

Credible Long-Term Wage Offers

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Abstract

A promise to pay future wages is not always credible. Paying the promised wage may not be the rational act when the time comes, and so the worker will not believe the promise in the first place. Legally enforceable contracts are one answer to this problem, but are rarely used in the employment relationship. The paper explores strategic equilibrium theories of reputation. A basic point is that a firm can raise its shareholder value by making a commitment to keep wage determination out of the hands of managers who care about shareholder value.

INTRODUCTION

An employer's wage offer to a prospective long-term worker suffers from a fundamental lack of credibility. The total value of the offer must be large enough to induce the worker to make the match-specific investment needed for the job—the investment often includes the substantial cost of moving to a new city, for example. Once the worker has made the investment, however, it is irrational for the employer to pay the worker more than the minimum needed to keep the worker in the job. The rational conduct for the employer is to offer wages sufficient to induce the worker to make the match-specific investment and then to cut wages by the amount of that investment once the worker has made it.

From the perspective of the job-seeker, able to think through the rational behavior of prospective employers, long-term wage offers will not be credible. The worker will not believe a statement by an employer that the employer will irrationally compensate the worker by more than the minimum needed to keep the worker. The lack of credibility of promises or threats to behave irrationally under any contingency is a fundamental tenet of modern strategic economics. A minimum requirement for an acceptable model of economic behavior is subgame perfection.

Labor economists have been keenly aware of the important tension in the employment relationship created by the existence of match-specific capital, although the issue of the credibility of long-term wage offers does not seem to have been studied specifically. Donald Parsons's chapter on the employment relationship in the *Handbook of Labor Economics* (1986) gives a perceptive summary of the modern thinking on this subject in labor economics. Parsons describes three governance methods for the employment relationship. His trichotomy reflects similar thinking of many other commentators on the employment relationship and on bilateral economic relationships in general.

First is the formal contract. A written contractual obligation to pay wages is enforceable in principle in the courts of virtually any country. Outside of the employment relationship, legally enforceable formal contracts are the standard way to make offers of future payment credible. When a coal supplier builds a special railroad line to deliver coal to a steel plant, the supplier automatically enters into a long-term formal contract with respect to the quantity and price of coal to be delivered to the steel producer, for example. Parsons observes that contracts can only be contingent on events that can be verified by courts. An employment contract must make compensation contingent on satisfactory performance by the worker, which is hard for an outsider to verify. Parsons also makes the important observation, overlooked in much of the literature, that the use of a bond that is forfeited in case of nonperformance is not really different because the parties can litigate the forfeiture and the court would have to decide exactly the same issues as it would in the absence of a bond.

The other two governance methods for the employment relationship fall within the general class of implicit contracts. The term implicit contract has proven too vague to be useful, and I will not use it in the rest of the paper. One method rests on reputation. An employer may rationally decide to honor the statements it made to recruit its current workers because it can develop a reputation for honesty which will pay off in recruiting future workers. I will comment later at greater length on Lorne Carmichael's (1984) model where employers have public reputations. Carmichael considers the implications of very simple behavior on the part of job-seekers—they assume that employers will continue to do in the future exactly what they most recently did in the past under the same conditions. He shows that employers have incentives to behave reasonably, but not optimally, in this setting. The equilibrium with reputations is much more favorable than the naked opportunism that would occur in his model without reputations. But Carmichael does not provide a rational basis for the decision rule he attributes to workers. Their behavior is sensible but

not the outcome of reasoned analysis about how to predict the future behavior of employers.

