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LUMP SUM BONUSES IN UNION CONTRACTS:  
SEMANTIC CHANGE OR STEP TOWARD A NEW WAGE DETERMINATION SYSTEM?

Christopher Erickson

Andrea Ichino

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Christopher Erickson

Andrea Ichino

Department of Economics  
Massachusetts Institute of Technology  
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## 1 Introduction

Recent evidence suggests that the relatively stable industrial relations system that was predominant throughout the post-war period in the United States is undergoing a period of crisis and transformation.<sup>1</sup> One of the most important aspects of that system which has become unsettled is the structure of wage increases: cost of living adjustments and predetermined annual improvement factors based on rules are progressively being abandoned or readjusted. This paper presents evidence on the prevalence of the innovations that are replacing the traditional systems of wage determination in the union sector and analyzes one of them, lump sum bonuses, in depth because of its growing diffusion and relative neglect by researchers. Lump sum bonuses are payments not explicitly tied to any measure of performance that are given instead of all or part of a base wage increase; in the union sector, these payments are contracted in advance and given at specific dates along the life of the contract. These bonus systems could represent minor, or even just semantic, modifications of the existing methods of wage determination. Or, they may evolve into something radically different from the basic compensation system that dominated the post-war period, with consequent implications for macro- and micro-economic performance. As a first step toward addressing this larger issue, we examine the basic nature and possible causes of bonus systems. Our main findings are that the existence of an uncertain environment increases the probability of signing a bonus contract, and that bonus contracts provide for larger growth in total compensation than straight wage contracts adopted under similar circumstances. These results suggest that bonus systems can best be understood as pay increases on which the firm maintains an option of non-renewal, and for which present workers must be compensated.

First, in section 2, we present basic information on bonus contracts and on the bargaining units that adopt them based on our sample of 455 manufacturing settlements. Next, in section 3, we suggest several hypotheses about the nature and causes of bonus systems. Finally, in section 4, we present econometric evidence designed to distinguish among these hypotheses.

## 2 Recent innovations in compensation systems

The innovations in compensation systems that have begun to replace automatic cost of living adjustments and annual improvement factor wage increases can be placed into the seven broad categories presented in Table 1.<sup>2</sup> In this section we examine their prevalence and argue that we have chosen to focus on one of them, lump sum bonuses, because its use has accelerated much

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<sup>1</sup> For a comprehensive analysis of this evidence, see Kochan, Katz and McKersie [1986].

<sup>2</sup> A similar classification is given in O'Dell [1986], p. 24.

more than any of the other systems and because it has been neglected by researchers until now. The seven innovations can be summarized as follows. As stated above, lump sum bonuses are payments not explicitly tied to any measure of performance that are given instead of all or part of a base wage increase. Incentive systems can be divided into profit sharing, gain sharing, small unit incentives, and individual incentives, which tie pay to company performance, large unit performance, small unit performance, and individual performance, respectively. Two tier plans require that new hires enter at a lower rate of pay than employees previously hired to fill those jobs. Finally, pay for knowledge means that pay is determined by the number of jobs an employee can do, not the job actually performed on a given day.

TABLE 1: Prevalence of Non-Traditional Compensation Systems in US Economy

SURVEY	AMERICAN PRODUCTIVITY CENTER 1986		HAY GROUP 1988	
	firms using	firms considering	firms using	firms considering
Lump Sum Bonuses	30 %	9 %	24 %	14 %
Profit Sharing	32 %	6 %	29 %	7 %
Individual Incentives	28 %	8 %	47 %	13 %
Small Unit Incentives	14 %	9 %	18 %	12 %
Gain Sharing	13 %	9 %	10 %	12 %
Two Tier	11 %	4 %	9 %	2 %
Pay For Knowledge	5 %	4 %	10 %	8 %

Unfortunately, the U.S. government does not systematically keep track of the prevalence of all these systems, and collects virtually no data at all on the non-union sector. Private organizations do conduct surveys, however, and Table 1 reports results from two of these. The American Productivity Center is a non-profit organization which undertook a survey of 1,598 organizations representing about 10% of the civilian working population of the U.S. in forty different industry groups in 1986; the Hay Group is a management consulting firm which undertook (with the magazine *BusinessWeek*) a survey of 688 companies in 1988.<sup>3</sup> Both surveys indicate that bonus and incentive systems are significant factors in the U.S. economy; note that

<sup>3</sup> The data in Table 1 comes from Hay[1989] and O'Dell[1986].

both also indicate that lump sum bonus systems are being considered for adoption by as many or more companies than are considering any of the other innovations.

More systematic evidence exists on the union sector. The main finding from here is that lump sum bonus provisions were almost unheard of for non-managerial workers before the 1980s, but have become commonplace recently. The Bureau of National Affairs (BNA) is a private organization which keeps track of all published union contracts for firms with more than 500 employees; they report that only 6% of the new contracts negotiated in 1984 had lump sum provisions while 19% had these provisions in 1985, 33% in 1986, 32% in 1987, and 36% in 1988.<sup>4</sup> The Bureau of Labor Statistics (BLS) reports that by the first half of 1989, 42% of all private sector workers under major collective bargaining settlements were covered by lump sum provisions<sup>5</sup>; before 1982, they did not account for these payments as a separate category because they were so rare.

We know of no evidence of any other compensation system which has grown so much recently or appears to show such continued growth, and so we turn our attention to the lump sum bonus phenomenon as a key compensation innovation in U.S. union contracts. Once again, in the union sector a lump sum bonus is defined as a contracted payment which does not go into the hourly base wage and which is not explicitly tied to individual, group, or company performance; many contracts specify more than one bonus payment over the life of the contract, but the amount and the timing of the bonuses are always specified at signing<sup>6</sup>. Before discussing hypotheses about the nature and the causes of bonus systems, we will first provide some basic information about their characteristics and about the bargaining units that adopt them: the form bonuses take, their average size, the industries they appear in, and their pattern of diffusion. Accordingly, we now turn to our sample of union contracts in large U.S. firms.

Our sample consists of 455 manufacturing settlements between 1982 and 1988. The data ultimately comes from the BLS.<sup>7</sup> Information on the size of the average base wage, average wage

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<sup>4</sup> BNA[1988]

<sup>5</sup> BLS[1989]

<sup>6</sup> To give two examples of lump sum provisions from the data set that will be used in the following pages:

- The Zenith Radio Corporation signed a three year agreement with the electrical workers' union (IBEW) in 12/86 providing for a \$750 payment in 12/86 and \$700 payments in 12/87 and 12/88.

- The Lockheed Georgia Company signed a three year agreement with the machinists' union (IAM) in 10/86 providing for a payment in 12/86 equal to 12% of the employee's earnings during the preceding 12 months and payments in 12/87 and 12/88 equal to 5% of earnings during the preceding 12 months.

(Data from the BLS)

<sup>7</sup> The original data set is from Vroman and Abowd [1988], with significant modifications made by Hirtle [1986]. The original source of the data was the BLS publication *Current Wage Developments*. The lump sum information comes from a separate BLS data source. We are grateful to Henry Farber at M.I.T., John Abowd at Cornell, and Janice Murphy at the BLS for giving us access to the various parts of the data set.

increase, and sizes and timing of bonuses are included, as well as other characteristics of the bargaining group and the settlement such as the region, industry and union, the number of workers, and whether the contract was preceded by a strike. All 20 of the two-digit manufacturing industries are covered. We choose 1982 as the starting date because this is the first year in which the BLS began to account for lump sum bonuses as a separate category.

66 of the settlements contain bonus provisions; the time pattern of their adoption is presented in Table 2. Note that our sample confirms the finding of the BNA that the adoption of bonus systems has accelerated greatly in the past few years. This trend is even more dramatic when we calculate the percentage of workers in new settlements with bonus provisions. Once again, we conclude that the bonus phenomenon is a recent and widespread innovation.

