| Title | IMPLICIT CONTRACTS UNDER JOB-SECURITY REGULATIONS |
|---|---|
| Sub Title | |
| Author | SAHA, Bibhas |
| Publisher | Keio Economic Society, Keio University |
| Publication year | 1993 |
| Jtitle | Keio economic studies Vol.30, No.1 (1993. ) ,p.53- 64 |
| JaLC DOI | |
| Abstract | An implicit contract model is extended to incorporate certain job-security regulations and their effects on wage and employment are analyzed. Institutionally fixed severance pay leads to overemployment and a reduction in wages resulting in a greater mean level of employment. On the other hand, quantitative restrictions on layoffs and retrenchment lead to underemployment in 'good' states and overemployment in other states. Consequently, the mean level of employment can actually be lower than that in the efficient contract. However, wages remain unaffected at the efficient level. |
| Notes | |
| Genre | Journal Article |
| URL | https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=AA00260492-19930001-0053 |

# IMPLICIT CONTRACTS UNDER JOB-SECURITY REGULATIONS

Bibhas SAHA*

*Abstract*: An implicit contract model is extended to incorporate certain job-security regulations and their effects on wage and employment are analyzed. Institutionally fixed severance pay leads to overemployment and a reduction in wages resulting in a greater mean level of employment. On the other hand, quantitative restrictions on layoffs and retrenchment lead to underemployment in 'good' states and overemployment in other states. Consequently, the mean level of employment can actually be lower than that in the efficient contract. However, wages remain unaffected at the efficient level.

## 1. INTRODUCTION

The implicit contract literature has tried to explain variability between employment and wages by treating labor contracts as a risk-sharing mechanism (see Azariadis (1975), Rosen (1985)). While the approach of the implicit contract models is simple and appealing, it unrealistically assumes that layoffs are unrestricted and the severance pay can be chosen freely. In most countries, labor contracts are constrained by job-security regulations and restrictive labor laws. In this paper, I extend an implicit contract model to incorporate some institutional provisions of job security and examine their effects on wage and employment. In particular, I tried to answer two questions. How do job-security regulations distort the efficient contract and will they raise or lower the mean level of employment?

Two specific job-security regulations are considered: (i) institutionally fixed severance pay (in short FSP) and (ii) quantitative restriction on layoffs (RLO). The first type of regulation is prevalent in most European countries as well as some developing countries, such as India.[1] The second type is common in a number of developing countries. For example, in India, an employer whose firm size is no less than 100 workers, has to seek permission from the relevent state government to retrench an employee. Similar laws exist also in Zimbabwe. Very often such permissions are denied, especially when it involves a large number of workers.

The present paper shows that FSP not only increases the 'mean' level of employ-

* I would like to thank Anindya Sen and an anonymous referee for their comments. Remaining errors, if any, are my responsibility.

[1] Indian labor laws require an employer, when terminating an employee's contract, to pay as many months' salary as the number of years the employee has served the company.

ment, but also reduces variability (i.e. layoff). It also generates a phenomenon that can be called "involuntary employment" in the sense that the employed workers are ex post worse off than the unemployed workers.[2] This appears to be unrealistic, but it highlights a possibility that higher severance pay can negatively influence the workers' incentive to work.

The second job-security regulation, RLO, is ambiguous in raising or lowering the mean level of employment. While reducing layoff, this regulation can actually reduce the mean level of empolyment (under a fairly reasonable condition). This shows a possible tradeoff between the stability and level of employment. This provision is appealing for its neutrality in providing idential treatment to all workers.[3]

When compared in terms of their relative effectiveness, the RLO regulation generates greater stability (less layoffs) if it maintains the same level of mean employment as the FSP regulation does. On the contrary, when both regulations have equal stability (same level of layoffs), FSP generates greater mean employment. These results might be useful in guiding policy decisions.