The third governance mechanism arises from the strategic interaction of a firm and its workers. With only a single worker having a finite work life, there appears to be no escape from the conclusion that the worker and firm play a bilateral game to divide their joint value, within which there is no guarantee that the firm does not deprive the worker of at least part of the worker's match-specific capital. Making it a multi-period game does not change the fundamentals, because of the notorious unraveling problem. In a richer environment, rational strategic interaction can support credible wage offers. Clive Bull (1987) has provided a full analysis. In his model, employers promise to pay an extra bonus to workers after the second of their two periods of work. There is no legal enforcement of the promise, and employers only fulfill the promise when the time comes if it is rational at that time. In the Nash equilibrium described by Bull, workers rationally believe the promises of employers who have fulfilled the promise for the earlier generation, and employers rationally fulfill the promise because it adds more value to their current employment relationships than it costs to pay the bonus. Bull's paper appears to be the first to describe a non-contractual employment governance method that meets the standards of modern strategic analysis.

WAGE OFFERS MADE CREDIBLE BY REPUTATION

One of the most difficult issues in the analysis of employment governance is how to characterize the way that workers forecast the future performance of a prospective employer. The modern approach is to portray the worker as putting himself in the employer's place in a subsequent period, to decide if honoring earlier promises is now the rational act. The worker will believe a promise only if it satisfies the criterion of subsequent rationality.

As in the closely related literature on limit pricing and entry deterrence (for exam-

ple, Kreps and Wilson (1982)), there is a strong interaction between the two sides. If employers believe that workers make their decisions on the basis of the earlier conduct of the employer, then the employer has an incentive to honor the current promise. A worker, knowing that the employer has an incentive to preserve a reputation for fulfilling promises, will believe the promise. But the construction of a subgame perfect equilibrium of this type is demanding.

Carmichael's (1984) interesting paper explicitly sidesteps the issue of providing the starting point for the bootstrap argument just outlined. Carmichael argues that the rational expectations philosophy underlying the requirement of subgame perfection, while persuasive for financial markets, is out of place in the labor market:

Since a searching worker does not typically get to observe a firm very closely before he joins it, it does not seem sensible to assume he has intimate knowledge of its technology or the tastes of its owners. He may, however, have some idea of how it has treated workers in the past. If the worker sees no reason for the firm's technology to suddenly change, and if the worker himself is not very different from other workers the firm has hired in the past, then he may do very well just by assuming that the firm will treat him as it has treated everyone else. (p. 715)

Carmichael goes on to assume that workers predict that they will be treated just the way the firm treated previous workers the last time that conditions were the same. His rationalization for the assumption is far from persuasive. Rationality is not ordinarily considered an aspect of technology or tastes. The issue is not whether technology or tastes have changed, but whether the employer will simply act in its best interests when the time comes. Extrapolation of apparently irrational past behavior into the future is not a reliable way to guide one's affairs.¹

¹I have a vivid childhood memory of watching a streetcorner con artist. He offered merchandise

In Carmichael's model, firms develop reputations for not overworking their employees. He does not deal with the issue I consider here, of reputations for fulfilling wage promises. But it is not hard to adapt Carmichael's approach to the wage issue. At the same time, I will dispense with Carmichael's treatment of uncertainty in order to focus on the wage credibility issue. To this end, let $R(h)$ be the revenue that the employer gains from working the representative worker h hours. Let s be the salary actually paid. The firm announces hours in advance and promises to pay workers at the end of the period if they work the prescribed number of hours. To attract workers, the firm must offer a salary-hours package at least as good as those available elsewhere in the market. Let $h(s)$ be the hours that workers are willing to work if they think they will be paid s ; $h'(s) > 0$. Workers in period t believe that they will be paid the amount that workers were paid last period, s_{t-1} . The firm sets this period's hours at the level necessary to attract workers:

$$h_t = h(s_{t-1}) . \quad (1)$$

The firm seeks to maximize the present value of its profits. The part of present value affected by the salary paid in period t is

$$R(h_t) - s_t + \frac{1}{1+r} [R(h(s_t)) - s_{t+1}] . \quad (2)$$

Here r is the firm's discount rate. The first-order necessary condition for the maximum is

$$R'(h_{t+1})h'(s_t) = 1 + r . \quad (3)$$

of ascending value to the crowd around him. Each person who offered money got the money back along with whatever he bought. Finally he offered a gold watch. The man who put up \$100 for it did not get the money back, though he obviously thought he would. The con artist then made a very speedy exit.

