

WAGES, TURNOVER AND JOB SECURITY

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Abstract

Many developing countries have far reaching regulations enforcing security of employment, mostly limited to the modern sector. Tenure protecting legislation can be seen as reflecting union power or the political desire to extract from the firms in the formal sector benefits to labor in exchange for favorable treatments in credit or trade and market policies. An alternative explanation, pursued in the paper, is that employment security is an aspect of efficiency wages. Security would be offered and is offered by firms even without coercive legislation to reduce turnover of laborers with firm specific human capital. The paper analyzes employer-worker equilibrium in a two-sector economy. It is shown that the degree of security, defined as the probability of being retained on the job, rises with the profitability of the firm and declines with the variability of external economic conditions. Whether wages will rise or decline with security depends on whether wage pay and security are complements or substitutes. It is also shown that the determination of wages by firms introduces inefficiency into the market equilibrium.

WAGES, TURNOVER AND JOB SECURITY

Firms, particularly in capital intensive and technology intensive industries, invest in selection, hiring and training. The faster labor turnover, the higher the investment. To reduce turnover, firms raise the level of the wage rate and introduce rising wage scales, pension funds and fringe benefits--measures that are often associated with length of employment. These forms of compensation reduce quitting and reduce turnover cost.

The literature dealing with labor turnover and its implications is vast and many aspects of these issues have been considered. More recently, the professional discussion has focussed on viewing the employment arrangements as contractual and analyzing the associated problems. This line will not be pursued here, though it will be shown that the firm-worker relation discussed in the paper has the economic properties of a contract.

The contribution I wish to attempt is the addition of the effect of the possibility of dismissal on quitting and turnover. In many aspects the discussion will follow Stiglitz (1974). Parsons (1972) incorporated job security in his specific human capital model, but his was only a firm level analysis and mostly empirical. Another predecessor is Azariadis (1975) who focused mostly on the unemployment implications of his pioneering model. The paper also follows these earlier writers in limiting the formal model to a single period.

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The motivation for the analysis stems from the following. Workers value both wage level and job security, thus firms will offer--particularly to highly paid workers--some security in lieu of pecuniary payments. Higher wages and more secure employment will reduce labor mobility--comparatively to instantaneously clearing markets. The questions that the tradeoff between wage level and job security entails, are questions of efficiency and welfare. I shall attempt to deal with some of them in the paper.

Preliminaries and Summary

The paper is written having in mind a typical developing country with a two sector economy: a formal, capital intensive sector, and an informal and rural sector. Training and labor turnover problems are assumed to be limited to the formal sector. It is also assumed, for simplicity, that full employment prevails and that laborers leaving a firm in the formal sector find employment in the informal economy (in some countries read government for the sector with assured employment). These assumptions are made not because they are believed to reflect accurately the real world, but rather to focus on the major subject of the paper and in order not to repeat analysis that was already conducted by others, particularly Stiglitz' analysis of urban unemployment.

Job security is a promise to keep labor employed even if conditions worsen. We take product price as fluctuating and the degree of security is defined as the lowest price under which labor will not be employed. Given the probability distribution of prices, security is the probability of being retained on the job.

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This version of the paper portrays mostly the theoretical aspects of the economics of the firm with specific human capital. The firm offers its employees both wage and job security. It is shown that job security is augmented with profitability of the firm and with training costs, it is reduced with variability in economic conditions. Since firms in the formal sector of developing countries often enjoy monopoly positions, have to train unskilled labor, and are sometimes protected from external economic changes, one may expect to find job security to be more important in developing than in developed countries even in the absence of tenure protecting legislation or unions. The economy at large is discussed only in two short sections and it is shown that with training costs a free market equilibrium is not Pareto efficient.

By its very nature, job security reduces the mobility of labor and other resources. The questions that then arises are: under what circumstances, if any, will the existence of job security reduce economic efficiency and social welfare? And does the possibility of job security call for policy intervention of one kind or another? These questions will be examined in future work.