TABLE 2: Incidence of Lump Sum Provisions in Sample of Union Contracts

	1982	1983	1984	1985	1986	1987	1988
% OF CONTRACTS WITH LUMP SUM PROVISIONS	0	2.7	11.9	23.2	31.6	34.9	50
% OF WORKERS IN NEW SETTLEMENTS WITH LUMP SUM PROVISIONS	0	9.7	83.1	40.5	49.8	77.5	58.3
% OF WORKERS IN NEW SETTLEMENTS WITH LUMP SUM PROVISIONS, EXCLUDING FORD & GM	0	9.7	40	40.5	49.8	38.5	58.3

Table 3 presents the basic characteristics of the bonus provisions themselves. We judge two categorizations to be relevant for the hypotheses that will be discussed below: whether the initial bonus is up-front or deferred and whether the bonus comes as a uniform dollar amount for all workers or as a percentage of earnings. The up-front versus deferred distinction is interesting because it suggests why bonuses may be attractive to workers given their discount rates and probability of future turnover or layoff; we define an up-front contract as one in which the first bonus comes within two months of the signing of the contract. The uniform versus percentage distinction is interesting because of the implications for within-firm wage dispersion. Note that while the bonus systems in our sample seem to be evenly split between uniform amount and percentage of earnings, most of the provisions provided for at least the first portion of the bonus

payment to come up front. Note also that the bonuses were not insubstantial sums, ranging from \$150 to \$2120 for uniform bonuses and from 1.5% to 12% of the previous year's earnings for percentage bonuses; the last column gives the average bonus payment per hour of the contract.<sup>8</sup>

TABLE 3: Characteristics of Bonuses

TYPE OF BONUS	# OF CONTRACTS	AVERAGE AMOUNT OF BONUS (\$)	AVERAGE AMOUNT OF BONUS (\$ / HOUR)
UP-FRONT , UNIFORM	28	\$1210	\$ 0.21
DEFERRED, UNIFORM	8	\$1080	\$ 0.19
UP-FRONT, PERCENTAGE	22	\$2140	\$ 0.36
DEFERRED, PERCENTAGE	8	\$1300	\$ 0.23

Table 4 presents some summary statistics on the differences between bonus and traditional settlements. The median number of workers is higher for bonus settlements, they are more likely to be preceded by a strike and to contain escalator and profit sharing provisions, and they are more likely to operate at the national level. Table 5 shows the distribution of these settlements across industries. The transportation equipment and petroleum industries seem to have a disproportionate share of these contracts, although at least one such contract has appeared in all but six of the twenty two-digit industries.

TABLE 4: Characteristics of Settlements in Sample

VARIABLE	LUMP SUM	NON- LUMP SUM
MEDIAN # OF WORKERS	6,300	2,200
% OF CONTRACTS PRECEDED BY STRIKE	13.6 %	7.4 %
% OF CONTRACTS WITH ESCALATORS	59.1 %	44.1 %
% OF CONTRACTS WITH PROFIT SHARING	15.2 %	4.6 %
% OF CONTRACTS FROM FIRMS OPERATING AT NATIONAL LEVEL	54.5 %	30.4 %

<sup>8</sup> Union contracts in the U.S. are typically three years long.



TABLE 5: Lump Sum Settlements by Industry

INDUSTRY	TOTAL CONTRACTS	% OF CONTRACTS WITH LUMP SUMS
SIC 20: FOOD AND KINDRED PRODUCTS	37	11 %
SIC 21: TOBACCO PRODUCTS	5	20 %
SIC 22: TEXTILE MILL PRODUCTS	37	0
SIC 23: APPAREL AND OTHER TEXTILE PRODUCTS	26	0
SIC 24: LUMBER AND WOOD PRODUCTS	18	0
SIC 25: FURNITURE AND FIXTURES	8	13 %
SIC 26: PAPER AND ALLIED PRODUCTS	38	21 %
SIC 27: PRINTING AND PUBLISHING	11	0
SIC 28: CHEMICALS AND ALLIED PRODUCTS	33	3 %
SIC 29: PETROLEUM AND COAL PRODUCTS	12	33 %
SIC 30: RUBBER AND MISC. PLASTICS PRODUCTS	14	7 %
SIC 31: LEATHER AND LEATHER PRODUCTS	8	0
SIC 32: STONE, CLAY, AND GLASS PRODUCTS	20	10 %
SIC 33: PRIMARY METAL INDUSTRIES	28	4 %
SIC 34: FABRICATED METAL PRODUCTS	19	21 %
SIC 35: MACHINERY, EXCEPT ELECTRICAL	25	12 %
SIC 36: ELECTRIC AND ELECTRONIC EQUIPMENT	43	23 %
SIC 37: TRANSPORTATION EQUIPMENT	44	55 %
SIC 38: INSTRUMENTS AND RELATED PRODUCTS	9	22 %
SIC 39: MISC. MANUFACTURING INDUSTRIES	9	0

### 3 Hypotheses about the nature and causes of bonus systems

A reading of the industrial relations environment reveals two apparent facts: management tends to view bonus systems as tools to lower labor costs, and unions generally oppose them. In a separate report from the one mentioned above, the Hay Group describes bonuses as follows: "Lump sum payments in lieu of base wage increases are a tactic that first gained reluctant acceptance in collective bargaining agreements, in industries where all parties recognized the need to become more competitive. Effectively, base wages are frozen but employees still have periodic lump sum payments to look forward to."<sup>9</sup> Interviews with personnel managers have confirmed this view - that bonus systems are perceived as serving to bring base wages into line with some lower standard. On the union side, the Teamsters for a Democratic Union comment in their newsletter that "Lump sum bonuses are part of a management strategy to eventually pay non-union wages in a union shop. The lump sum bonus ... is not really a bonus at all - it's a delayed wage increase that does not add to the sum of our base wage. It's a lousy wage increase because it doesn't accrue and build our base wage as an hourly increase does."<sup>10</sup> Interviews with union leaders have indicated that bonuses are generally opposed in principle as concessionary. These

<sup>9</sup> Hay Group [1987].

<sup>10</sup> Braxton [1989], p. 8.

considerations suggest as a first approximation that bonuses are just a one-shot tactic to avoid raising wages.

Yet, there is also another side of the story. In the just mentioned report, the Hay Group goes on to state that “With each subsequent year, the relief [for the company] becomes cumulatively greater, *and the possibility of larger lump sum awards grows*”<sup>11</sup> (emphasis added); this suggests that bonuses may not be perceived by firms as one-shot tactics and could in fact persist and become a significant portion of pay. On the union side, interviews with people in the labor movement have indicated that the rank-and-file, particularly younger workers, do not necessarily oppose bonus systems to the extent the leadership does. Furthermore, some of the less dogmatic union leaders, while opposing bonuses in principle, appreciate that there may be circumstances under which they are appropriate, and many view explicit profit sharing much more favorably. For example, one union leader told us that he was willing to accept that some pay should come in the form of a bonus when the company does not know whether or not its product market environment will allow it to pay the same wages in the future. In addition, it is not clear that the bonus itself (the form of payment) is opposed so much as its perceived tendency to accompany cuts in growth in total compensation (the size of the total settlement). These observations suggest that the lump sum bonus phenomenon might not be transitory after all, and opens up a range of questions about the basic nature of these systems and the conditions under which they are adopted.

Unfortunately, it is too early to answer definitively the most interesting question: are bonus systems only temporary tactics which will be replaced by the old system of automatic base wage increases once the real base rate has been sufficiently reduced, or will they evolve into something else like explicit incentive or profit sharing systems? It does seem difficult to believe that they can continue in their present form indefinitely, given the near across-the-board opposition of the unions to these systems. We also cannot yet say with confidence whether bonuses are more easily taken away than wage increases, although we can say that this seems to be the perception of the parties involved. What we can do is to describe possible scenarios which define the basic nature of bonuses and the conditions under which they may be likely to appear and present empirical evidence which provides clues as to which of the scenarios best approximates reality.

SCENARIO I: The bonus system is in fact identical to the wage system and bonuses are nothing more than a semantic change, with no effects on payoffs in the bargaining process.

This scenario is based on the assumption that a dollar is a dollar and it does not matter what form the payment takes. Rational agents should be able to see through any difference in the form of

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<sup>11</sup> Hay group [1987]

payment, and a union with given bargaining power should be able to extract the same amount from the firm regardless of whether it comes in the form of wage increases or bonuses. This implies that the amount of money that each worker gets under a bonus contract must be exactly equal to the present discounted value, over the life of the contract, of what he/she would have gotten under the wage system. This explanation also requires that bonuses are no more easily taken away than wage increases and that unions can just as easily demand a compounded growth in the bonus as in the wage. The empirically testable implication of this scenario is that, within each contract, after controlling for the characteristics of the bargaining unit, the compensation package under the bonus system should be identical to the compensation package under the wage system; we cannot yet adequately test for whether the bonus is more easily taken away in the next contract, however.

This scenario is clearly unsatisfactory. First of all, it does not give us any hint about why a merely semantic change should be favored by the firm, given that labor costs would be the same under both systems if this were the true explanation. Even more, it does not explain why these systems should be becoming so prevalent in U.S union contracts, as we have shown above. Finally, this explanation does not tell us why unions should oppose bonuses so strongly.