By contrast, the condition for efficiency, where the marginal revenue product of labor equals the marginal rate of substitution between salary and hours, is

$$R'(h_t)h'(s_t) = 1 . \tag{4}$$

There are two sources of inefficiency: First, the firm thinks about the benefits of paying its workers not in relation to the group actually doing the work, in period t , but in relation to the group who are influenced by the payment, those working in period $t + 1$. This source disappears in the steady state. Second, because of the delay in the effect of paying wages, discounting drives a chronic wedge between the marginal revenue product and the marginal rate of substitution. Firms always underpay their workers and the workers always work too little, relative to an efficient relationship.

The existence of reputation, here modeled as the influence of this period's wage payments on next period's recruiting, largely but does not completely offset the force of opportunism. If firms had no future or if they discounted the future at an infinite rate, they would pay zero salaries when the time came. At realistic discount rates and a one-year period, the reputation effect would mostly offset the opportunism effect, but not completely. If we interpret the relevant time period to be most of the length of a career—say 20 years—the bias toward opportunism would be very large.

In the environment created by workers' unflinching extrapolation of past behavior, the employer's wage offer becomes completely credible. Firms rationally build reputational capital because each wage payment now helps recruit labor later. Workers are aware that the subsequent payment of their salaries is rational, so they believe that it will occur.

CREDIBLE WAGE OFFERS IN STRATEGIC EQUILIBRIUM

The model in the previous section offers no rational basis for the way that workers project the salaries they will actually be paid. A formal answer to this criticism is

available in a variant of the earlier model, which draws some of its features from Bull (1987). The model has a Nash equilibrium in which workers make rational inferences from the past behavior of employers. Opportunism is suppressed in that equilibrium, because the harm to a firm's reputation from cheating on salaries is greater than the profit to be gained.

In contrast to the earlier model, here firms either pay a salary s at the level they promised when they hired this period's workers, or they cheat flagrantly and pay zero salary. Partial opportunism is ruled out. Workers know the salary histories of all employers. In the Nash equilibrium, workers play the strategy of accepting work only at employers who have always previously been honest. One strategy available to employers is to be honest every period. They set hours at $h(s)$ and actually pay their workers s when the time comes. Their value is

$$\sum_{\tau=0}^{\infty} \left(\frac{1}{1+r} \right)^{\tau+1} [R(h(s)) - s] . \quad (5)$$

The optimal salary offer, s^* , satisfies the efficiency condition,

$$R'(h(s^*))h'(s^*) = 1 , \quad (6)$$

and the value the firm achieves is

$$\frac{R(h(s^*)) - s^*}{r} . \quad (7)$$

An alternative strategy is to start cheating in some period. A firm goes out of business after it cheats, because it can't hire workers the next period, and once it has not hired, it has no reputation upon which to hire in the future. Thus the value from cheating after making salary offer s is

$$\frac{R(h(s))}{1+r} . \quad (8)$$

This value is an increasing function of the salary s . In the very simple model set forth here, prospective workers could spot the cheater who offered more than the efficient wage s^* ; they would rationally infer that any high-salary offer came from an employer who planned to default. Rather than elaborate the model in that direction, I will simply assume that the prospective cheater offers the efficient wage. The firm will choose the strategy of pure honesty if

$$\frac{R(h(s^*)) - s^*}{r} \geq \frac{R(h(s^*))}{1 + r} \quad (9)$$

or

$$R(h(s^*)) - s^* \geq r s^* . \quad (10)$$

Thus there is a Nash equilibrium involving purely honest employment relationships provided that each period's profit per worker exceeds the interest rate times the salary. Opportunism will not be a problem if a firm makes enough profit and it would sacrifice the stream of positive profits if it could not hire workers because of a salary default. Opportunism will be uncontrollable if the per-period profit from honest operations is less than the critical value $r s^*$.

