AN OPPORTUNITY COST APPROACH TO REDUNDANCY COMPENSATION: AN APPLICATION TO SRI LANKA

Ariel Fiszbein*

ABSTRACT

The paper proposes the principles which should guide the design of a compensation package for redudant workers following a program of voluntary retrenchment. It is argued that the compensation should be equal to the opportunity cost of leaving the enterprise. Using a simple specification for the opportunity cost, a payment schedule is derived and simulated for the case of Sri Lanka.

SÍNTESIS

Este trabajo plantea los principios que debieran orientar el diseño de un sistema de compensaciones para los trabajadores despedidos como resultado de una dotación de personal excesiva a continuación de un programa de disminución voluntaria de gastos. Se plantea que la compensación debiera ser igual al costo de oportunidad que supone el retirarse de la empresa. Mediante una especificación simple del costo de oportunidad, derivamos y simulamos una escala de pagos para el caso de Sri Lamka.

* **The paper benefitted from comments and suggestions made by Gobind Nankani, T.N. Srinivasan and Orsalia Kalantzopoulos. All remaining mistakes are the author's exclusive responsibility.**
The World Bank. The views expressed here are those of the author and should not be attributed to the World Bank.

AN OPPORTUNITY COST APPROACH TO REDUNDANCY COMPENSATION: AN APPLICATION TO SRI LANKA*

Ariel Fiszbein

This paper discusses some conceptual elements to be considered in the design of a redundancy compensation package for the case of voluntary retrenchment of workers in State-owned Enterprises (SOE). Labor redundancy is, indeed, a major problem in a large proportion of public enterprises in most LDCs. This imposes a significant cost on society because of its negative impact on fiscal management and the loss in efficiency associated with poorly performing enterprises. Many countries have initiated ambitious reform programs which involve either privatization or downsizing of SOE. In both cases labor retrenchment is an important component of the reform efforts. The condition that retrenchment be based on a voluntary program appears to be a binding one in many cases, as in most countries the political environment is such that there exists an implicit (and in some opportunities explicit) public employment guarantee. The approach followed here takes *existing public jobs as a type of entitlement*[1]. In that sense, the redundancy compensation should be seen as a second-best solution given the strong social and political constraints under which the retrenchment process will have to take place.[2]

The paper is organized in three sections. The first one sets up a model that summarizes the main factors influencing the optimal compensation package. The second section uses information for Sri Lanka to empirically simulate the model. Section three concludes.

1. The Model

The approach taken implies asking what is the minimum compensation a worker must receive in order to voluntarily leave the enterprise. Thus, the compensation must be equal to the worker's opportunity cost of leaving the enterprise, which in turn is equal to the present discounted value of his expected lifetime income loss resulting from the job loss.

* *Estudios de Economía*, publicación del Departamento de Economía de la Facultad de Ciencias Económicas y Administrativas de la Universidad de Chile, vol. 21, número especial.

[1] This is particularly true in the case of former socialist countries.

[2] For a broader discussion of these issues see Svejnar and Terrel (1991) and Fiszbein (1992).

It is natural to start this discussion by asking what is the nature of the pecuniary[3] loss. Three types of losses should be considered. First, earnings in alternative private sector jobs (including not only salaries alone, but also fringe benefits and tax advantages) might be lower. Second, the process of finding a new job is time-consuming and as a result an initial period of unemployment is likely to result after retrenchment. To the extent that unemployment benefits, when existing,[4] do not fully compensate workers, this loss should also be factored in. Finally, while public sector employment offers job security, private sector employment involves a certain probability of involuntary separation.[5] As a result, the expected alternative wage is lower than actual wages. When all these factors are adequately combined, it is possible to obtain an explicit expression for the opportunity cost which could be used as an indicator for an optimal compensation payment.

For a worker "a" years old, the opportunity cost (C_a) is given by:

$$C_a = \sum_{t=0}^{T-a} \frac{W_{a+t}(t) - R_{a+t}(t)P_{a+t}(t)}{(1+d)^t} \qquad (1)$$

where $W_a(t)$, $R_a(t)$ and $P_a(t)$ are, respectively, the wage in the public sector, the alternative wage and the probability of being employed of a worker of age "a" in period t. T is the officially determined retirement age, and d is the discount rate. The previous expression assumes workers are risk neutral. The case of risk aversion could also be considered by adding a risk premium factor to (1). In that case, the opportunity cost would obviously be higher. However, the qualitative results discussed in section II could be affected only if risk aversion increases with age (see below).