However, the present paper does not try to assess the impact on employment beyond the firm level. Various studies have provided evidence of negative effects of job-security regulations on aggregate employment. Lazear (1990) from a dataset of 22 European countries over 29 years, finds that severance pay reduces the size of the labor force and lowers the number of jobs in the economy. His model shows that 59 percent of unemployment in France between 1956 and 1984 can be explained by changes in severance pay. Fallon and Lucas (1991) have shown that a 1976 regulation in India restricting layoff and retrenchment have reduced industrial employment by 17.5 percent in the subsequent years. A similar regulation in Zimbabwe passed in 1980 has, according to Fallon and Lucas, led to an estimated 25.2 percent reduction in empolyment. The problem of economy wide unemployment coupled with firm-level overemployment which is pervasive among the developing countries, can be better explained with the help of a more comprehensive model that would bridge the gap between the firm and the economy level analyses. The present model addresses only one part of the problem.

The next section sets out the preliminaries of the model. In Section 3, I present

[2] However, it should be noted that the contract models are very sensitive to assumptions on severance pay. Early implicit contract models, such as Azariadis (1975), did not include severance pay and these models generte "involuntary unemployment". On the other hand, Grossman and Hart (1981) introduced internal severance pay which resulted in "voluntary unemploment" (i.e. all workers are treated identically). My model is closer to Grossman and Hart and with the additional restriction on severance pay, I obtain a much stronger result-quite opposite to Azariadis.

[3] Identical treatment of workers (which implies voluntary unemployment) has been considered a major weakenss of the implicit contract models. The implicit contract models are still unsuccessful in combinding internal severance pay and involuntary unemployment. However, in the context of developing countries, layoff contracts with identical treatment of workers can be quite appealing. Many developing countries are currently going through structural adjustment and lot of workers may lose jobs. As the workers in these countries traditionally enjoy job security, the proposition of large scale layoffs may not be implementable unless the workers are provided identical security.

the efficient contract that will be used as a reference point for other contracts. Section 4 introduces FSP and analyzes its effects and implications. The effects of RLO are studied in Section 5. The concluding section suggests the scope of further work.

## 2. THE IMPLICIT CONTRACT FRAMEWORK

A firm and a union consisting of $N$ identical workers are trying to agree on the levels of employment and wage. Production will take place at a future date after the firm experiences a random shock, $s$, affecting its profitability. The shock will be commonly observed and therefore, employment and wages will be contingent on the realized state of nature. If the shock adversely affects the profitability of the firm, then some workers may be needed to be laid off and they have to be paid severance pay or layoff compensation.[4]

The state of the nature variable, $s$, can be interpreted as the market price of the product or an unknown demand parameter. We assume that $s$ can take only two values: $s_1$ with probability $p_1$ and $s_2$ with probability $p_2$; $s_2 > s_1$ and $p_1 + p_2 = 1$, $p_i > 0$, $i = 1, 2$. We will refer to $s_1$ as the 'bad' and $s_2$ as the 'good' state.

The technology of the firm is given by a standard concave production function where labor, $l$, is the only variable input: $Q = f(l)$. The firm's profit function for the ith state of nature, is $\pi_i = s_i f(l_i) - w_i l_i - (N - l_i)c_i$, $(i = 1, 2)$ where $c$ is the variable for severance pay. The firm maximizes expected profit $E\pi = \sum_i p_i \pi_i$.

Let the preference of a representative worker be $u = u(x + \mu L)$ where $x$ is his earnings and $L$ is leisure with $\mu$ being the money value of one unit of leisure. $u(\cdot)$ is concave. We make a simplifying assumption that the demand for leisure (or supply of labor) is inelastic. If the worker is empolyed, he will be left with no leisure $(L = 0)$. But if he is unemployed, he will have full leisure $(L = L_{\max})$. We normalize $L_{\max} = 1$. Also, $x = w$ or $c$ depending on whether he is empolyed or not. We can rewrite the utility function of a worker as $u = u(w)$ if empolyed and $u = u(c + \mu)$ otherwise. In any given state, the workers to be employed are chosen randomly. So the worker's utility for any given state is, $u_i = \{l_i u(w_i) + (N - l_i)u(c_i + \mu)\}/N$, $i = 1, 2$, where $l$ is the number of workers to be employed. The worker is an expected utility maximizer: $Eu = \sum_i p_i u_i$. The union tries to maximize the sum of expected utilities over all workers. Its objective function is $U = NEu$.