One obvious question about this model is why workers have to guess about whether they will be paid their salaries. They could be paid up front instead. Carmichael (1984) shows that up-front pay (effectively in the hands of workers at the time they agree to take a job) always dominates any form of deferred pay, when the incentive to pay the deferred pay is just to maintain the firm's reputation. The firm gets immediate credit for up-front pay, whereas the value of deferred pay comes from the ability to recruit workers later, and thus is discounted. Up-front pay has the same economics as an interest-free loan. In Carmichael's model, workers are paid in advance and they grant employers the power to dictate the level of effort in exchange. Firms have reputations about how hard they make their employees work, and his basic result is

that there is chronic overwork in a reputational equilibrium.

Bull (1987) looks at the opposite case—firms can't dictate effort, nor is effort observable to a third-party enforcer, but firms observe effort themselves and can make a deferred payment that rewards those workers who stick to their side of the employment bargain. The opportunistic firm defaults on its promise to pay the bonus to the workers who perform. Although Bull's model is more complicated than the one developed here because of the explicit treatment of effort and the corresponding explicit rationalization of deferred pay, the flavor of his results is the same. MacLeod and Malcomson (1989) discuss much more general strategic equilibria between workers and firms. They comment,

The fundamental requirement for an implicit contract to be self-enforcing is that there exist sufficient economic surplus from continuing it over what the parties can jointly get if it is terminated...In these results, as in the standard "Folk Theorem" results, agents who deviate from an equilibrium are punished by other agents' refusing to cooperate with them in the future. (pp. 448, 449)

These models of strategic equilibrium between workers and firms rely, as do all models of this type, on the parties' knowing how the other side might respond to an action that their side takes with probability zero in equilibrium. Beliefs formed outside historical experience matter fundamentally in these models.

THE ANALOGY TO MONETARY POLICY

The issue of the credibility of wage offers is analytically a close cousin to the issue of the credibility of monetary policy. Just as the employer's promise to make future wage payments suffers from a fundamental lack of credibility because it will not be rational to make those payments when the time comes, so does the promise of a

central bank to keep inflation at low levels. When the time comes, the rational act of the central bank is to surprise the public by expanding. But the public can think through how the central bank makes its decisions and the public can then predict what will actually happen. The only equilibrium is at a rate of inflation sufficiently high to make the net benefit of additional inflation zero. Kydland and Prescott (1987) were the first to make this point; Fudenberg and Tirole (1991, pp. 74-77) discuss the topic within the framework of modern game theory.

The pessimistic reading of the literature on credible monetary policy holds that even the best-intentioned central bank is doomed to a highly inflationary policy. One answer, equivalent to the formal, enforceable compensation contract, is a monetary constitution. Milton Friedman suggested, long before the formal supporting analysis was developed, that the central bank should set monetary policy according to the arbitrary policy of fixed money growth. The bank would not be allowed to think about what monetary policy would be optimal at any given moment.

Friedman's monetary rule had some influence in the United States in the 1970s, but has vanished altogether from official Federal Reserve policy today. Nonetheless, inflation in the United States and similar countries has been brought to remarkably low levels. The method seems to be a more subtle application of ideas suggested by Kydland and Prescott's analysis.² The job of the modern central banker is to keep inflation at low levels, not to optimize social welfare. The most conspicuous example of this is the new charter of the central bank of New Zealand, which links the compensation of the chairman to the rate of inflation (negatively).

I believe the analogy in the labor market is worth thinking about. Many firms have compensation departments whose responsibility seems to be different from maximizing shareholder value. These departments put a great deal of emphasis on historical

²Kydland and Prescott, and the related subsequent work by Barro and Gordon (198x), have deeply influenced the central bankers of most countries.

continuity and the maintenance of customary relations with compensation in other firms. They hardly ever recommend that management should squeeze a worker's salary down to the minimum level needed to keep the worker.