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The Worker

Let w_u and w_r be, respectively, wage rate in a typical firm in the formal sector and in alternative, informal sector employment; p is the probability of dismissal and, accordingly, $1-p$ is the job security coefficient; $v()$ is a concave utility function. The expected utility of the worker is

$$(1) \quad E v = (1-p)v(w_u) + p v(w_r)$$

The slope of the indifference curve between security and wage pay is given by

$$\frac{d(1-p)}{dw_u} = - \frac{(1-p)v'(w_u)}{v(w_u) - v(w_r)}$$

Hence

$$\frac{d(1-p)}{dw_u} < 0, \quad \frac{d^2(1-p)}{dw_u^2} > 0 \quad \text{for } w_u > w_r$$

The indifference curves have the regular shape.

By assumption, security of employment in the traditional sector is complete. Firms in the modern sector have therefore to offer $w_u \geq w_r$. If workers were uncertain about finding employment in the traditional sector, they may have been willing to take employment in the modern sector for lower pay.

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Workers quit for many reasons: personal, family, inconvenient transportation, social relations on the job. The firm views the workers, somewhat mechanically, as each having a certain probability of quitting. This probability, q , is called here the quit function: the proportion quitting out of those accepted for employment. The quit function can be affected by economic factors, particularly by w_u and by $1-p$, which are the parameters of the indirect utility function of the worker.^{1/}

$$(3) \quad q = q(w_u/w_r, 1-p)$$

$$0 < q < 1, \quad q_i < 0, \quad q_{ii} > 0, \quad i = 1, 2$$

By the assumptions on the derivatives of q , both wages and job security reduce quitting, though at decreasing rates. In general, we shall also assume $q_{12} < 0$; that is, wages and security are complementary factors, as highly paid workers value job security more than others.

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The Firm

The decisions on the amount of labor employed and on the wage and job security policy are made simultaneously. To simplify the discussion, we start by assuming a given work force and a constant marginal (physical) product of labor, y . The unit of the product is defined such that the average price is one, but actual price varies randomly. The value of the marginal product is

$$(4) \quad \text{VMP} = y(1 + \theta)$$

where θ is a stochastic price component with

$$E\theta = 0 \quad \text{Var}\theta = \sigma^2$$

The probability distribution $F(\theta)$, with density $f(\theta)$, is known; θ is realized at the beginning of the year.

The period of operation is one year and the firm is seen here as a repeated stochastic process. The firm maximizes expected profits (details below) and announces in advance the value of its two control variables. The first control is w_u , the wage rate. The second is a cut-off value for θ , a , such that

- (5) if $\theta \geq a$ labor is retained and the firm operated
if $\theta < a$ labor dismissed and the firm is closed down for the year

The probability of labor being dismissed is $F(a)$ and the coefficient of job security is $1-F(a)$.

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Quitting takes place after training and before reporting to work, and the quitting function can now be written as

$$q = q(w_u/w_r, 1-F(a))$$

Given q , the firm has to train $(1-q)^{-1}$ workers for every position. For simplicity of the algebra, we shall use a recruiting function $\beta()$

$$(6) \quad \beta = \beta(w_u/w_r, 1-F(a)) = \frac{1}{1-q}$$

$$\beta_i < 0, \beta_{ii} > 0 \quad i = 1, 2$$

$$\beta_{12} = (2q_1q_2 + (1-q)q_{12})/(1-q)^3$$

The signs of the derivatives of β are derived from the derivatives of q . The cross effect of β_{12} will be negative only if the cross effect in the quit function q_{12} is large in absolute value compared with the own effects q_1, q_2 . We further assume that the training cost is T , a constant for each trainee, and that the firm maximizes expected profits per worker^{2/}

$$(7) \quad E\pi = \int_a^\infty [y(1 + \theta) - w_u] f(\theta) d\theta - \beta T$$

$$= [1-F(a)](y-w_u) + y \int_a^\infty \theta f(\theta) d\theta - \beta T$$

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The maximization is with respect to w_u and a and the first order conditions are

$$(8a) \quad -\beta_1 T / w_r = [1 - F(a)]$$

$$(8b) \quad \beta_2 T = y - w_u + ya \\ = y(1 + a) - w_u$$

Since $\beta_1, \beta_2 < 0$, the left-hand-sides of (8a) and (8b) are positive and negative, respectively.