**SCENARIO II: Bonus systems are worth less than wage systems adopted under similar circumstances, even within the life of a single contract.**

This scenario implies that firms face lower labor costs under bonus systems within each contract. It requires the assumption that workers either do not perceive this cut in wages or have higher discount rates than the firm. To give an example of the first possibility, a personnel manager told us that the workers in his plant accepted a bonus system because they did not understand that three yearly wage increases will compound, while three bonus payments will not. Along the same lines, workers may not perceive the amount of money that they lose due to the fact that bonuses do not go into the base on which overtime and some benefits (such as pensions) are calculated; hence, a package which might seem like a fair deal to the worker might in fact represent a cost savings to the firm.<sup>12</sup> As for the discount rate argument, the firm may save on labor costs within each contract by exploiting the preferences of workers for large sums of money immediately rather than wage increases spread over time which add up to more money when discounted at the market rate of interest. The empirically testable implication of this scenario is that, within each contract, after controlling for the characteristics of the bargaining unit, the compensation package under the bonus system should be worth less than the compensation package under the wage system.

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<sup>12</sup> The same argument is presented on the union side in Braxton [1989].

This scenario does have its merits. It gives a satisfactory explanation for why firms should favor bonus systems, and is consistent with some anecdotal evidence: bonuses do tend to be loaded up front, and union leaders have told us that it is difficult to generate a strike against a new compensation system which promises a big check upon signing. However, on the firm side it does not explain why bonus systems have only appeared recently. On the union side, if the compounding or benefits story is true, why do the unions fail to inform their workers of these effects before ratification; if the discount story is true, why do union leaders oppose these systems if they meet the preferences of the rank and file? Note that the two motivations for this explanation give different predictions about the permanence of bonus systems: if compounding is the issue, then one would expect that workers will eventually see the trick and bonus systems will disappear; while if discount rates are at work, then in some sense a fair trade is occurring and bonus systems could persist.

SCENARIO III: Bonuses can be cut in future contracts much more easily than wages; hence, firms must pay for this "option of non-renewal"

This scenario requires an institutional or psychological reason to explain why it is more difficult to cut nominal wages than to fail to renew a bonus in future contracts. Anecdotal and scholarly evidence suggests that this is in fact the case.<sup>13</sup> Taking this for granted, a bonus system can be designed so as to provide the same present discounted value of lifetime earnings as a wage system adopted under similar circumstances. This implies that, in order to compensate workers for the higher probability that the bonus will be taken away in the future, the firm must pay more money over the life of a bonus contract than over the life of a wage contract adopted under similar circumstances. The empirically testable implication of this scenario is that, within each contract, after controlling for the characteristics of the bargaining unit, the compensation package under the bonus system should be worth more than the compensation package under the wage system.

There are several possible reasons why the firm, the workers, or the union might favor or oppose a bonus contract which pays more than the alternative straight wage contract in the present

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<sup>13</sup> Webster's New Collegiate Dictionary[1973] defines "bonus" as: (1). Something given in addition to what is usually or strictly due, (2). Money or an equivalent given in addition to an employee's usual compensation.

Kahneman, Knetsch, and Thaler [1986] report the following results from a telephone survey of 198 Canadians in 1984-85: When people were posed the following question: "A small company employs several people. The workers' incomes have been about average for the community. In recent months, business for the company has not increased as it has before. The owners reduce the workers' wages by 10% for the next year," the responses were: acceptable 39%, unfair 61%. However, when a separate group was asked: "A small company employs several people. The workers have been receiving a 10% annual bonus each year and their total incomes have been about average for the community. In recent months, business for the company has not increased as it had before. The owners eliminate the workers' bonus for the year," the responses were: acceptable 80%, unfair 20%.

contract but less in expected value terms in future contracts. We now examine three such explanations.

III.a) The adoption of the bonus contract is related to uncertainty about future performance of the firm.

This modification of the basic "option" scenario is based on the assumption that the bonus is more easily taken away than a wage increase when the firm is facing a downturn, so that an increase in the perceived probability of the occurrence of bad states should make the bonus system more desirable to the firm. If we further assume that the firm's labor demand is elastic with respect to wages, not only the firm but also the workers could benefit from this increase in wage flexibility: models of the labor market such as the one presented in Weitzman[1984] indicate that a decrease in employment induced by a shock to demand or to non-labor costs could be neutralized by wage flexibility.<sup>14</sup> In short, the gain induced by the shift to a bonus system could be positive sum for both the workers and the firm.

If, on the other hand, we assume that union wage determination simply involves the division of ample and exogenously determined rents so that the firm's employment decision is unrelated to the wage, any gain to the firm from increased wage flexibility should represent an equal loss to the union. Yet, it is still possible that uncertainty matters if the firm has more complete information than the union about the future performance of the company or the firm interprets the commonly available information differently. Under this type of assumption, suppose that a firm perceives for the future an environment that is more uncertain than the one faced in the past; in other words, suppose that it becomes increasingly more difficult to forecast the size of the pie to be split with the workers in the future. If this perception is not shared by the union, the firm should find it advantageous to shift to a bonus system that would fully compensate workers if uncertainty were at the lower level perceived by the union, but in fact increases the profits expected by the firm on the basis of its different perception about future variability of performance. Again, the key assumption of this scenario is that there is a range of "bad states" over which the firm can exercise the option of non-renewal on a bonus but cannot cut the base wage in future contracts.

The empirically testable implications of this scenario are twofold: first, the probability of signing lump sum bonus contracts should be increasing with some measure of uncertainty about the future performance of the firm. In addition, as with the more general option scenario, within each contract, after controlling for the characteristics of the bargaining unit, the compensation package under the bonus system should be worth more than the compensation package under the

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<sup>14</sup> This explanation begins to blur the distinction between bonus systems and explicit profit sharing; perhaps bonus systems just allow workers to trade off wage stability for employment stability in the long-run (i.e. over the course of the next contract) while profit sharing provides this tradeoff in the shorter-run.

wage system. Clearly, however, it is impossible to determine empirically if the larger within-contract compensation package under the bonus system fully compensates workers for the uncertainty concerning future contracts perceived by the firm.

This scenario, compared to those described above, seems to have one substantial merit: not only does it explain why firms may favor bonuses systems, but it also gives some clue about the reasons for the increasing prevalence of these innovations in the eighties. It has been argued by Piore and Sabel[1984], among others, that the postwar period up to the seventies was a period of relative stability for the U.S. economy, and that this stable environment allowed for the viability of the more rigid compensation system described above (based on fixed annual improvement factors and cost of living adjustments), while at the same time the compensation system was in itself a part of the regulatory mechanism that helped to maintain the stability of the environment. The late seventies and the eighties have been periods of greater uncertainty for U.S. companies. Yet, a different kind of uncertainty is at play now than in the late seventies. Before Reagan and in the aftermath of the oil shocks, the issue was uncertainty about prices, and in general nominal variables such as interest rates, due to the inflationary environment. In the eighties, the various attempts to deregulate the economy and to reduce the presence of the state in the market, the skyrocketing federal deficit, and the increasing foreign penetration in U.S. markets have all created different sources of uncertainty. In particular, it can be argued that U.S. companies have encountered situations in which elements such as these have affected their market shares in not easily predictable ways. Those specific situations, which are likely to have affected different companies in different periods, may have caused the perception of increasing uncertainty hypothesized here.

However, this scenario is still unsatisfactory for one key reason: it does not explain the strong opposition of unions to bonuses. According to the assumptions above, the firm is in fact able to design a bonus system that fully compensates workers given their perception of the future. Yet, unions tend to oppose bonuses in principle. The following scenario addresses this issue of union opposition.

III.b) The firm exploits the fact that yet-to-be hired workers will not receive the bonus if it is not renewed, while workers with low expected tenure favor the bonus system because they expect to leave.

Starting from the basic option value story outlined in scenario III, here we assume that the existing workforce has a shorter time horizon than the firm and the union, which both take into account workers who will be hired in the future. Under these circumstances, the firm may find it profitable to propose a bonus system that fully compensates the existing workforce but leaves the expected base wage lower than under the equivalent wage system. The higher profit to the firm

would be due to the fact that such a bonus system would amount to a subtle way of introducing a two tier wage system in which workers hired in the future, when the bonus is not paid, would essentially receive a lower compensation package than the one received by older workers. The latter would have received in the past the compensation that they do not get in the future, while newly hired workers would simply be paid less. Note that, in contrast to explicit two-tier systems, at any given moment in time new workers earn the same wage as older workers, perhaps leading to a less disruptive work environment.<sup>15</sup>

In addition, note that not all existing workers will gain equally from the shift to a bonus system. If young and low tenure workers perceive a higher probability of quitting or being laid off because of greater turnover at the beginning of their careers and because of seniority rules, they will put more value on money guaranteed in the present contract against money promised in future contracts. Furthermore, when the bonus comes in the form of a uniform dollar amount for all of the workforce as often seems to be the case<sup>16</sup>, low tenure workers receive a proportionally higher compensation increase because they start from a lower base wage. Finally, young workers are less likely to participate in some benefits related to the base wage such as pensions and medical payments. On the other hand, older workers who expect to retire soon also have low expected tenure and so might also favor money in the present contract over money promised in the future when they will be gone. Given these differences in the way workers regard bonuses, in addition to playing off present employees against future employees, the firm might use bonus systems to cut its costs by benefiting only part of the present workforce at the expense of the others.