One could imagine the ultimate version of this solution to the wage credibility problem. The firm shows the prospective employee its wage determination computer, sealed in a glass box. The computer uses a publicly known algorithm to determine the pay of each worker. The firm automatically accepts the determination of the computer. No manager with any responsibility for shareholder value is allowed to intervene in the wage-determination process after a worker is hired. The shareholders earn a *higher* value from this approach to wage setting than they would from putting it in the hands of a manager—improved recruiting would more than offset the foregone earnings from opportunism.

FORMAL CONTRACTS

All economic interactions with a time dimension are in principle subject to the tension considered in this paper. Whenever there is transaction-specific capital or a gap between the time when one side performs its obligation and the time when the other side performs, there is a potential gain from opportunism. Contracts deter opportunism in most business-to-business relationships in advanced countries. The success of contracts is so complete that their role is almost inconspicuous. In the United States, the probability of litigation over a contract is essentially zero, because the principles under which contract disputes are resolved are so clearly understood by both sides.

Most commercial contracts whose purpose is to suppress opportunism are very simple. For the coal contract mentioned in the introduction, the contract could specify the quantity of coal to be delivered, the technical specifications, and a formula for determining the price. The formula would typically be based on a suitably weighted set

of government price indexes; almost without exception in my experience, commercial contracts extending more than a year into the future are fully indexed.

Commercial contracts do *not* typically deal explicitly with the consequences of non-performance by one side or the other. They are limited to setting forth the obligations of the two sides created by the contract. Should one side default, a standard body of law governs the consequences. This body of law derives from English common law, though it is generally embodied in state statutes today.³ To continue with the coal supply example, the supplier might default. Then the steelmaker would be entitled to compensation for the difference between the agreed price and the cost of buying substitute coal. Or if the steelmaker refused to accept delivery, the coal supplier would be entitled to compensation for the difference between the agreed price and the price available in the market. If the steelmaker failed to pay for coal it received, then the court would order the steelmaker to make the payment.

Contracts can, and generally do, have provisions dealing with the resolution of disputes. Most contracts require that the non-prevailing party pay the legal costs of the prevailing party, and many require private trials rather than trials in public court.

Breach of a commercial contract is a common and normal event and rarely results in a dispute or litigation.⁴ Because the rules governing breach are so clear, the parties can almost always settle upon appropriate compensation without dispute. And the rules control most types of opportunistic behavior, so a breach is rarely opportunistic. Certainly the point considered in this paper—that a worker is at risk for an opportunistic refusal by his employer to pay the promised salary—is a non-issue under a commercial contract.

So why doesn't the labor market make use of the body of law and practice that business-to-business relations exploit so successfully? Although the law prohibits

³See Polinsky (1983), Chapter 5, for a perceptive discussion.

⁴See Polinsky (1983) for a discussion of the conditions under which breach is economically efficient.

enforcement of contracts that amount to slavery, a contract specifying future compensation is unquestionably fully enforceable everywhere in the United States. In California, whose employment law is often considered hopelessly inefficient, courts treat a written employment agreement as fully equivalent to a commercial contract. A written agreement can eliminate almost any of the rather broad rights that workers have absent such an agreement.

Formal contracts do govern some important employment relationships. Where workers are represented by unions, the union generally enters into a formal collective bargaining agreement. Many of the terms of these agreements have the effect of limiting opportunistic wage reductions. To the extent that unions succeed in capturing rents, union members are more vulnerable than other workers to opportunism—both their rents and their job-specific capital are at risk. Collective bargaining agreements protect workers against opportunistic wage reductions relative to the general wage level at the firm. For example, a senior worker must be paid a prescribed premium over a new hire. Beyond the typical three-year duration, collective bargaining agreements do not specify the overall level of compensation. There is an interesting contrast between commercial contracts, which routinely prescribe prices 20 years in the future governed by elaborate indexation formulas, and collective bargaining agreements extending at most three years in the future, with either very simple or no indexation. And collective bargaining agreements in other countries are generally even shorter, often covering only a single year.

Corporate executives and professional athletes generally have formal employment agreements. The compensation of executives often depends on performance of the business units under their management and the compensation of athletes on health and performance. These contracts often cover quite a few years.