For convenience of discussion we make a distinction between unempolyment and layoff in the following way. Unempolyment will refer to an individual worker's status and layoff to the difference between the two levels of empolyment. The number of unempolyed workers in $i$th state is $(N - l_i)$ whereas the magnitude of layoff is given by the absolute value of $(l_j - l_i)$.

[4] In the present formulation layoff compensation and severance pay are synonymous.

## 3. THE EFFICIENT CONTRACT

First we consider the unconstrained case where the employer is free to choose the level of empolyment, wage and severance pay. This contract is obtained by solving the following maximization problem:

$$\text{Max} \qquad E\pi = \sum_i p_i[s_i f(l_i) - w_i l_i - (N - l_i)c_i]$$

subject to

$$\sum_i p_i[u(w_i)l_i + u(c_i + \mu)(N - l_i)] = \underline{U}\,.$$

The first order conditions are[5]

$$s_i f'(l_i) = w_i - c_i - \{u(w_i) - u(c_i + \mu)\}\lambda\,, \quad i = 1, 2 \qquad (1.\text{a,b})$$

$$\lambda = \frac{1}{u'(w_i)}\,, \quad i = 1, 2 \qquad (2.\text{a,b})$$

$$\lambda = \frac{1}{u'(c_i + \mu)}\,, \quad i = 1, 2 \qquad (3.\text{a,b})$$

$$\sum_i p_i[u(w_i)l_i + u(c_i + \mu)(N - l_i)] = \underline{U}\,, \qquad (4)$$

where $\lambda$ is the Lagrange multiplier for the union's individual rationality (IR) constraint. Each of the above three conditions gives rise to a pair of equations denoted by a and b. It can be ensured that $\lambda > 0$ and therefore from (2.a,b) and (3.a,b) it follows that $w_i = c_i + \mu = w$ for all $i$. This in turn implies that $u(w) = u(c + \mu)$ regardless of $i$. Therefore (1.a) and (1.b) will yield $s_i f'(l_i) = \mu$ for all $i$.

The marginal utility (of earnings) of a worker is unchanged not only between different states of nature, but also between his empolyed and unempolyed status. Thus the workers are completely insured. However, because of the simplified form of the utility function, wages are also equalized across states and severance pay is so adjusted that ex post a worker will remain indifferent between being employed and unemployed.

The result that all workers are treated identically has come under attack as most real world labor contracts make the unemployed workers worse off. However, evidence does exist where a laid-off worker receives compensation almost equal to regular earnings.[6]

[5] The second order conditions are easily satisfied.

[6] Oswald (1986) reports that the 1982 contract signed by the UAW and General Motors had provision of layoff compensation as high as approximately 95 percent of the after-tax pay of an employed worker. In the same year, 1982, the Goodyear Tire Company signed a contract with URCLPWA agreeing to pay 80 percent of regular earnings when a worker will be laid off. Traditionally, the US auto industry has provided quite a high rate of layoff compensation —70 percent of regular pay.

The value of the marginal product of labor is equated to the opportunity cost of labor in every state and therefore employment is efficient, both ex ante and ex post. The *efficient implicit contract* $\{l_i{}^*, w^*, c^*;\ i=1,2\}$ solves the following equations:

$$s_1 f'(l_1{}^*) = \mu$$

$$s_1 f'(l_1{}^*) = s_2 f'(l_2{}^*)$$

$$w^* = c^* + \mu \quad \text{and} \quad Nu(w^*) = \underline{U}\,.$$

We can fix the union size $N$ at $l_2{}^*$, so that no one is unempolyed in the good state. Let the associated layoff rate and expected or mean empolyment level be denoted as $\alpha^*$ and $m^*$, where $\alpha^* = (N - l_1{}^*)/N$ and $m^* = p_1 l_1{}^* + p_2 N$ respectively.

## 4. INSTITUTIONALLY FIXED SEVERANCE PAY (FSP)

Many countries require their firms to provide severance pay (and layoff compensation) to their workers according to some prespecified formula. Starting from the situation discussed above, if we impose a restriction that $c$ cannot fall below $\underline{c}$ there might be many firms for which this constraint will be binding. For such firms, the 'price' of an unemployed worker will be higher and consequently, they would reduce unempolyment.