In short, the firm can cut its costs either by making present workers better off at the expense of yet-to-be-hired workers or by splitting the present workforce. However, unless we assume the existence of a fixed cost of changing systems, perhaps in the form of worker dissatisfaction with the concept of change, bonuses would always be a dominant strategy for the firm and at least part of the workforce. Given that we do not observe bonuses everywhere, these fixed costs are likely to be at play and so some other condition must be met for the appearance of bonuses. One such condition could be an increase in uncertainty about the firm's performance: if fixed costs exist, when uncertainty increases the value of the innovation to the firm increases, raising the likelihood that those fixed costs will be overcome. One would also expect that bonus systems would have a higher value to firms that are expanding, and thus are likely to soon reap the

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<sup>15</sup> The Hay Group[1987] points out another sense in which lump sum payments may reduce the disruptive environment created by a two-tier wage system. They note that "the lump sum tactic is usually the smoothest way to integrate [an explicit] two-tier wage structure. Under this approach, new employees are hired at lower rates than existing employees are receiving for the same positions. In most cases, the senior employees are effectively frozen at the old rates (or put into lump sum programs), while the gap between the new and the old tiers is gradually closed."

<sup>16</sup> See Table 3, p. 5.

benefits of the implicit two-tier system upon hiring new workers.<sup>17</sup>

The empirically testable implications of this scenario are fourfold: first, as in scenario IIIa, uncertainty should positively affect the probability of signing bonus contracts. Secondly, a proxy for an expansionary firm environment, indicating the likelihood of hiring in the near future, should also positively affect the probability of signing bonus contracts. Thirdly, firms with more young and low expected tenure workers should be more likely to adopt these innovations. Finally, as in the other variants of the option value story, the bonus contract should provide more money within the life of the agreement than wage contracts signed under similar circumstances.

This scenario gives an explanation for why some workers might accept bonus contracts while unions oppose them: union leaders are likely to care about those workers who will be hired in the future and will bear the cost of the innovation in the event that the firm exercises the option of non-renewal<sup>18</sup>. In addition, this scenario shares the same merits as the previous one, IIIa, as far as relying on uncertainty to explain the recent increasing prevalence of bonuses. On the other hand, it seems unlikely that firms would slight workers who expect to stay with the company a long time and yet-to-be-hired workers at the expense of those present workers who expect to leave, as long as there is some perceived relationship between wages and the quality of the workforce<sup>19</sup>: the gain from cutting labor costs in this way may well be overwhelmed by the losses due to the effect on morale and effort of part of the present and future workforce. Finally, this explanation is based either on expectations of an expansionary environment or on uncertainty independent from the level of present and expected future performance, while anecdotal evidence suggests that the parties involved tend to associate these systems with situations of firm or industry crisis when concessions are imposed on workers.

III.c) In a situation in which the union is forced to take concessions and the fixed costs of shifting away from tradition have to be paid anyway, a bonus system may be preferred by workers to a concessionary wage contract.

As we said at the end of the previous scenario IIIb, the story based on the firm and existing workers gaining from bonus systems at the expense of yet-to-be-hired workers does not tell us why these systems might be more likely to appear in a concessionary environment. Suppose,

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<sup>17</sup> The existence of queues for union jobs, which generally pay much higher wages than similar non-union jobs, probably rules out the possibility that the jobs would go unfilled at a slightly lower rate of compensation. For an analysis of queues for union jobs, see Farber[1983]. Of course, if the wage is used as a recruitment device to find more qualified workers, this issue becomes more complicated.

<sup>18</sup> This may be motivated by a higher sense of solidarity and participation in the cause on the part of union leaders, or, in a more greedy and rational world, it could be due to the fact that union leaders have to get reelected in the future. By making their opposition to bonuses clear, they gain the right credentials to represent newly hired workers in the future

<sup>19</sup> E.G. efficiency wage theory, and wages as a recruitment device to find qualified workers.



however, that the fixed cost of change comes more from an aversion to change in-and-of itself rather than to shifting away from one ideal type of system to a different one. Under this assumption, if the firm is hit by shocks that make the old base wage dynamic incompatible with expected performance, independent from uncertainty, the bargaining unit will incur the fixed cost anyway because a lower than customary wage growth is imposed by the situation.<sup>20</sup> Hence, for a given level of uncertainty, bonus systems should be more likely to be adopted in a concessionary environment because the fixed cost of shifting away from the traditional system is less relevant. Note that despite the fact that some present workers might prefer the bonus system, union leaders on behalf of future workers would still likely oppose bonuses for the same reasons outlined in the scenario IIIb. In this case, future workers hired after the firm exercises the option of non-renewal would essentially take a larger concession than the one taken by present workers when the bonus system is introduced. Yet, if many current workers are either indifferent or prefer the bonus system once it is agreed that concessions have to be taken, union leaders may not be able to gain enough support from the rank and file to fight the innovation.

Empirically, this scenario is distinguishable from the previous one because now, for any given level of uncertainty, a proxy for the existence of a concessionary environment rather than an expansionary environment should positively affect the probability of signing bonus contracts. In addition, as with the above scenario IIIb, firms with young and low tenure workers and firms that face high uncertainty should be more likely to adopt these innovations. Finally, as in all the variants of the option value story, the bonus contract should provide more money, within the life of the agreement, than wage contracts signed under similar circumstances.

The scenarios outlined above have different empirical implications that allow us in principle to distinguish among them in the data. These implications are summarized in Table 6. However, at this stage of our research, we do not yet have all of the empirical information needed to adequately evaluate these differences; furthermore, given the very recent appearance of bonus systems, any attempt to estimate their permanence in the future or their possible evolution is seriously compromised. However, the use of econometric techniques with our data set allows us to get hints about which of these scenarios is most accurate. More generally, we are able to address the following two fundamental questions:

- (1) Do bonus agreements provide to workers more, less, or the same amount of money as traditional contracts adopted under similar circumstances?
- (2) Under what types of circumstances are bonus systems adopted?

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<sup>20</sup> Suppose, for example, that the workers have always received "3% plus COLA", which is one stylization of the post-war regime. If the company can no longer give 3% and remain viable, is it that much more of a change to also alter the form of payment?

TABLE 6 : Empirical Implications of the Scenarios

Scenario	Determinants of the probability of signing a lump sum contract				Determinants of compensation growth
	Proxy for uncertainty	Proxy for expected tenure	Proxy for expansionary environment	Proxy for concessionary environment	Presence of lump sum provisions
Scenario I: bonuses are a semantic modification	no effect	no effect	no effect	no effect	Bonus contracts <u>pay the same</u> as wage contracts under similar conditions
Scenario II: bonus contracts are worth less due to differences in discounting or ignorance	no effect	no effect	no effect	no effect	Bonus contracts <u>pay less than</u> wage contracts under similar conditions
Scenario III: bonus contracts include the option of non-renewal					Bonus contracts <u>pay more than</u> wage contracts under similar conditions
a) uncertainty about the future increases the value of flexibility	increases probability of bonus contract	no effect	no effect	no effect	"
b) the firm and present workers, particularly those with low expected tenure, gain at the expense of future workers	increases probability of bonus contract	increases probability of bonus contract	increases probability of bonus contract	no effect	"
c) fixed costs of changing form of the compensation system are more easily overcome in concessionary environments	increases probability of bonus contract	increases probability of bonus contract	no effect	increases probability of bonus contract	"

#### 4 Empirical results

##### 4.1 Do bonus agreements provide to workers more, less or the same amount of money as traditional contracts adopted under similar circumstances?

The purpose of this section is to attempt to distinguish among the three basic scenarios by determining how much money workers get under bonus contracts compared to wage contracts adopted under similar circumstances. Our testing procedure allows us to reject the hypothesis that workers are paid less. Hence, we conclude that the adoption of a bonus system is most likely not just a short-run tactic to cut labor costs within the present contract, but rather a more sophisticated arrangement such that any cost savings for the firm can only result from failing to renew the bonus in subsequent agreements.

Starting from sample comparisons, Table 7 presents the wage characteristics of the settlements.