We will express the existence of a positive wage differential between the public and private sector in the following manner:[6]

$$R_a(t) = \alpha W_a(t) \qquad \alpha \leq 1 \qquad (2)$$

[3] It could be argued that resigning from a SOE involves, in addition, nonpecuniary costs as "loss of prestige" or others which are not measurable. In what follows those costs will not be considered.

[4] We will assume there is no unemployment compensation.

[5] This statement should be qualified for two reasons. First, the guarantee of public sector job security is only formal: in principle there exists the possibility of forced dismissal. Second, labor regulations typically impose significant restrictions on the private sector in terms of dismissals.

[6] The differential could itself vary with age. For simplicity, α will be taken as an age-invariant parameter.

The probability of an individual of age "a" being employed at a specific point in time can be expressed as:

$$P_{a+t}(t) = P_{a+t-1}(t-1)r + P_{a+t-1}(t-1)(1-r)p_{a+t} + (1 - P_{a+t-1}(t-1))p_{a+t} \quad (3)$$

where r is the probability of an individual retaining his job and p_a is the probability of an individual of age "a" finding a job in period t. It should be noticed that this last probability varies with age but is not time-dependent.

$$P_a(0) = p_a \quad (4)$$

Through some algebraic manipulation, and considering that the probability of being employed in the initial period is equal to the probability of finding a job in that period (equation (4)), we have:

$$P_{a+t}(t) = \sum_{i=a}^{a+t} p_i \prod_{j=i+1}^{a+t} (r(1-p_{a+t})) \quad (3')$$

Replacing (2) and (3') into (1) we obtain the following expression:

$$C_a = \sum_{t=0}^{T-a} \frac{W_{a+t}\left(1 - \alpha \sum_{i=a}^{a+t} p_i \prod_{j=i+1}^{a+t} (r(1-p_{a+t}))\right)}{(1+d)^t} \quad (1')$$

Next, it is necessary to adopt a definition for the age-specific probability of finding a job (p_a). We will define the probability of finding a job as the ratio between vacancies and job seekers. In order to obtain an age-specific probability we need to assume the existence of age-specific vacancies[7]. Thus we have:

[7] The existence of age-specific probabilities of finding a job imply that workers of different ages are not perfect substitutes. This should be reflected in job vacancies showing an age distribution.

$$p_a = \frac{1-r+g_a}{1-r+u_a} \qquad p_a \leq 1 \qquad (5)$$

where u_a is the unemployment rate among individuals of age "a" (defined in terms of employment rather than in terms of labor force) and g_a is the rate of job creation for individuals of age "a".[8] In essence, under this specification the opportunity cost for individuals with different ages is expressed as a function of several factors including wages in the public sector, wage differentials, and the probabilities of finding and losing private sector jobs. The amount of the compensation increases with the public sector wage (both the current and the future) and the public/private wage differential, and diminishes with the probability of finding and retaining private sector jobs.

In this scheme, the amount of the compensation is related to the age of the individual in several ways. First, the older the individual is, the lower the number of years of wage loss which he/she will have to be compensated for. For example, consistently with the perception of jobs as entitlements, an employee that is (T-1) years old would only have to be partially compensated for an additional year of work while one that is (T-20) years old one would have to be partially compensated for twenty years.[9]

Second, the probability of finding a new job and that of retaining it may be associated with age. The three key factors influencing these probabilities are the age-specific rates of unemployment, employment growth and labor turnover. In most countries, both unemployment and employment growth rates diminish with age. Third, public/private wage differentials might change with age. Overall, it is not possible to establish a simple qualitative link between age and compensation, as the relationship depends on a variety of factors. Thus, the answer must be quantitatively determined and the model will be simulated using information for Sri Lanka.