Formally, the model allows only one change compared to Section 3, as we drop $c$ from the contract and set it from outside at some level $\underline{c}$. Note that if $\underline{c} \leq c^*$, then the efficient contract prevails. So to study the effects of FSP, we need to set $\underline{c} > c^*$. The first order conditions (1.a,b) and (4) are modified by $\underline{c}$ in place of $c_i$. Conditions (2.a,b) remain unaffected and (3.a,b) will no longer be relevant.

Once again $w_1 = w_2 = w$. This would imply complete insurance in the present context, even though $w_i$ may not necessarily be equal to $\underline{c} + \mu$. When the severance pay is fixed from outside, complete insurance would mean the equalization of marginal utility of wage across different states.

Utilizing (2.a) and (2.b), equations (1.a) and (1.b) can be combined to write

$$s_2 f'(l_2) = s_1 f'(l_1) = a(w)$$

where

$$a(w) = w - \underline{c} + \frac{u(\underline{c} + \mu) - u(w)}{u'(w)}\,.$$

It can be checked that $a(w) < \mu$ for all $w$ not equal to $\underline{w}$, where $\underline{w} = \underline{c} + \mu$. At $\underline{w}$, $a(w) = \mu$. $a(w)$ is monotonically increasing in $w < \underline{w}$ and decreasing in $w > \underline{w}$ as

$$a'(w) = r(w)\left\{\frac{u(\underline{c} + \mu) - u(w)}{u'(w)}\right\}$$

and $r(w) = -u''(w)/u'(w)$ refers to absolute risk aversion.

LEMMA 1. *In the optimal contract w cannot be equal to* $\underline{w}(=\underline{c}+\mu)$.

*Proof.* If $w=\underline{w}$, $a(w)=\mu$ and $l_1=l_1^*$, $l_2=l_2^*=N$. Since $\underline{c}>c^*$, the IR constraint will be oversatisfied, i.e. $Nu(\underline{w})>\underline{U}$. The firm can raise profits by slightly reducing the wage, even if employment is held unchanged.

PROPOSITION 1. *The optimal contract* $\{\tilde{l}_i, \tilde{w}_i, i=1,2\}$ *specifies* $\tilde{l}_1>l_1^*$, $\tilde{l}_2=N$ *and* $\tilde{w}_i=\tilde{w}<w^*$.

*Proof.* Lemma 1 shows that $\tilde{w}$ would be state-invariant and that $\tilde{w}$ will not be equal to $w$. Therefore, $a(\tilde{w})<\mu$. If $s_2 f'(l_2)=a(\tilde{w})$ is maintained, $l_2$ has to exceed $N$. But that is ruled out by assumption. So $\tilde{l}_2=N$ and $s_2 f'(N)>a(\tilde{w})$. However, $s_1 f'(l_1)=a(\tilde{w})$ can easily be satisfied resulting in overemployment.

Now utilizing the fact that in the efficient contract $Nu(w^*)=\underline{U}$ we can rewrite the IR constraint as

$$\frac{(p_1\tilde{l}_1+p_2N)}{N}u(\tilde{w})+\frac{p_1(N-\tilde{l}_1)}{N}u(\underline{c}+\mu)=u(w^*)\,. \tag{5}$$

Note that the left hand side expression of (5) is a weighted average. Since $u(\underline{c}+\mu)>u(w^*)$, $\tilde{w}<w^*$ must hold.

The above proposition shows that institutionally fixed severance pay creates overemployment. At the same time it reduces the wage rate with an adverse impact on the empolyed workers. Ex post an unemployed worker will enjoy much higher utility than an employed worker. Such discrimination against the empolyed worker is driven by two factors: (i) an in-built bias in the fixed rate of severance pay in favor of the unemployed and (ii) the union acting as a single unit, allows the employed workers to (over) subsidize their unemployed colleagues.

Certainly, in reality, workers in general prefer to be empolyed than not. That could be due to a number of factors which we have not modelled. For example, an employed worker might prefer working despite a lower wage if he is likely to experience a learning effect which would enhance his future earnings.