TABLE 7: Wage Characteristics of Settlements in Sample (standard deviations in parentheses)

VARIABLE	LUMP SUM		NON- LUMP SUM	
	\$/hour (\$ 1983)	% of signing pay per year	\$/hour (\$ 1983)	% of signing pay per year
AVG. HOURLY PAY AT SIGNING <sup>21</sup>	11.04 (1.63)		9.33 (2.38)	
AVG. WAGE INCREASE	0.38 (0.38)	1.3 (1.1)	0.65 (0.83)	3.1 (3.6)
AVG. COLA INCREASE	0.46 (0.51)	1.3 (1.5)	0.20 (0.35)	0.6 (1.1)
AVG. COLA + WAGE INCREASE	0.84 (0.54)	2.6 (1.4)	0.85 (0.88)	3.7 (3.6)
AVG. BONUS INCREASE	0.24 (0.18)	0.7 (0.5)		
AVG. INCREASE IN TOTAL COMPENSATION	1.08 (0.59)	3.3 (1.5)	0.85 (0.88)	3.7 (3.6)

<sup>21</sup> Includes bonuses in previous contract.

On average, non-lump sum contracts provide for a 3.7% annual growth in wages, including COLA provisions, over the life of the contract, while lump sum contracts provide for a 2.6% annual growth in wages.<sup>22</sup> The average bonus increase is 0.7%, so that the average growth in total compensation is lower in bonus contracts. This finding should not, however, be taken at face value: it does not address the more interesting question of whether a bonus contract gives more or less money than a wage contract adopted by a similar company in a similar environment in a particular year; i.e. it does not isolate the effect of the bonus from other factors at work in the economy, in particular industries or in particular companies. We can hold these factors constant by using econometric techniques.

Accordingly, we propose the following procedure to test the three basic scenarios presented above. Let  $\Delta w$  be the annual growth rate of nominal take-home pay (wages and bonuses) over the life of the contract.<sup>23</sup> Let  $ls$  be a dummy variable equal to one if the contract contains a lump sum bonus provision, zero otherwise. Let  $fr$  be the fraction of total compensation accounted for by the bonus. Consider the following regressions:

$$(I) \quad \Delta w = x\beta_1 + \alpha_1 ls + \varepsilon_1$$

$$(II) \quad \Delta w = x\beta_2 + \alpha_2 fr + \varepsilon_2$$

where  $x$  is a matrix of industry, region, and year dummies, as well as a constant and other labor market, institutional, and expectational variables which might influence the size of collective bargaining settlements.

The above three scenarios about the nature of bonuses correspond to the following hypotheses on  $\alpha_1$  or  $\alpha_2$ :

$$\text{Scenario I:} \quad \alpha_i = 0$$

$$\text{Scenario II:} \quad \alpha_i < 0$$

$$\text{Scenario III:} \quad \alpha_i > 0$$

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<sup>22</sup> For Table 7 and the wage regressions which follow, total COLA payments for incomplete contracts were calculated by projecting the realized COLA at the point the data was collected until the end of the contract using the DRI inflation forecast at the time of writing, assuming that the same relationship between the rate of inflation and the size of the COLA payment would hold from the time of data collection until the end of the contract as from the time of signing until the date of data collection. This might introduce a bias to the extent that COLAs are front-loaded and caps on COLA payments are present. Recall from table 4 that lump-sum contracts are more likely to contain COLA provisions; it is also true in the sample that lump sum contracts are less likely to be capped (5% of the lump sum contracts have caps, 18% of the non-lump sum contracts).

<sup>23</sup> First, calculate the average hourly value of the bonus over the life of the contract, as presented in the last column of Table 3. Then, let  $w_1$  be the nominal value of hourly compensation, wages plus bonus, at the end of the previous contract,  $w_2$  the nominal value of hourly compensation at the end of the present contract, and  $q$  the length of the present contract in years. Then,  $\Delta w = 100 * (\ln(w_2) - \ln(w_1)) / q$ .

Note, however, that  $\Delta w$  is not the ideal dependent variable. It has been suggested that one of the principal differences between bonuses and wage increases is that the latter go into the base on which overtime and benefits are calculated while bonuses do not.<sup>24</sup> In order to evaluate whether bonus contracts pay more or less than wage contracts, we want to take into account these other components of the entire compensation package. Hence, we constructed another dependent variable as follows. We found the portion of total labor costs accounted for by pensions, insurance benefits, payment for time not worked, meals, etc. from the U.S. Chamber of Commerce by two-digit industry and the maximum average number of weekly overtime hours by two-digit industry for the period 1970-1983 from *Employment and Earnings*; using this information we inflated the wage portion of the compensation increase, leaving the bonus portion unchanged.

The variable that we thus obtained,  $\Delta tc$ , is a proxy for the growth of total labor cost incurred by the firm, or, looking at it from the other side, a proxy for the growth of the total compensation package received by the workers. Yet, it is still not precisely the measure we would like to have because it exaggerates on average the advantage to the worker of a dollar in the base wage against a dollar in the form of the bonus within the life of the present contract. This bias is due to the following reasons. First, it is difficult to determine whether all the benefits we included are a function of the size of the hourly wage, particularly insurance benefits. Furthermore, the assumptions about the extent of overtime that we are forced to make for the lack of better data are quite extreme. Finally, this measure does not take into account the time pattern of payments: we noted above that most bonus clauses provide for at least part of the bonus payment to come at the beginning of the contract, so bonuses are probably worth more in present discounted value terms than similar increases in the base wage over the life of the contract.<sup>25</sup> Unfortunately, it is not possible to adequately compare the present discounted value of two contracts with different lengths without making a restrictive assumption about the size of compensation following the contract; in fact, this is exactly the type of assumption we want to avoid, since we do not want to attempt to estimate the workers' beliefs about the probability of the bonus being terminated.

In short, we believe that  $\Delta tc$ , although for our purposes a better measure than  $\Delta w$ , is still unsatisfactory because on average, within the life of a contract, the growth of traditional wage system compensation packages is overestimated against the growth of lump sum bonus compensation packages. The existence of this bias suggests that the correct way to frame our testing procedure is as a one-tail test in which the null hypothesis is that bonus contracts pay less or the same amount of money as wage contracts adopted under similar circumstances. If, despite the

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<sup>24</sup> See, for example, Braxton[1989].

<sup>25</sup> E.G. If the contract is one year long, a \$365 lump sum payment upon signing is worth more to the worker than \$1 per day over the life of the contract.

fact that  $\Delta tc$  overestimates the growth of compensation in wage contracts, we can still reject the null hypothesis that bonus contracts provide less or the same amount of money, we will be able to conclude with confidence that, on average, firms that introduce bonuses do not succeed in cutting compensation within the life of the present contract. More formally, if despite this bias the hypothesis  $H_0: \alpha_i \leq 0$  can be rejected in the equations

$$(III) \quad \Delta tc = x\beta_3 + \alpha_3 ls + \varepsilon_3$$

$$(IV) \quad \Delta tc = x\beta_4 + \alpha_4 fr + \varepsilon_4$$

we can consider this as convincing evidence consistent with the "bonus as revocable option" story presented in Scenario III above.<sup>26</sup>

The matrix  $x$  of regressors include industry, region, and year fixed effect dummies as well as the unemployment rate at the time of settlement, the expected inflation rate at the time of settlement as determined from a regression of the CPI on two annual lags over the period 1950-1988, the inflation surprise over the life of the contract if positive for contracts with COLA provisions, the inflation surprise over the previous contract, the change in the firm's labor force over the previous contract, and dummies for whether the bargaining unit generally sets or follows a regional or intra-industry wage bargaining pattern.<sup>27</sup> When we use  $ls$  alone as an indicator for the

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<sup>26</sup> Recognizing that the value of the contract (in terms of growth rate of compensation) and the existence of a bonus provision are simultaneous outcomes of the same contract negotiation process, instrumental variable techniques are in principle required to estimate the equations I, II, III and IV in the text. We instrument for  $ls$  and  $fr$  as follows. Consider a logit regression on the probability of signing a lump sum contract (such logits will be presented below); let  $p$  be the predicted probability from that regression. If at least one explanatory variable in the logit regression can be assumed not to be an explanatory variable in the wage growth regression, we can use  $p$  as an instrument for  $ls$  (see footnote 28). To get an instrument for  $fr$ , we regress  $fr$  on the same explanatory variables in the logit regression for the values of  $fr$  such that  $fr > 0$ . We then use the coefficients from this regressions to find the predicted value of  $fr$  for all observations. Defining these predicted values as  $predfr$ , the following is a valid instrument for  $fr$ :  $p \cdot predfr$  if  $predfr > 0$ , 0 otherwise.