Before discussing the results from the simulation, it is important to discuss the role of seniority in affecting the opportunity cost. The approach discussed in this note is forward-looking in the sense that what must be compensated is future earnings differentials and not past behavior. Thus, seniority (understood as job

[8] In the simulations, u_a and g_a will be considered to be constant through time. In the case of the unemployment rate, this implies that it is not affected by the retrenchment itself. To the extent that the rate of job creation increases (decreases) through time, the model will overestimate (underestimate) the opportunity cost.

[9] It must be recognized, however, that this compensation excludes pension payments which increase with age. Thus, while an older worker is compensated for less years of "denied" employment, he will receive a larger pension payment at the time of retirement.

tenure) will matter only to the extent that it affects the expected future income stream.[10]

Let us assume there is a return to seniority (independent of age): wages increase with on-the-job experience. If returns are constant (wages increase by x percent a year) the opportunity cost is independent of seniority as the expected evolution of wages can be determined exclusively on the basis of the individual's current wage and age. If returns are increasing so is the loss that must be compensated, while if there are diminishing returns the loss to be compensated is negatively related to seniority.[11]

In practice, we know very little about returns to seniority. It is very likely that returns to seniority change discretely rather than continuously and are not monotonic. For the purpose of the simulation the case of constant (and continuous) returns was considered, in such a way that one can concentrate on the age-profile disregarding the independent effect of seniority.

2. An Application to Sri Lanka

In order to make this model instrumental it is necessary to define the age profile for three variables: W, g, and u. The model will be used to simulate optimal compensations for archetypical workers in SOEs in Sri Lanka. Thus, rather than assuming specific functional forms for those variables, we will run simulations using alternative assumptions based on, to the extent it is possible, evidence for Sri Lanka.

The age-specific unemployment rates were obtained from published data corresponding to the 1991 Labor Force and Socio-Economic Survey.[12] The rate of employment creation (g) was taken as that observed between 1990 and 1991. The wage age-profile was calculated using average values from the 1990 Census of Public Sector Employees. In all cases, the values were obtained for five-year age brackets. The values for u_a, g_a, and W_a are presented in table 1.

[10] Seniority would also affect the opportunity cost if the probability of finding a job were to vary with it. Several arguments can be made in this respect. On the one hand, it could be argued that the "ability to find jobs" diminishes when one does not exercise it. On the other hand, seniority can be perceived as a signal of "stability" and "good work habits". In the first case the probability of finding jobs diminishes with seniority while in the other it increases. Also, if returns to seniority in the public sector are independent of changes in productivity, the more senior workers will have a higher reservation wage which does not necessarily reflect higher productivity. Under those circumstances the expected search time would increase with seniority. For empirical evidence from the US see Valletta (1991).

[11] Consider the case of two workers of the same age but different seniority. If returns to seniority are increasing, the wage differential between them should rise over time. Thus, the worker with more seniority should receive a proportionately (in terms of current wages) larger compensation.

[12] Department of Census and Statistics (1992).

There are three parameters in the model: r, d and α. The values used in the base case were r=0.04, d=0.12, and α=0.8. The model was simulated using several other values in order to determine the robustness of the results. Table 2 reports the results of the simulation exercises, expressed as yearly salaries at time of retrenchment.

The opportunity cost, and correspondingly the compensation payment, is found to diminish with age. It diminishes from approximately three and one half annual salaries for a 20 year-old worker (with 35 years to retirement) to less than one third of an annual salary for a 54 year-old worker (with 1 year to retirement). The opportunity cost for the average worker in the public sector (aged 36) is found to be equal to less than two annual salaries.[13]

The results do not appear to be sensitive to the value of the probability of retaining jobs (r), as indicated by the third column in table 2. Neither the unemployment rate nor the rate of employment growth show a significant effect on compensation. A 10 percent change in both rates was considered, and the results of the simulation are reported in columns 6 to 9 in table 2. The average elasticity of the opportunity cost with respect to both rates is found to be less than 0.1. A 10 percent increase in the unemployment rate increases the opportunity cost by less than 1 percent. Figures 1 and 2 show the age profile of the opportunity cost under different values of u and g. No significant difference can be appreciated between the different profiles.

The opportunity cost, however, is found to be very sensitive to the public/private wage differential (α). For example, for a worker of age 36 a difference of 10 percentage points in the differential implies a 47 percent change in the opportunity cost. This effect, however, is stronger in the middle of the age range.[14] Figure 3 shows the different age profiles derived assuming three wage differentials.