The FSP contract is, in effect, quite simplified as it has to solve only two equations:

$$s_1 f'(\tilde{l}_1)-a(\tilde{w})=0 \tag{6}$$

and

$$(p_1\tilde{l}_1+p_2N)u(\tilde{w})+p_1(N-\tilde{l}_1)u(\underline{c}+\mu)-\underline{U}=0\,. \tag{7}$$

Note that this contract produces smaller layoffs and a higher level of expected employment compared to the efficient contract. If we denote the layoff rate associated with this contract as $\beta$, then $\beta$ is smaller than $\alpha^*$, the efficient layoff rate.

COROLLARY. Let $\beta=(N-\tilde{l}_1)/N$ *and* $\tilde{m}=(p_1\tilde{l}_1+p_2N)$. *Then* $\beta<\alpha^*$ *and* $\tilde{m}>m^*$.

It may be useful to define the level of severance pay at which employment in both states reaches its maximum level $N$. Let us denote this level of severance pay as $\underline{c}_{\max}$ at which $s_1 f'(N) = a(w)$ and $l_1 = l_2 = N$. So for a meaningful analysis, particularly for comparative statics, we need to consider $\underline{c}$ only in the range of $(c^*, \underline{c}_{\max}]$.

The comparative static effects of $\underline{c}$ on $\tilde{l}_1$ and $\tilde{m}$ are predictably positive, but the effect on wage is not obvious. With an increase in employment the associated weight on the utility of the unemployed worker in the IR function (see equation 5) decreases while the same on the utility of the employed workers increases. Therefore wage may increase or decrease to maintain the balance.

PROPOSITION 2. *$\tilde{l}_1$ and $\tilde{m}$ are increasing in $\underline{c}$. But the effect of a change in $\underline{c}$ on $\tilde{w}$ is ambiguous.*

*Proof.* Differentiating $\tilde{l}_1$ and $\tilde{w}$ with respect to $\underline{c}$ from equations (6) and (7), we obtain

$$\frac{\partial \tilde{l}_1}{\partial \underline{c}} = \frac{-k\tilde{m}u'(\tilde{w}) - a'(\tilde{w})u'(\underline{c}+\mu)(N-\tilde{m})}{D}$$

$$\frac{\partial \tilde{w}}{\partial \underline{c}} = \frac{-s_1 f''(\tilde{l}_1)(N-\tilde{m})u'(\underline{c}+\mu) - kp_1 \Delta u}{D}$$

$$\frac{\partial \tilde{m}}{\partial \underline{c}} = p_1 \frac{\partial \tilde{l}_1}{\partial \underline{c}}$$

where

$$D = s_1 f''(\tilde{l}_1)\tilde{m}u'(\tilde{w}) - p_1 a'(\tilde{w})\Delta u, \quad \Delta u = u(\underline{c}+\mu) - u(\tilde{w}), \quad k = 1 - \frac{u'(\underline{c}+\mu)}{u'(\tilde{w})}.$$

Note that $\tilde{w} < \underline{c} + \mu$, $\Delta u > 0$, $0 < k < 1$, $a'(\tilde{w}) > 0$ and $D < 0$. Therefore, $\partial \tilde{l}_1 / \partial \underline{c} > 0$ and $\partial \tilde{m} / \partial \underline{c} > 0$ unambiguously. But the sign of the numerator of $\partial \tilde{w} / \partial \underline{c}$ is ambiguous.

However, a closer scrutiny of $\partial \tilde{w} / \partial \underline{c}$ may become useful. First consider the two endpoints of the range of $c$. The sign of $\partial \tilde{w} / \partial \underline{c}$, evaluated at $\underline{c} = c^*$, is unambiguously negative as $k = 0$ at $c^*$. At $\underline{c} = c_{\max}$, there is no layoff and $w = w^*$ (which follows from the union's IR constraint). So $\partial \tilde{w} / \partial \underline{c}$ evaluated at $c_{\max}$ must be positive. This suggests that $\tilde{w}$ may initially fall and then rise as $\underline{c}$ increases.