<sup>27</sup> Because our primary concern here is to determine whether bonus contracts are worth more or less than non-lump sum contracts, we will not attempt to provide detailed arguments for the inclusion of these variables in the wage equations; these are typical explanatory variables in union wage equations such as those presented in Vroman and Abowd[1988] and Kochan[1988]. In brief:

- the unemployment rate proxies for the tightness of the labor market and should be negatively related to the growth rate of nominal wages
- expected inflation should have a positive effect on the nominal settlement to the extent that the union and the firm bargain over expected real wages
- the inflation surprise over the life of the contract should increase the size of the nominal settlement for those contracts with COLAs, more for uncapped than capped COLAs
- the inflation surprise over the previous contract should increase the settlement to the extent that there is compensation for real losses in the previous contract
- the change in the firm's labor force proxies for how well the firm is doing and should be positively correlated with the size of the settlement
- the existence of wage patterns should increase the size of the settlement to the extent that they allow unions to "take wages out of competition"; these variables were constructed by Thomas Kochan and are described in Kochan[1988].

bonus contract, we test only for whether shifting to the bonus system has an effect on the constant; using  $fr$  allows us to see whether the size of the bonus, not only its existence, has any effects. In order to determine whether either of these possibilities is clearly predominant, we also ran two specifications, one for each of the two dependent variables, in which we include both  $ls$  and  $fr$ .

Moving on to our results, Tables 8 and 9 present the estimates from the growth rate regressions described above.<sup>28</sup> Whether the presence of a lump sum provision raises or lowers, *ceteris paribus*, the value of total compensation within the life of the contract is indicated by the sign of the coefficients on  $ls$  and  $fr$  in Tables 8 and 9. Looking at the first four columns of Table 8, in which the dependent variable is  $\Delta w$ , the coefficients of interest are positive and it is possible to statistically reject that they are negative or zero with a margin of error (p value) not larger than 5% for OLS, 1% for IV.<sup>29</sup> In the fifth and sixth columns the two coefficients are still positive, but statistically not significantly different from zero; this shows that the effect of the size of the bonus versus the effect of the existence of bonuses independently from size cannot be adequately distinguished in our data. We conclude that bonus contracts do not provide less money than pure wage contracts adopted under similar circumstances when only the straight compensation package, excluding overtime and benefits, is considered.

When total cost growth  $\Delta tc$  is considered (Table 9), the coefficients on  $ls$  and  $fr$  are still positive, but the upper bounds on the margins of error at which we can statistically reject the hypothesis that they are zero or negative increase to 5% and 14%, respectively, for OLS and 2% for IV. We still consider this as evidence in favor of Scenario III, although we can say this with less confidence than in the case of the wage growth equations discussed above. However, in evaluating these results, recall that  $\Delta tc$  is biased against rejecting the hypothesis that bonus contracts provide less money and this may well contribute to the larger margins of error. Furthermore, additional evidence against the idea that workers are fooled (one of the variants of Scenario II) is that ten out of fourteen contracts in our sample that follow bonus settlements continue with these provisions; if workers had been unaware of the implications of bonuses regarding overtime and benefits, one would probably expect learning to have occurred.

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<sup>28</sup> We instrumented for  $ls$  and  $fr$  as described in footnote 26; the identifying variables are dummies for whether or not another company in the same region or industry had signed a lump sum contract in the past. We report both OLS and instrumental variables results; we ran specification tests in which we rejected the hypothesis that OLS is correctly specified in most cases. We do not report other specifications in which we tried to use firm performance variables in the form of the five-year trend coefficient on sales/assets because they were not significant and had no effect on the qualitative results on  $\alpha$ .

<sup>29</sup> The margin of error is 1% for IV when the null is zero and it is lower if the null is less than zero.

TABLE 8: Determinants of Magnitude of Average Annual Growth Rate of Nominal Wages<sup>30</sup>  
(t-statistics in parentheses)

VARIABLES	technique	ols		iv		ols		iv	
constant		-.320 (.11)	-2.062 (.68)	.113 (.04)	-1.001 (.34)	-.217 (.07)	-1.483 (.48)		
unemployment rate in month of settlement		.076 (.23)	.136 (.39)	.029 (.09)	.016 (.05)	.062 (.18)	.060 (.17)		
expected inflation at time of settlement		.500 (1.70)	.555 (1.84)	.460 (1.56)	.457 (1.52)	.488 (1.65)	.492 (1.60)		
inflation surprise over life of contract, if pos.:									
- uncapped colas		1.067 (2.66)	1.031 (2.51)	.911 (2.19)	.608 (1.34)	1.001 (2.33)	.718 (1.44)		
- capped colas		3.832 (.45)	3.973 (.46)	3.514 (.41)	3.166 (.37)	3.714 (.44)	3.404 (.39)		
inflation surprise over previous contract		-.093 (.76)	-.091 (.73)	-.102 (.84)	-.117 (.94)	-.097 (.79)	-.109 (.87)		
growth of workforce		.072 (7.76)	.072 (7.52)	.072 (7.73)	.071 (7.50)	.072 (7.74)	.071 (7.47)		
regional pattern dummy		.308 (.48)	.235 (.36)	.298 (.46)	.198 (.30)	.298 (.46)	.193 (.29)		
industry pattern dummy		1.054 (2.09)	.853 (1.59)	1.055 (2.09)	.847 (1.58)	1.037 (2.05)	.801 (1.49)		
ls : lump sum dummy		.881 (1.80)	2.289 (2.41)			.635 (.85)	.920 (.61)		
fr : bonus as a fraction total compensation				.321 (1.64)	.866 (2.41)	.130 (.44)	.627 (1.11)		
N		335	330	335	330	335	330		
R squared		.42	.40	.42	.40	.42	.40		

<sup>30</sup> Including bonuses but not fringes; regressions include industry, region, and year fixed effects dummies.



TABLE 9: Determinants of Magnitude of Average Annual Growth Rate of Total Compensation<sup>31</sup>  
(t-statistics in parentheses)

VARIABLES \ technique	ols		iv		ols		iv	
	ols	iv	ols	iv	ols	iv	ols	iv
constant	-.064 (.02)	- 2.547 (.82)	.388 (.13)	- 1.628 (.53)	-.118 (.04)	- 1.95 (.61)		
unemployment rate in month of settlement	.121 (.34)	.187 (.52)	.078 (.22)	.080 (.22)	.129 (.36)	.109 (.30)		
expected inflation at time of settlement	.719 (2.35)	.795 (2.54)	.682 (2.22)	.707 (2.25)	.726 (2.35)	.731 (2.28)		
inflation surprise over life of contract, if pos.:								
- uncapped colas	.743 (1.78)	.716 (1.69)	.641 (1.48)	.320 (.68)	.778 (1.74)	.394 (.76)		
- capped colas	3.937 (.45)	4.198 (.47)	3.695 (.42)	3.453 (.38)	4.000 (.45)	3.612 (.40)		
inflation surprise over previous contract	.174 (1.37)	.172 (1.33)	.168 (1.31)	.148 (1.13)	.176 (1.38)	.153 (1.16)		
growth of workforce	.048 (4.99)	.049 (4.97)	.048 (4.97)	.050 (4.91)	.048 (4.99)	.049 (4.90)		
regional pattern dummy	.458 (.69)	.386 (.57)	.463 (.69)	.346 (.50)	.463 (.69)	.343 (.50)		
industry pattern dummy	.505 (.96)	.328 (.59)	.541 (1.03)	.306 (.55)	.514 (.98)	.275 (.49)		
ls : lump sum dummy	.840 (1.65)	2.026 (2.06)			.972 (1.25)	.616 (.40)		
fr : bonus as a fraction total compensation			.222 (1.09)	.806 (2.15)	-.070 (.22)	.645 (1.10)		
N	335	330	335	330	335	330		
R squared	.33	.32	.33	.31	.33	.31		

<sup>31</sup> Weights wage increases (but not bonuses) by industry average proportion of payroll accounted for by overtime and fringe benefits, excluding legally required payments; regressions include industry, region, and year fixed effects dummies.

We want to emphasize that the finding that bonus contracts do not provide less than wage contracts under similar circumstances does not mean that bonus contracts are never concessionary. What the result does say is that a bonus contract adopted in a concessionary environment will not provide less than a wage contract adopted in the same concessionary environment, although both will be concessionary compared to past contracts. Anecdotal evidence also supports the view that bonus contracts provide more than wage contracts adopted under similar circumstances: in the negotiations with GM that led to the split of UAW-Canada from UAW-USA, the U.S. autoworkers accepted a lump sum contract, but the Canadians held out for an increase in the base wage. GM essentially told the Canadians that they could have an increase in the base wage, but that they would have to accept less money overall than they would have gotten if they had taken it in the form of bonuses.<sup>32</sup>

In conclusion, our econometric results suggest that bonus contracts do not provide less money than wage contracts adopted under similar circumstances. This finding leads us to speculate that when the unions say that they get less money with lump sum bonus contracts, they are probably not comparing their settlements to what they would have gotten under similar circumstances if there had been no bonus. Rather, they must be comparing the present contract to the past when they perhaps got more, or they are thinking about future contracts when the bonus might be taken away more easily than a wage increase.