In terms of the three factors which determine the existence of an opportunity cost, the simulations show that the existence of a period of unemployment following retrenchment, and the probability of involuntary separation in private sector jobs do not significantly affect the magnitude of the cost (and the compensation payment). The magnitude of the opportunity cost is found to be strongly dependent on that of the public/private wage differential.

The simulations have assumed that workers are risk neutral. As already indicated, the qualitative results of an opportunity cost which diminishes with age

[13] It should be remembered that the cost is expressed in terms of salaries at the time of retirement, which depend on age. So, for example, the opportunity cost, expressed in monetary terms, for a 20 year old is 41 % higher than for a 36 year old.

[14] The difference is approximately 25 % for workers in the two extremes of the age distribution.

could potentially be affected if risk aversion increases with age. It is an empirical question whether, in such a case, the increase in risk aversion is large enough to reverse the age profile obtained from the simulations. Future extensions of this work should deal with this possibility.

3. Some Additional Comments

It could be argued that the optimal compensation package should be based on estimates of the social opportunity cost rather than on the individual one as was done in this paper. For example, from a social point of view it might be desirable to pay lower compensations to younger workers in order to lower their reservation wages and decrease their optimal job-search time. However, the perception of public sector jobs as an entitlement of those currently holding them imposes a limit to an approach based on the social opportunity cost and forces the use of the individual one as the right measure.

The opportunity cost can serve as the basis for the design of a redundancy compensation package. However, depending on other objectives, the government can alter the opportunity cost schedule in order to determine actual payments. For example, a minimum age requirement or a maximum payment cap could be used in order to restrict the scheme to relatively older workers. The Government can affect the opportunity cost itself through changes in its future wage policy. For example, it can reduce the opportunity cost by offering those workers which prefer not to retire a salary fixed in nominal terms until retirement. In any event, the opportunity cost schedule provides the basic knowledge the government needs in order to make an informed decision.

The previous discussion implicitly assumed workers are homogeneous. In fact, workers are heterogeneous in terms of their skill level. This is due both to ability and training not captured by the information on their position within the firm. Heterogeneity has important implications for the process of retrenchment, as an homogeneous compensation package is more attractive for the most productive workers who could probably find better paid jobs faster.

A final point to be discussed is the possibility of making compensation dependent on employment status. This would involve the payment of an initial sum and a monthly payment during the period in which the worker is unemployed. However, in order for such a scheme giving incentives for job search, there must be a time limit for compensation which should decrease over time. The scheme discussed above solves this problem in a simpler way. By calculating the compensation on the basis of the length of unemployment for the average worker it partially covers the losses associated with job search while at the same time provides incentives for efficient search.

TABLE 1

VALUES USED IN SIMULATIONS

AGE	u_a	g_a	w_a
20	0.57	0.04	1.000
21	0.57	0.04	1.019
22	0.57	0.04	1.039
23	0.57	0.04	1.058
24	0.57	0.04	1.079
25	0.19	0.04	1.099
26	0.19	0.04	1.120
27	0.19	0.04	1.142
28	0.19	0.04	1.166
29	0.19	0.04	1.191
30	0.09	0.09	1.217
31	0.09	0.09	1.243
32	0.09	0.09	1.270
33	0.09	0.09	1.286
34	0.09	0.09	1.302
35	0.07	0.09	1.318
36	0.07	0.09	1.335
37	0.07	0.09	1.351
38	0.07	0.09	1.365
39	0.07	0.09	1.380
40	0.04	0.09	1.394
41	0.04	0.09	1.409
42	0.04	0.09	1.424
43	0.04	0.09	1.446
44	0.04	0.09	1.469
45	0.04	0.07	1.492
46	0.04	0.07	1.515
47	0.04	0.07	1.539
48	0.04	0.07	1.554
49	0.04	0.07	1.570
50	0.04	-0.09	1.586
51	0.04	-0.09	1.602
52	0.04	-0.09	1.618
53	0.04	-0.09	1.634
54	0.04	-0.09	1.650

TABLE 2

OPPORTUNITY COST
(Number of Annual Salaries at Time of Retrenchment)