Therefore, it might be instructive to look for conditions that would suggest a well behaved relationship between $\underline{c}$ and $\tilde{w}$. One can utilize the first order conditions to rewrite[7]

$$\frac{\partial \tilde{w}}{\partial \underline{c}} = \frac{p_1 u'(\underline{c}+\mu)}{D}\left[a(\tilde{w})\{h(l_1)(N-l_1)+1\}-b(\tilde{w})\right]$$

where

$$b(\tilde{w}) = \tilde{w} - \underline{c} + \frac{u(\underline{c}+\mu)-u(\tilde{w})}{u'(\underline{c}+\mu)} \quad \text{and} \quad h(l_1) = \frac{-f''(l_1)}{f'(l_1)}.$$

Note that $b(\tilde{w}) \geq a(\tilde{w})$ and $b'(\cdot) = -k/(1-k) < 0$. $h(l_1)$ is a measure of the degree of concavity (equivalent to absolute risk aversion).

REMARK. Assume that $h(l)$ is non-increasing in $l$. Then there is a critical value of $\underline{c}$, say $\underline{c}^0$ which solves $a(\tilde{w})\{h(\tilde{l}_1)(N-\tilde{l}_1)+1\} = b(\tilde{w})$ and $\partial\tilde{w}/\partial\underline{c} < 0$ for $\underline{c} < \underline{c}^0$, $=0$ at $\underline{c} = \underline{c}^0$ and $>0$ for $\underline{c} > \underline{c}^0$.[8]

It is clear that the FSP provision is quite effective in raising employment. But it will be difficult for many marginal firms to comply with the regulation. Those firms who were making nominal profit in the unconstrained environment will perhaps go out of business and the overall effect on aggregate employment may be negative.

## 5. RESTRICTION ON LAYOFFS (RLO)

Many countries try to restrict layoffs and retrenchment through official monitoring and job-security laws. One can argue that these restrictions are beneficial in stabilizing employment (or controlling layoff) and generating greater welfare to the workers. Job-security can also enhance productivity over the long run. However, a policy maker has to check whether the intended stability in employment is achieved at the cost of lower level empolyment. In the present model,

[7] Consider the numerator of $\partial\tilde{w}/\partial\underline{c}$ which can be written as

$$p_1 u'(\underline{c}+\mu)\left[-s_1 f'(l_1)(N-l_1)\frac{f''(l_1)}{f'(l_1)} - \left\{\frac{\Delta u}{u'(\underline{c}+\mu)} - \frac{\Delta u}{u'(\tilde{w})} + \tilde{w} - \underline{c} - \tilde{w} + \underline{c}\right\}\right].$$

Substituting equation (6) we obtain

$$p_1 u'(\underline{c}+\mu)\{a(\tilde{w})h(l_1)(N-l_1) + a(\tilde{w}) - b(\tilde{w})\}.$$

[8] $\partial\tilde{w}/\partial\underline{c}$ is non positive if

$$\frac{a(\tilde{w})}{b(\tilde{w})} \geq \frac{1}{h(l_1)(N-l_1)+1}.$$

Starting from $\underline{c} = c^*$, the left hand side is equal to $l$ and the above inequality is satisfied. Then a small increase in $\underline{c}$ raises $l_1$ and raises the right hand side if $h(\cdot)$ is non increasing in $l$. $\tilde{w}$ will decrease and reduce the left hand side below 1. The process will continue until some critical value of $\underline{c}$, say $\underline{c}^0$ at which the above relation is satisfied with equality. Beyond $\underline{c}^0$, $w$ starts rising and the ratio $a(\cdot)/b(\cdot)$ will also begin to rise while the right hand side expression still continues to rise. But now the inequality will be reversed. At $\underline{c}_{max}$ the right hand side expression is equal to 1 and the left hand side expression is strictly less than 1.

the employment level is suitably captured in the mean or expected level of employment.

This idea is formalized by imposing a restriction $l_1 \geq (1-\alpha)l_2$ where $\alpha$ is the permissible layoff rate. Note that if $\alpha$ is sufficiently high, this restriction may not be binding for most of the firms. So we set $\alpha$ less than the efficient layoff rate $\alpha^*$ and allow $c$ to vary freely.