#### 4.2 Under what types of circumstances are bonus contracts adopted?

The second question we seek to address is: in what situations are lump sum provisions more likely to be adopted? Some of the scenarios presented above and interview evidence suggest that an increase in the uncertainty about the company's future as well as the existence of a concessionary or expansionary environment in the present should have a positive effect on the probability of adoption. We can also test for other characteristics of the bargaining unit, such as the size of the base wage at the end of the previous contract relative to the rest of the industry, and characteristics of the industry, such as the existence of lump sum provisions in other firms. We can best address these questions with a logit regression on the probability of signing a lump sum contract.

In order to test for the importance of firm-specific effects, we merged the contract data set used so far in the analysis with firm-level data from COMPUSTAT and CRSP and industry-level data from the Current Population Survey (CPS).<sup>33</sup> We used the COMPUSTAT and CRSP data to get proxies for uncertainty and expansionary or concessionary environments as follows. For

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<sup>32</sup> This anecdote is taken from the documentary *Final Offer*[--].

<sup>33</sup> COMPUSTAT is a computerized data bank containing legally required balance sheet and income data for publically traded companies; CRSP contains data on stock prices.

uncertainty, we regressed the ratio of sales to total assets against a constant and a time trend for the five years preceding the signing of the contract. We then created two variables that we call “positive variability” and “negative variability”. Positive variability is the deviation of sales/assets from trend in the year before the contract divided by the sum of absolute deviations in the five years before the contract if this deviation is positive; the variable is zero otherwise. Negative variability is the same variable for negative deviations in the year before the contract is signed.<sup>34</sup> Separating these trend deviations into positive and negative shocks allows us to determine whether the reaction to these two types of uncertainty (positive and negative) is symmetric. We also created a “stock market uncertainty” variable which is the variance of excess returns on the firm's stock in the year before the settlement divided by the variance over the two years before that. We believe that these variables capture the essence of “uncertainty” in that they do not just measure the value of the deviation from trend or stock price variability in the year before the contract, but the extent to which the recent past has been more uncertain than the more distant past. In other words, when the value of these variables increase, firms are less able to say with much confidence whether they are moving along the same trend line they perceived in the past or along a different one; to put it still another way, these variables are designed to capture the concept of a change in environment which cannot be easily identified as an outlier in the old distribution of events rather than a movement to a new distribution. To capture whether the firm is more likely to be in an expansionary or in a concessionary environment, we define two other variables. Positive performance is defined as the coefficient on time in the above trend regressions if positive, zero otherwise; negative performance is the absolute value of the same variable for negative coefficients.

A second type of variable we include in our regressions is the ratio of the base wage at the end of the previous contract to the average industry wage, as measured in the CPS. Some might want to define concessions as actions designed to bring unusually high wages back into line with the firm's competitors. If so, we should expect to see bonuses where wages are high relative to the rest of the industry and thus “concessions” are most appropriate.

We also include two “imitation dummies”, one for the four-digit industry and one for the detailed geographic region (two digit). The industry imitation dummy is equal to one if at least one other firm in the same industry has signed a lump sum contract one month or more before the

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<sup>34</sup> More formally the two variability measures are derived from the following expression:

$$\frac{(S/ta)_{t-1} - \text{trend}_{t-1}}{\sum | (S/ta)_{t-i} - \text{trend}_{t-i} |}$$

where S = sales, ta = total assets and trend = predicted value from the trend regression. Positive variability is equal to this ratio if it is positive and zero otherwise; negative variability is equal to the absolute value of this ratio if negative and zero otherwise.

contract in question; the geographic imitation dummy is defined similarly. We expect these variables to be important to the extent that pattern bargaining occurs within industries or regions, or, alternatively, to the extent that firms in the same industry or geographical region share the same labor market and so tend to follow the same compensation policies.<sup>35</sup>

In addition, we include the median age of workers in the industry, as measured in the CPS. As mentioned above, scenario IIIb suggests that young workers might favor bonuses more than older workers. This variable is also included to get at the issue of expected tenure, albeit in a very rough manner, since there are good reasons to expect that both very young and very old workers will have low expected tenure. The number of workers in the bargaining unit is also included because it is possible that large firms systematically employ different compensation policies. Finally, we include a constant and industry, region, and year dummies.<sup>36</sup>

Tables 10 and 11 present the results of logit regressions on the probability that a bargaining unit signs a lump sum contract. The dependent variable is equal to one if the contract contains a lump sum provision, zero otherwise. Table 10 presents the actual coefficients from the regressions, while Table 11 presents the marginal effects of the variables on the probability of signing a lump sum contract.<sup>37</sup>

Unfortunately, as the tables show, COMPUSTAT and CRSP data do not exist for all of the bargaining units in the contract data set, so that when the two data sets are merged, more than half of the observations are lost. An additional problem is created by the fact that COMPUSTAT contains company-level data while the contracts are at the level of the bargaining unit, so some measurement error is present, particularly for very large companies. Despite these shortcomings, the results obtained from merging the two samples are quite revealing.

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<sup>35</sup> As for the imitative pattern of the adoption of bonus systems, the following is true in our sample:  
 - 29 of the 66 lump sum contracts came at least one month after another contract with lump sum provisions was signed in the same four-digit industry.

- 46 of the 66 lump sum contracts came at least one month after another contract with lump sum provisions was signed in the same detailed geographic area.

<sup>36</sup> We do not report specifications in which we test for the significance of a dummy variable for whether or not the contract was preceded by a strike. We do have anecdotal evidence that bonuses are sometimes paid at the beginning of a contract to compensate for pay lost during a strike (for example, the contract signed by Boston city clerical employees in 1983). If this is the predominant reason for bonus payments, we should expect the occurrence of a strike before the ratification of the contract to have a significant positive effect on the probability of signing a lump sum contract. The strike dummy was never significant, but it probably should not be included in the regression because the existence of a strike may well be endogenous with the form of the contract; we plan to control for this factor in future research.

<sup>37</sup> Note that the magnitude of the coefficients in Table 10 have no direct economic interpretation because these are the true coefficients divided by the standard error of the regression. On the contrary, the numbers reported in Table 11 are more easily interpretable in that they represent the increase in the probability of observing bonuses from changing the variables by the amounts defined in the footnote to that table. As for statistical significance, the t-statistics in Table 10 are more reliable indicators of the influence of the variables on the probability of signing a lump sum contract than are the t-statistics reported in Table 11.

TABLE 10: Determinants of the Probability of Signing a Lump Sum Contract: Logistic Coefficients  
(t-statistics in parentheses)

VARIABLES	controls	industry region	industry region year	industry region	industry region year	industry region	industry region year	industry region year
constant	- 37.604 (3.01)	- 40.662 (.89)	- 63.810 (2.70)	- 63.772 (.79)	- 60.720 (2.49)	- 182.872 (.86)	-93.752 (.91)	
# of workers (hundred thousands)	.202 (.36)	5.843 (1.70)	- .327 (.41)	11.828 (1.12)	- .251 (.30)	47.422 (1.60)	31.048 (1.13)	
median age (of workers in industry)	.987 (2.88)	.354 (.84)	1.484 (2.41)	- .389 (.25)	1.389 (2.20)	- .259 (.24)	-1.613 (.83)	
avg. firm wage / avg. industry wage	1.144 (.96)	1.155 (.88)	7.276 (2.40)	20.188 (2.30)	6.876 (2.39)	20.550 (2.56)	25.115 (2.44)	
industry imitation dummy	.943 (1.83)	- .781 (1.16)	1.267 (1.49)	.007 (.00)	1.465 (1.63)	2.287 (1.16)	.697 (.28)	
geographic imitation dummy	1.934 (4.08)	- .014 (.02)	3.125 (3.47)	.999 (.60)	2.697 (3.21)	1.694 (.92)	1.666 (.82)	
stock mkt uncertainty <sup>38</sup>			0.655 (1.81)	1.814 (2.10)			2.533 (2.18)	
positive variability <sup>39</sup>					1.151 (1.57)	.129 (.10)	2.436 (1.21)	
negative variability <sup>40</sup>					.582 (.85)	5.09 (2.08)	8.120 (2.17)	
positive performance <sup>41</sup>			29.004 (1.78)	131.536 (1.54)	18.784 (1.43)	145.324 (2.05)	115.446 (1.82)	
negative performance <sup>42</sup>			6.252 (.71)	28.056 (1.20)	2.868 (.32)	40.234 (1.66)	37.330 (1.46)	
# of Observations	352	352	148	148	162	162	148	
# of Lump Sum Contracts	58	58	43	43	46	46	43	
log likelihood	- 88.98	- 68.81	- 38.63	- 15.89	- 42.08	- 15.96	-11.48	

<sup>38</sup> The variance of excess returns on the company's stock over the year before the contract divided by the variance over the two previous years.

<sup>39</sup> The deviation of sales (divided by total assets) in the year before contract from the five year trend, divided by the sum of absolute deviations from trend in the 5 years before the contract, if positive; zero otherwise.