AGE	Base Case	r=O.l	α=0.9	α=0.7	△u+10%	△u-10%	△g+10%	△g-10%
20	3.55	3.56	2.67	4.43	3.66	3.43	3.53	3.57
21	3.38	3.39	2.48	4.27	3.49	3.27	3.36	3.41
22	3.20	3.21	2.28	4.11	3.29	3.10	3.18	3.22
23	2.99	3.01	2.06	3.92	3.08	2.91	2.97	3.02
24	2.77	2.78	1.82	3.72	2.85	2.70	2.75	2.80
25	2.52	2.53	1.55	3.49	2.59	2.47	2.51	2.55
26	2.44	2.45	1.47	3.41	2.50	2.40	2.43	2.47
27	2.35	2.36	1.38	3.32	2.41	2.31	2.34	2.39
28	2.25	2.26	1.28	3.22	2.30	2.22	2.23	2.28
29	2.14	2.14	1.17	3.10	2.18	2.12	2.12	2.17
30	2.01	2.01	1.05	2.97	2.04	2.00	2.00	2.04
31	1.98	1.98	1.03	2.93	2.01	1.97	1.97	2.01
32	1.95	1.95	1.02	2.88	1.97	1.94	1.94	1.97
33	1.93	1.93	1.02	2.85	1.95	1.93	1.92	1.95
34	1.92	1.92	1.01	2.82	1.92	1.91	1.91	1.93
35	1.89	1.90	1.01	2.78	1.90	1.89	1.89	1.90
36	1.88	1.88	1.00	2.75	1.88	1.87	1.87	1.88
37	1.85	1.85	1.00	2.71	1.86	1.85	1.85	1.86
38	1.83	1.83	1.00	2.67	1.84	1.83	1.82	1.84
39	1.81	1.81	0.99	2.63	1.81	1.81	1.80	1.82
40	1.78	1.78	0.99	2.58	1.79	1.78	1.77	1.80
41	1.76	1.76	0.98	2.53	1.76	1.75	1.74	1.77
42	1.72	1.72	0.98	2.47	1.73	1.72	1.71	1.74
43	1.68	1.68	0.97	2.39	1.69	1.67	1.67	1.70
44	1.63	1.63	0.96	2.30	1.64	1.63	1.62	1.65
45	1.58	1.58	0.95	2.21	1.59	1.57	1.56	1.60
46	1.52	1.52	0.94	2.11	1.53	1.51	1.50	1.54
47	1.46	1.46	0.92	1.99	1.47	1.45	1.44	1.48
48	1.39	1.39	0.91	1.87	1.40	1.38	1.37	1.42
49	1.32	1.32	0.90	1.75	1.33	1.31	1.30	1.35
50	1.25	1.26	0.89	1.61	1.26	1.24	1.22	1.28
51	1.05	1.06	0.75	1.35	1.06	1.04	1.03	1.08
52	0.83	0.83	0.59	1.06	0.83	0.82	0.81	0.85
53	0.58	0.59	0.42	0.75	0.59	0.57	0.57	0.60
54	0.31	0.31	0.22	0.39	0.31	0.30	0.30	0.31