The firm chooses a contract to maximize expected profits subject to the union IR constraint and the layoff constraint $l_1 \geq (1-\alpha)l_2$. Interestingly, the wage rate and the rate of severance pay remain unchanged at $w^*$ and $c^*$ as in the efficient contract and the workers are once again fully insured. All workers are identically treated. The firm sets empolyment according to the following conditions:

$$s_2 f'(l_2) = \mu + \frac{\tau(1-\alpha)}{p_2} \tag{8}$$

$$s_1 f'(l_1) = \mu - \frac{\tau}{p_1} \tag{9}$$

in conjunction with

$$l_1 = (1-\alpha)l_2$$

where $\tau$ is the Lagrange multiplier for the layoff constraint.

PROPOSITION 3. *The optimal contract specifies* $\{\hat{l}_i, \hat{w}_i, \hat{c}_i, i=1,2\}$ *such that* $\hat{l}_2 < N$ *and* $\hat{l}_1 > l_1^*$, $\hat{w}_i = w^*$, $\hat{c}_i = c^*$.

This contract overemploys in the bad state and underemploys in the good state. This leads to a suspicion that the mean level of employment can be smaller than that in the efficient contract. The mean level of employment critically depends on $\hat{l}_2$ as $\hat{l}_2$ automatically determines $\hat{l}_1$ through $\alpha$. The following proposition specifies the critical value of $\hat{l}_2$ above which employement has to rise to generate a greater expected employment.

PROPOSITION 4. *The RLO contract generates a smaller level of expected employment,* $\hat{m}$, *if* $\hat{l}_2 < N\{(1-p_1\alpha^*)/(1-p_1\alpha)\}$.

*Proof.* Immediately follows from a comparison of the two mean levels of employment.

Now let us turn to some of the comparative static properties of this contract. The effect of a change in $\alpha$ on $\hat{l}_2$ is positive:

$$\frac{\partial \hat{l}_2}{\partial \alpha} = \frac{1}{\Delta}\left\{\frac{\tau}{p_1 p_2} - \frac{(1-\alpha)s_1 \hat{l}_2 f''(\hat{l}_1)}{p_2}\right\} > 0$$

where

$$\Delta = -\frac{s_1 f''(\hat{l}_1)(1-\alpha)^2}{p_2} - f''(\hat{l}_2)\frac{s_2}{p_1} > 0 .$$

But the effect on $\hat{l}_1$ and consequently on $\hat{m}$ is ambiguous:

$$\frac{\partial \hat{l}_1}{\partial \alpha} = \frac{1}{\Delta}\left\{\frac{\tau(1-\alpha)}{p_1 p_2} + \frac{\hat{l}_2 s_2 f''(\hat{l}_2)}{p_1}\right\} .$$

$$\frac{\partial \hat{m}}{\partial \alpha} = \left\{e\frac{(1-\alpha p_1)}{\alpha p_1} - 1\right\} p_1 \hat{l}_2 , \tag{10}$$

where $e = (\alpha/\hat{l}_2)(\partial \hat{l}_2/\partial \alpha)$ is the elasticity of $\hat{l}_2$ with respect to $\alpha$, $e > 0$.

PROPOSITION 5. (a) *If* $e(1-\alpha p_1)/\alpha p_1 < 1$, *expected employment increases with a greater restriction on layoffs.*

(b) *Starting from* $\alpha = \alpha^*$, *if* $\alpha$ *is marginally reduced expected employment will increase.*

*Proof.* (a) Follows from (10).

(b) If $\alpha = \alpha^*$, $\hat{m} = m^*$ and $\tau = 0$. Now evaluate $\partial \hat{m}/\partial \alpha$ at $\alpha^*$. $\partial \hat{m}/\partial \alpha = -p_1 \hat{l}_2$ as $\partial \hat{l}_2/\partial \alpha = 0$.

Thus while setting such restrictions on layoffs, the policy makers should examine the relevant information on preference and technology to see whether the above condition is satisfied or not, if maintaining a high expected employment level is one of the objectives. If the estimates of empolyment elasticity (in the good state) is sufficiently small, then such provisions are beneficial in both counts-raising mean and reducing variability of empolyment. However, for marginal deviation from $\alpha^*$, expected empolyment will increase.

