unrelated. Thus the salesperson and his marketer should not be competing for the same job, but salespersons across the two accounts may be put in a competitive situation. In fact, many sales contests in firms have exactly that flavor. So the first way to alleviate the adverse consequences is to set up rivalries only between individuals among whom cooperation is unimportant.

A second way to minimize the difficulty is to use a more compressed wage structure. Individuals are reluctant to cooperate because the prize associated with a particular promotion is large. As the spread between the winner's prize and the loser's prize gets smaller—that is, as the raise associated with a promotion is reduced—two things happen. First, as I've already discussed, the incentives to put forth effort are reduced. That is a negative consequence. But, second, the incentives to withhold information and to engage in uncooperative behavior are also reduced. Thus there is a trade-off. Where cooperation is extremely important, a more compressed or equal salary structure is optimal, and it will pay to accept some reduced effort as a by-product of increased cooperation.

To recap this section: Relative performance is often the best way to motivate workers. Further, as long as a firm has raises associated with promotions and as long as workers are able to compete for those promotions, there are incentives implicit in any firm's salary structure. Rather than allowing those incentives to be determined by chance, it is important to think strategically about the relation of the salary in one job to that in another. Compensation on the basis of relative performance creates a deviation between a worker's output and compensation, but, contrary to the expectation of "common sense," loosening the direct link between compensation and output is often a good thing. Because relative performance pay eliminates the effect of extraneous factors such as business cycles, production problems, and capricious supervisors, workers can be made better off and profits can rise when motivation is based on relative rather than absolute performance.

There are some adverse consequences, however, of using a tournament-like structure to motivate workers. The main one is that relative performance pay motivates workers to be uncooperative and, at the extreme, to sabotage their rivals. Those adverse effects can be mitigated by setting up the lines of rivalry between individuals for whom cooperation is unimportant and by compressing the salary structure somewhat.

Paying Workers More and Less Than They Are Worth

A related but somewhat different problem is how to motivate a worker who has been in a position for a long period with virtually no hope of being promoted. The key here is to couple the tournament type of salary structure with a

within-job salary structure that gives large experience raises contingent, again, on some measure of performance, preferably relative performance. The idea is that, when an individual is promoted from assistant vice-president to vice-president, the starting wage at vice-president should be just slightly above his or her AVP wage. Potential for high wages within that job should be extremely large. In particular, motivation is best served when the initial salary is, on average, less than the worker is worth and the final salary is more than the worker is worth. Longevity and continued high performance in the job are thereby rewarded, providing those workers with little hope of being promoted the incentive to perform at high levels.

Most firms already use this method of compensation, perhaps unknowingly, to some extent. Many academics would argue that young professors do all the work, writing the most papers and perhaps doing the best teaching, whereas old professors get all the money. This scheme rewarding longevity on the job creates incentives for young faculty members to work especially hard so they can eventually live the cushy life of their senior colleagues. I used to think this system somewhat unfair, but with each passing year I find it more attractive. Law firms and accounting firms use this system, sometimes quite explicitly. Associates work very long hours and at a fraction of the pay received by partners. They do so not because their current wage is so high, but because they hope to make partner and enjoy the benefits someday.

There is one difficulty with this incentive scheme. While it has fine motivational effects, it makes workers a bit too anxious to remain on the job. If senior workers are being paid more than they are worth, then at some point it becomes necessary—indeed, socially optimal—

for those workers to retire. But the workers who are receiving very high wages may be reluctant to do so. In the past, this was not a problem. In fact, I believe that it was one of the main reasons why mandatory retirement was more prevalent in good jobs than in bad ones. Unfortunately, as a result of changes in age-discrimination legislation, mandatory retirement is no longer a feasible tool.

But there are many legal ways to encourage workers to retire at the appropriate age. Generally this involves using a defined-benefit pension plan, the actuarial value of which declines with age of retirement past some point. For example, almost all defined-benefit plans that pay workers based on years of service alone have pensions that decline once the worker reaches a certain age. While the annual pension flow continues to increase, workers who retire later receive that flow for fewer years. So, for example, an individual permitted to work to age 85 might have quite a high pension at retirement but would receive that pension for only one year. That same individual, were he or she to retire at 65, would receive a lower annual pension but would receive it for 21 years. The present value of the age-65 retirement pension flow is almost certain to be higher than the present value of the age-85 retirement flow.

Firms are somewhat limited in their ability to use defined-contribution plans to induce workers to retire. Contributions cannot be a function of age, although for the most part courts have not yet ruled out basing those contributions on years of experience. While contributions can fall to zero, it is impossible to make at least the expected value of a defined-contribution pension plan fall with additional years of work. Thus firms that relied heavily on mandatory retirement should adopt defined-benefit pension plans, the formulas of which

penalize heavily work beyond the previous mandatory retirement age. In this way, incentives can be maintained without driving the firm into bankruptcy.

Summary

My theme has been that compensation need not be linked directly to output in order to provide motivation of workers. Sometimes less is more. A compensation scheme that relates less closely to an individual's absolute performance is often a better motivator than one directly related to his or her performance.

To summarize my major points: First, compensation based on relative performance is an effective motivator. The tournament metaphor is directly applicable to the salary structure along the firm's hierarchy. Big raises correspond to big prize spreads and tend to motivate workers. Too large a prize spread, however, will make recruiting difficult. Thus market constraints place a limit on the amount of motivation the firm can generate. An important point is that the firm's desire to use its wage structure as a motivator in a tournament-like setting is almost irrelevant. If raises exist, and if workers are promoted based on relative performance, then incentives are present. Management may ignore these incentives, but doing so can only result in lower profits. Workers are taking relative compensation into account in determining their effort, and productivity is affected immediately by their strategies. Like it or not, firms should be thinking about the incentives implicit in their salary pyramid.

Second, payment on the basis of relative performance is usually a good motivator because it eliminates extraneous factors that are a nuisance to workers. A disadvantage is that relative compensation creates incentives for

uncooperative behavior among workers. A solution is to avoid competition among workers for whom cooperation is important and to compress the wage structure somewhat when the first method is unavailable.

Additionally, within jobs, workers should be paid less than they are worth when they enter and more than they are worth by the time they leave. This provides appropriate motivation even for the worker destined to remain in that position. A necessary by-product of such a scheme, however, is the use of mandatory retirement, which is now all but illegal except for high-level managers. A substitute for mandatory retirement is a defined-benefit pension plan the value of which declines sharply as individuals remain on the job beyond a certain age.