The interpretation of (8a) is straightforward. $1 - F(a)$ is the expected value of an addition of 1 unit to the wage level, since workers will be dismissed and wages not paid in probability $F(a)$. The expression on the left is the marginal contribution of such a pay rise in terms of reduced cost of training.

Equation (8b) is more complicated. The negative sign implies that either $w_u > y$ or $a < 0$ or both. If $w_u < y$, $a < (w_u - y)/y$ -- the cut-off point is a loss point. In principle, the solution may dictate $a < -1$, but this is a negative price and we shall assume that this situation does not occur and that $1 + a > 0$. For interpretation, examine the first line of (8b) and note that $f(a)$ appears as a multiplier in all terms in the derivative $\partial E\pi / \partial a$; it was cancelled out in the equation presented. By the derivative, increasing the cut-off θ by da reduces the probability of operating the firm by $f(a)da$ and reduces the expected profits by $(y - w_u)f(a)da$. Also, increasing the cut-off point by da removes a slice at the lower bound of the expectation integral in the profit function; the slice is $yaf(a)da$. From the point of view of the firm, such a change is a gain as most often $a < 0$. The left hand term in (8b) is the benefit; again, in reduced training cost.

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The Offer as a Contract

A contract between an employer and an employee--in our case on wage rate and job security--is an agreement they may reach voluntarily. Such an agreement is Pareto efficient in the sense that neither party to the agreement can improve its position without worsening the position of the other side. Analytically, a firm-worker contract is equivalent to the firm maximizing its profit given a constant utility of the worker.

In the discussion in the paper, the firm maximizes its profits taking into account the worker's quit behavior. We have to show that in doing so it creates a contract so that another worker will not be able to approach the firm and suggest an alternative wage-job security combination that will be superior to at least one party compared with the offer the firm had originally made. We show that the firm offer is a contract by showing that it is equivalent to profit maximization given the worker's utility level.

To this end write the quit function in full

$$(9) \quad q = q [v(w_u/w_2), 1-F(a)]$$

The same could be shown for

$$Ev = (1-F(a))v(w_u) + F(a)v(w_r)$$

$$\text{still} \quad \beta = (1-q)^{-1}$$

Maximizing (7) the first order conditions can be rewritten as

$$(10) \quad \frac{v_1}{v_2} = - \frac{[1-F(a)]w_r}{[y(1+a)-w_u]}$$

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To maximize firm profits subject to given worker's utility, v^* , write the Lagrangian

$$(11) \quad H = E\pi - \lambda[v(w_u/w_2), 1-F(a)) - v^*]$$

The first order conditions of (11) can also be rewritten as (10). This proves that the firm's offer of a pair (w_u, a) that maximizes eq. (7), is a contract.

Second Order Conditions

The Hessian matrix of the cross derivatives is

$$(12) \quad H = \begin{pmatrix} -\beta_{11}T/w_r^2 & f(a)(1+\beta_{12}T/w_r) \\ f(a)(1+\beta_{12}T/w_r) & -f(a)[y + \beta_{22}Tf(a)] \end{pmatrix}$$

Since $\beta_{ii} > 0$, the condition on negative second self derivatives is realized. The other part of the second order condition--in this two variable case it is $|H| > 0$ --is realized if the following inequality holds

$$(13) \quad \frac{\beta_{11}T}{w_r^2} [y + \beta_{22}Tf(a)] > f(a) [1 + \beta_{12}T/w_r]^2$$

which can be rewritten as

$$\frac{\beta_{11}y}{w_r^2 f(a)} + \frac{\beta_{11}\beta_{22}T}{w_r^2} > \frac{1}{T} + \frac{2\beta_{12}}{w_r} + \frac{\beta_{12}^2 T}{w_r^2}$$

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It is useful to check the required inequality in its two representations in the two lines of (13); both highlight the critical role played by the cross effect β_{12} (see eq. (6)).

The term $f(a)[1 + \beta_{12}T/w_r]$ is the cross derivative of $E\pi$. If $[1 + \beta_{12}T/w_r] < 0$, the controls w_u and a are complementary in affecting profits. This is "strong" complementarity for which the weaker complementarities in quitting and recruitment, q_{12} , $\beta_{12} < 0$, are necessary but not sufficient conditions.