This result assumes significance in the context of radical reforms that many developing countries are going through. In India, empolyers asking for a free hand in terminating a certain percentage of their workforce. This is equivalent to raising $\alpha$ in our model. Ignoring the problem of technical change and capital adjustment, one can expect to see increase in the factory level empolyment in the good state. It can also raise the mean employment if the empolyment elasticity is significantly greater than unity. Therefore, the debate on whether the employers should be given such right, can be partly resolved by looking into the estimates of employment elasticity.

It is true that this type of job-security regulation can again force some marginal firms go bankrupt compared to the unconstrained case. However, if severance pay is not mandatory, these firms can survive by not paying compensation to idle workers.

The following proposition compares the two regulations in terms of their relative effectiveness in controlling variability and generating greater mean. For the ease of comparison we express $\beta$ as a function of $\underline{c}$ and $m(\cdot)$ as function of $\underline{c}$ or $\alpha$, depending on the case, instead of the superscripts ˜ and ˆ, respectively.

PROPOSITION 6. (i) *When* $\beta(\underline{c})N=\alpha\hat{l}_2$, $m(\underline{c})>m(\alpha)$, (ii) *if* $m(\underline{c})=m(\alpha)$, $\beta(\underline{c})N>\alpha\hat{l}_2$ *and* (iii) $m(\underline{c})=m(\alpha)$ *and* $\beta(\underline{c})=\alpha$ *simultaneously hold only if* $\alpha=\alpha^*$, $\underline{c}=c^*$.

*Proof.* (a) Since the RLO contract will always underemploy in the good state, equal amount of layoff means $\hat{l}_1<\tilde{l}_1$ which implies $m(\underline{c})>m(\alpha)$.

(b) $m(\underline{c})=m(\alpha)$ implies that $\hat{l}_1>\tilde{l}_1$ sufficiently and as $\hat{l}_2<N$, the FSP contract will generate greater layoff i.e. $\beta(\underline{c})N>\alpha\hat{l}_2$.

(c) This is evident as both contracts reduce to the efficient contract.

The above proposition is useful in formulating labor policies. The FSP regulation is very appealing for its emphasis on empolyment, but its possible adverse impact on the empolyed workers has to be taken into account. On the other hand, the RLO regulation is directly targeted at the variability in employment. But its effect on expected employment is unclear. However, it does not discriminate between the empolyed and the unemployed. Another advantage of the RLO regulation is that it can protect the marginal firms (and hence avoid negative effects on aggregate employment) by making severance pay optional. Marginal firms will then be able to survive by avoiding layoff costs whereas this option is not available in the FSP provision.

## 6. CONCLUSION

An implicit contract model is extended to incorporate certain job-security regulations. Institutionally fixed severance pay leads to overemployment and a reduction in wage, resulting in a greater mean level of employment. On the other hand, restrictions on layoffs lead to underemployment in the 'good' states and overemployment in other states leaving wage unchanged. The mean level of employment can actually be lower than that in the efficient contract. These results can be useful in understanding real world labor contracts. However, other types of labor models, such as efficiency wage and insider and outsider models, should also be examined in the light of job-security regulations. The real world labor contracts are of so varied nature that one single class of models cannot fully theorize them. Furthermore, these results should be embeded in a macro model to evaluate the overall impact of such regulations. It appears that these regulations, even though effective at the firm level, can have negative effects on aggregate employment.

*Indira Gandhi Institute of Development Research, INDIA*

## REFERENCES

Azariadis, Costas, (1975), "Implicit contracts and underemployment equilibria", Journal of Political Economy, vol. 83, pp. 1183–1202.

Fallon, Peter R. and Robert E. Lucas, (1991), "The impact of changes in job-security regulations in India and Zimbabwe", The World Bank Economic Review, vol. 5, pp. 395–413.

Grossman, Sanford and Oliver D. Hart, (1981), "Implicit conracts, moral hazard and unemployment", American Economic Review, vol. 71, pp. 301–307.

Lazear, Edward P., (1990), "Job security, provisions and employment", Quarterly Journal of Economics, pp. 699–726.

Oswald, Andrew J., (1986), "Unemployment insurance and labor contracts under asymmetric information: Theory and facts", American Economic Review, vol. 76, pp. 365–377.

Rosen, Sherwin, (1985), "Implicit contacts: A survey", Journal of Economic Literature, vol. 23, pp. 1144–1175.