Most commentary agrees that it is difficult to write a formal contract covering the work to be done by the employee. That is, we would not expect to see the employment

equivalent of the long-term coal supply agreement I discussed at various points in this paper. Work can't be measured in tons and BTU content. But a number of authors have pointed out that a contract can specify compensation and let the employer make a unilateral decision about whether to retain a worker at the specified compensation.⁵

Under a termination contract, the employer decides unilaterally whether to retain a worker, but must pay a predetermined wage if retention is chosen. The performance of termination contracts is either fully efficient or meets a reasonable criterion for constrained efficiency, both in the presence of information private to the employer and in circumstances where outside verification of work effort is impractical. In some settings, such as universities and professional partnerships, the termination contract provides a single moment of potential termination; the employment relationship is governed by an "up or out rule."⁶ The rule prevents opportunistic continuation of employment at the low entry salary and thus protects the employee's investment in the match. Termination contracts appear to be an important part of the general employment governance method used in many parts of the U.S. economy.

The question raised earlier in this section can be restated as: Why aren't the wage determination terms of employment contracts set forth as long-term indexed formal contracts? Again, no court would have any problem enforcing a contract that prescribed the rate of pay for a worker as long as the employer chose to continue employment. The indexation one would expect to see in the contract would most likely be to some measure of wages in an industry or sector. The ubiquity of sophisticated indexation formulas in commercial contracts disposes of the notion that the complexity of indexation is a barrier to this type of contract.

I believe that the best answer to this question is that other mechanisms give per-

⁵Hashimoto (1981), Hall and Lazear (1984), and MacLeod and Malcomson (1988), to name a few examples.

⁶See Gilson and Kraakman (1990) for a detailed discussion of rules in law firms.

formance superior to a formal indexed contract. In particular, a policy of placing compensation decisions in the hands of an independent compensation department, isolated from value maximization, may deliver sufficiently better performance than any formula written years in advance. In monetary policy making, we seem to have found that we get the best results by putting policy into the hands of a thoughtful body, without tying their hands, but charging the body with something other than welfare maximization. Firms may have found that the same approach gives the best results for wage policy.

EVOLUTIONARY ASPECTS

A reputational equilibrium can prevent opportunism in wage determination. The most realistic form of that equilibrium appears to be that firms develop reputations for wage-setting procedures that are effectively isolated from value maximization. The equilibrium is sustained by the belief among employers that workers will not be willing to work for them in the future if they deviate below the wage rates recommended by these procedures. There is an important externality associated with the punishment administered by jobseekers. The social value of the collective willingness to punish deviating employers is far greater than the sum of the private values.

Formal contracts and government punishment provide the obvious way to deal with this externality. But these tools are evidently dominated by others because formal contracts are seldom used for employment governance. If the cultural norms of a society make people think that it is right and proper to avoid working for employers who have cheated their workers in the past, that society will flourish because it will have much more effective governance of its employment relationships. Hence evolution will favor societies that develop those norms. The point goes beyond the employment relationship. If people think it is wrong to buy the products of manufacturers who have sold defective products in the past, social control of defective products will be

more successful, for example.

CONCLUDING REMARKS

By and large, employment relations work better than the bleak predictions of the simple theory of credibility. Employers do not systematically cheat their workers of any match-specific capital the workers might have developed. Workers make match-specific investments, such as a long-distance move, with the reasonable expectation that they will not subsequently lose the extra earnings that motivated the move in the first place.

Though theory suggests it is fragile, reputational equilibrium seems to be the main governance method, used in favor of long-term formal contracts even where the contracts are practical. Reputational equilibrium is fragile because it relies on workers to punish deviating employers, and private incentives for punishment are weak. On the other hand, the equilibrium is attractive to a firm—shareholder value is strictly greater in a firm that is successful in isolating compensation decisions from managers who care about shareholder value. Modern firms seem to be reasonably successful in resolving this paradox. They make credible commitments to compensation policies that forswear opportunism.

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