FIGURE 1

OPPORTUNITY COST
Alternative Unemployment Rates

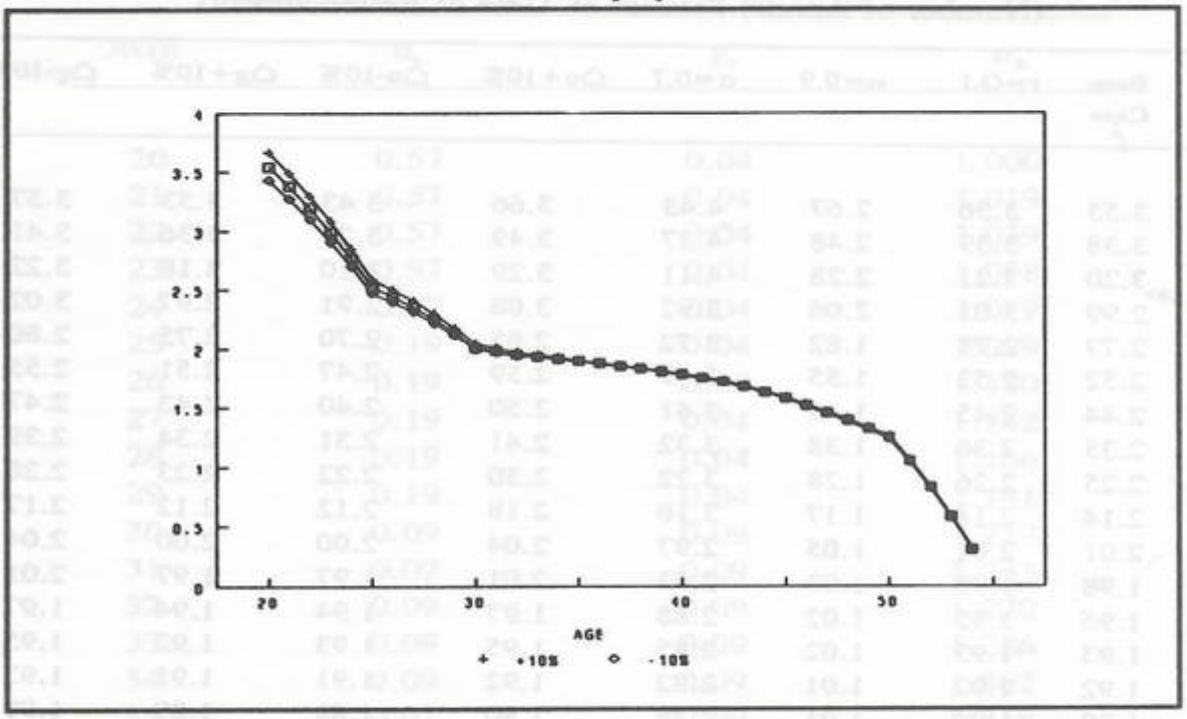


FIGURE 2

OPPORTUNITY COST
Alternative Employment Growth Rates

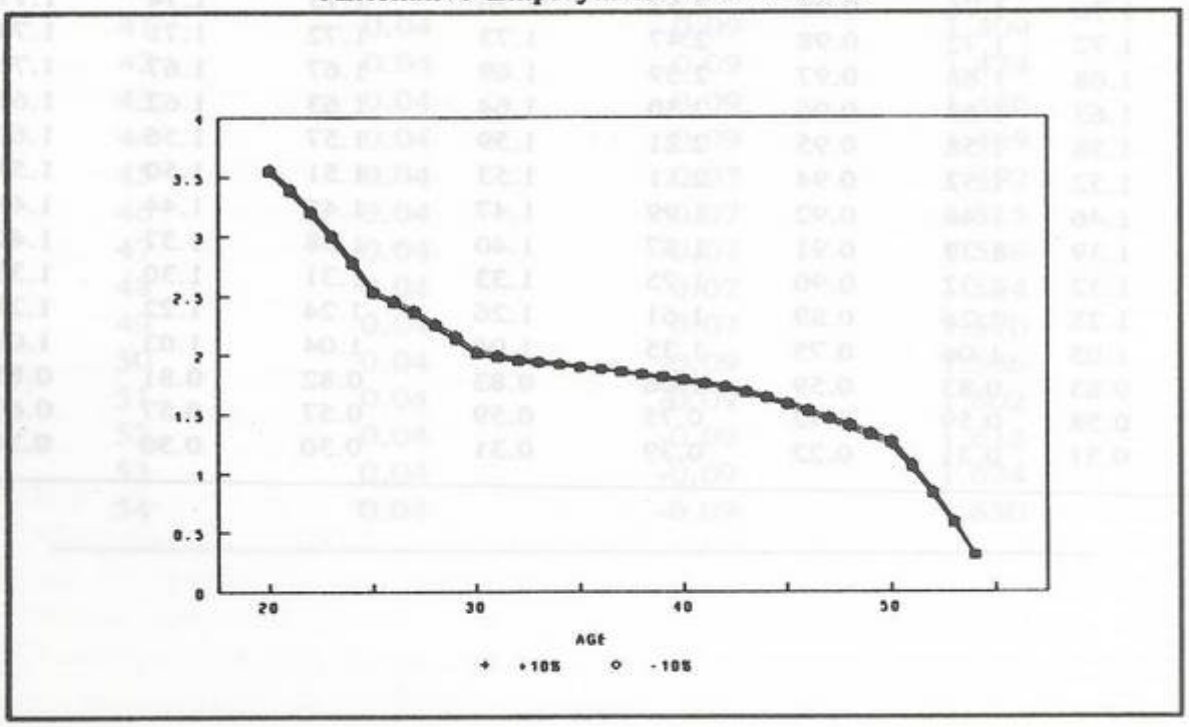
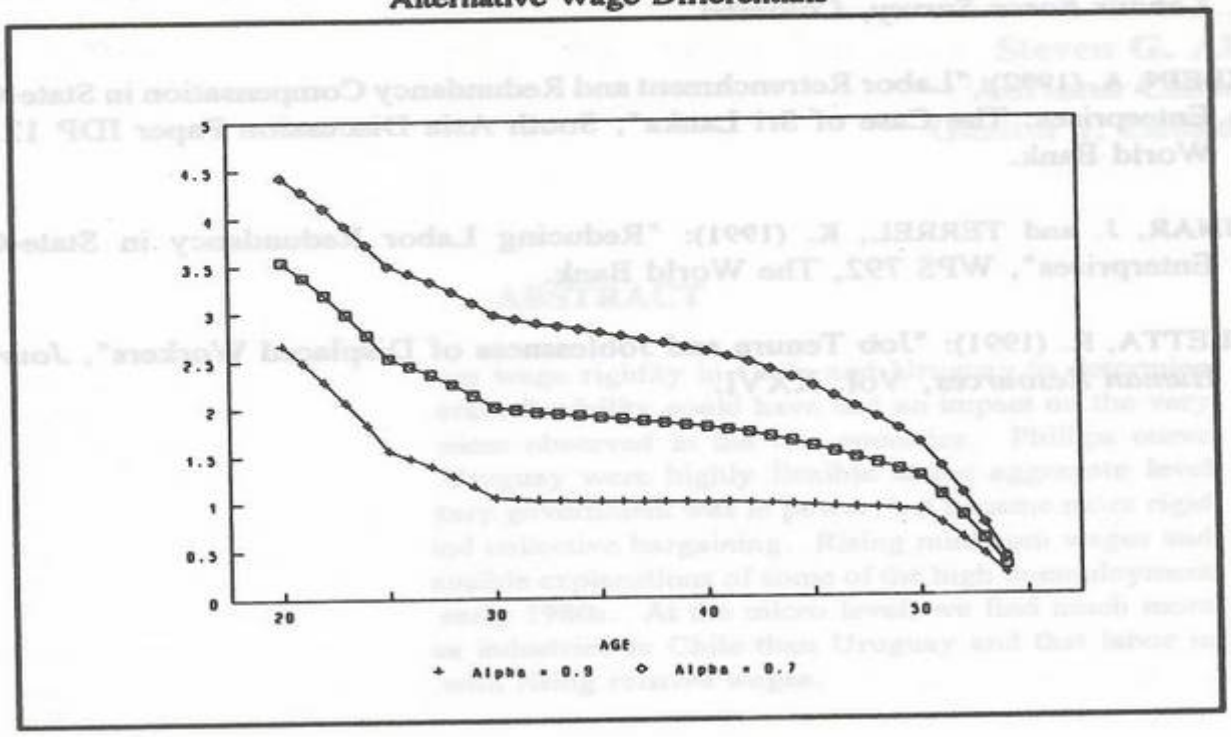


FIGURE 3

OPORTUNITY COST
Alternative Wage Differentials



REFERENCES

DEPARTMENT OF CENSUS AND STATISTICS (1992): *Quarterly Report of the Sri Lanka Labour Force Survey*, Colombo.

FISZBEIN, A. (1992): "Labor Retrenchment and Redundancy Compensation in State-Owned Enterprises: The Case of Sri Lanka", South Asia Discussion Paper IDP 121, The World Bank.

SVEJNAR, J. and TERREL, K. (1991): "Reducing Labor Redundancy in State-Owned Enterprises", WPS 792, The World Bank.

VALLETTA, R. (1991): "Job Tenure and Joblessness of Displaced Workers", *Journal of Human Resources*, Vol. XXVI.