<sup>40</sup> The absolute value of the deviation of sales (divided by total assets) in the year before contract from the five year trend, divided by the sum of absolute deviations from trend in the 5 years before the contract, if negative; zero otherwise.

<sup>41</sup> The coefficient on five year trend of sales/assets if positive, zero otherwise.

<sup>42</sup> The absolute value of the coefficient on five year trend of sales/assets if negative, zero otherwise.

TABLE 11: Determinants of the Probability of Signing a Lump Sum Contract: Marginal Effects<sup>43</sup>  
(t-statistics in parentheses)

VARIABLES \ controls	industry region	industry region year	industry region	industry region year	industry region	industry region year	industry region year
# of workers	.0000 (.36)	.0004 (1.74)	-.0000 (.41)	.0004 (1.14)	-.0000 (.30)	.0014 (1.69)	.0007 (1.20)
median age (of workers in industry)	.0893 (2.75)	.0230 (.82)	.1366 (2.46)	-.0130 (.25)	.1257 (2.22)	-.0079 (.24)	-.0376 (.79)
avg. firm wage / avg. industry wage	.0091 (.94)	.0073 (.88)	.0633 (2.47)	.0645 (2.98)	.0590 (2.45)	.0618 (3.79)	.0640 (2.45)
industry imitation dummy	.0869 (1.62)	-.0444 (1.30)	.1185 (1.36)	.0002 (.00)	.1396 (1.47)	.0772 (1.23)	.0164 (.27)
geographic imitation dummy	.1861 (3.79)	-.0009 (.02)	.3281 (3.82)	.0340 (.59)	.2845 (3.10)	.0547 (.91)	.0439 (.72)
stock mkt uncertainty			.0610 (1.79)	.0622 (2.56)			.0702 (2.20)
positive variability					.0295 (1.57)	.0012 (.10)	.0173 (1.21)
negative variability					.0123 (.78)	.0401 (2.08)	.0661 (1.95)
positive performance			.0323 (1.75)	.0653 (1.51)	.0236 (1.44)	.0588 (2.03)	.0442 (1.30)
negative performance			.0157 (.69)	.0318 (1.34)	.0066 (.32)	.0386 (2.00)	.0282 (1.51)
# of Observations	352	352	148	148	162	162	148
# of Lump Sum Contracts	58	58	43	43	46	46	43
log likelihood	- 88.98	- 68.81	- 38.63	- 15.89	- 42.08	- 15.96	- 11.48

43 The number reported is the average change in the probability of observing a lump sum contract if:

- the number of workers increased by 100 in each company
- the median age increased by 1 year in each industry
- each company's average base wage increased by 10% of the average industry wage.
- each company went from having no followers to having a follower
- the positive variability, stock uncertainty and positive performance variables increased in absolute terms by one sample standard deviation, conditional on being positive
- the negative variability and negative performance variables increased in absolute terms by one sample standard deviation, conditional on being negative.

Considering the last five columns of Table 10, the uncertainty measures appear to significantly affect the probability that a bonus contract is signed. Positive variability has more explanatory power (a larger t-statistic) within industry and region (column 5), but this might mainly be due to the fact that most of the lump sum contracts came in the later eighties when times were relatively better than in the early eighties. When we control for this effect by including year dummies as well (columns 6 and 7), the positive variability measure loses statistical significance and the negative variability measure gains explanatory power. The stock price uncertainty measure appears to have explanatory power both within and across years (columns 3, 4 and 7).

In terms of marginal effects, looking at Table 11, a one standard deviation increase in positive variability increases the probability of signing a lump sum contract by 3.0 percentage points (after controlling for industry and region). The same variation in negative variability increases the probability by 4.0 - 6.6 points (after controlling for industry, region and years). A one standard deviation increase in stock uncertainty raises the probability by more than 6 percentage points whether or not we control for years. Including all three measures of uncertainty (column 7) does not seem to diminish the effect of any of them; the stock market and product market measures of uncertainty appear to contribute to the probability of signing bonus contracts independently from each other. We conclude from these results that the more uncertain a firm's environment (i.e. the larger the deviation of sales/assets from trend in the year before the contract compared to the five years before the contract or the larger the variance of excess returns of the firm's stock compared to the recent past), the more likely it is that the firm will shift to a lump sum bonus contract.

Turning to the proxies for the existence of an expansionary or concessionary environment, a worsening of negative performance increases the probability of signing lump sum bonus agreements after controlling for industry, region and year. We interpret this result as supporting the hypothesis that bonuses are more likely to appear in concessionary environments, along the lines described in Scenario IIIc above. However, an increase in positive performance also significantly increases the probability of signing lump sum contracts both within industries and regions and after controlling for years as well. Insofar as we can infer from a positive trend on sales/assets in the past that the firm will be hiring in the future and so will reap the benefits of imposing a subtle two-tier system soon, we take this as tentative evidence in favor of Scenario IIIb. In short, these results suggest that both firms that are doing very well and firms that are doing very poorly are more likely to adopt bonus systems, *ceteris paribus*, while firms that are not doing either remarkably well or poorly seem to be less likely to introduce them.

The next interesting result concerns the coefficient on the relative wage, which is positive and significant for five of the seven specifications (it is not statistically significant when the COMPUSTAT and CRSP variables are excluded, but is still positive). A marginal increase of

10% in the real base wage at signing relative to the average industry wage increases the probability of signing a bonus contract by 0.7 - 6.5 percentage points, depending on the specification (Table 11). This provides weak evidence for the version of the “concession theory” of bonuses according to which they appear where the base wage is high and so serve to bring it back into line with the firm's competitors.

The median age is positive and significant in three of the specifications, when we do not control for years. This suggests that bonuses are more likely to appear where the workforce is older, which contradicts the prediction of scenario IIIb that bonuses should appear where there are more young workers. This is an interesting result, although it probably does not adequately address the key issue of expected tenure. We wonder whether there is some reason that older workers might prefer bonuses or whether there is some characteristic of industries which employ older workers (and perhaps are not hiring young workers) which leads the firms within them to favor bonuses.

The geographic imitation dummy has a lot of explanatory power within industries and regions; the industry imitation dummy somewhat less. Not only are they generally statistically significant, they also increase the probability by a great deal: going from having no predecessors with bonus contracts within the same industry to having at least one increases the probability of signing a lump sum contract by 8.7 - 14.0 percentage points, while for geographic region, the increase ranges from 18.6 - 32.8 points (Table 11). When we control for years as well, these effects goes away. This is not surprising for the industry imitation dummy, since many of the contracts in the same industry (e.g. aerospace, automobiles) are negotiated in the same year, and so any imitation effect should be swamped by a year effect; the fact that the year dummies also swamp the geographic imitation dummy is more puzzling. On balance, we take these results as evidence that some sort of “patterning” is occurring.

In summary, the logit results indicate that bonus systems do not systematically appear in large firms and are more likely to appear where the workforce is older. There is evidence that they are associated with concessionary environments, in that they appear where the base wage is high relative to the rest of the industry and when performance is down. These provisions also seem to show up in firms that are doing particularly well. There is evidence that there is pattern bargaining occurring in the sense that bargaining units are more likely to adopt them if another bargaining unit in the same industry or region has done so in the past. Finally, “uncertainty”, in the form of an unusually large shock in the year before the contract, tends to increase the probability of a lump sum settlement.



## Conclusions

This paper has presented evidence on the prevalence of compensation innovations and has analyzed one of them, lump sum bonuses, in depth, because of its growing diffusion and neglect by researchers until now. Possible scenarios explaining the basic nature and causes of bonus systems have been laid out, and empirical evidence designed to distinguish among them has been presented. The estimation of wage growth equations shows that variables indicating the presence and the size of bonuses have positive coefficients; this suggests that the adoption of a bonus system is most likely not just a short-run tactic to cut labor costs within the present contract, but rather a more sophisticated arrangement such that any cost savings for the firm can only be anticipated for the future when the bonus may be discontinued in subsequent agreements. In particular, within a concessionary environment, these results suggest that workers, while perhaps receiving less than what they were getting in the past, still receive more than what they would have gotten in the same concessionary environment under a traditional wage contract. Logit regressions indicate that increases in uncertainty significantly raise the probability of signing bonus contracts. While none of the evidence presented is conclusive in itself, taken together these results support the view that bonuses can be understood as pay increases on which the firm maintains an option of non-renewal. Present workers must consequently be compensated for this option, the value of which increases with uncertainty, largely at the expense of future workers. If this line of reasoning is accurate, it allows us to interpret the apparently puzzling fact that unions generally vehemently oppose bonus systems but can rarely generate strikes against them: while portions of the existing workforce, particularly young and low tenure workers, might favor these systems, unions may well oppose them on behalf of yet-to-be-hired workers and the remainder of the present workforce.

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