The inequality in the first line of (13) depends on the complementarity factor not being too large. For large values of the cross derivative of $E\pi$ a maximum in (7) is not assured; job security and wage rate reinforce each other's effect so strongly that it always pays to increase both. Reinforcement is plausible in quitting and recruitment, but not necessarily in the profit function. Therefore we do not attribute a priori a sign to the complementarity factor $(1 + \beta_{12}T/w_r)$. Even if complementarity in profits exists, it is implausible that mutual reinforcement of a and w_u be so strong that profits will be unbounded. We therefore assume that the inequality in (13) is maintained and (7) has a finite maximum.

The second line in (13) indicates that the concavity of the β function $\beta_{11}\beta_{22} > \beta_{12}^2$ and, particularly, β_{11} large compared with β_{12} , contribute to the satisfaction of the inequality condition. The same inequality also indicates that the training cost T should not be too small: by (8a) for $T=0$, w_u cannot be a control variable associated with an internal maximum of $E\pi$.

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Variance

Increased intensity of economic fluctuations is represented in our model by an increased variance of the stochastic element in product price. To analyze the effect of changes in the variance of the distribution assume that the variance of θ is $\sigma^2 = 1$ and that $f(\theta)$ and $F(\theta)$ are the standardized normal functions. These assumptions do not alter any of the results of the paper. Further, mark the stochastic element in product price as $\sigma\theta$.

Equation (7) is now

$$(7') \quad E\pi = \int_{\sigma a}^{\infty} [y (1+\sigma\theta) - w] \left(\frac{f(\theta)}{\sigma} \right) d\sigma\theta$$

Since $\text{pr}(\sigma\theta < \sigma a) = \text{Pr}(\theta < a) = F(a)$, the definition of β (eq. (6)) is not modified.

The first order conditions are now

$$(8'a) \quad -\beta_1 T/w_r = [1-F(a)] \quad (\text{unchanged})$$

$$(8'b) \quad \beta_2 T = y (1+\sigma a) - w_u$$

Increased variance, keeping σa constant, increases the profits of the firm since it increase the probability of realizing higher prices. Increased variance, again for a constant cut-off value, σa , reduces job security. Whether the firm will maintain the same level of job security ($a = \text{constant}$) or change it, and what the direction of such a change will be, can be examined in the analysis of comparative statics to which we now turn.

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Comparative Statics

The writing of this section is detailed to help the reader follow the argument. The exogenous parameters in the analysis are y , T , σ , and w_r -- the general symbol will be x . The endogenous variables are w_u and a . Rewrite (8a) and (8b) as

$$(8''a) \quad h_1(w_u, a; y, T, \sigma, w_r) = 0$$

$$(8''b) \quad h_2(w_u, a; y, T, \sigma, w_r) = 0$$

For simplicity, we shall continue to assume $\sigma^2 = 1$ when not dealing with the effect of the variance on the firm.

The Hessian can now be expressed as

$$H = \begin{pmatrix} \frac{\partial h_1}{\partial w_u} & \frac{\partial h_1}{\partial a} \\ \frac{\partial h_2}{\partial w_u} & \frac{\partial h_2}{\partial a} \end{pmatrix}$$

and the system of the equations of the comparative statics is

$$(14) \quad H \begin{pmatrix} \frac{dw_u}{dx} \\ \frac{da}{dx} \end{pmatrix} = - \begin{pmatrix} \frac{\partial h_1}{\partial x} \\ \frac{\partial h_2}{\partial x} \end{pmatrix}$$

The signs of the solutions in the column vector on the left-hand-side of (14) are determined by examining the solution of (14) using Cramer's Rule and the assumption $|H| > 0$.

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The vectors $\partial h / \partial x$ for $x=y, T, \sigma, w_r$ are

y	T	σ	w_r
0	$-\beta_1/w_r$	0	$\frac{T}{w_r^3} [\beta_1 w_r + \beta_{11} w_u]$
$-f(a)(1+a)$	$\beta_2 f(a)$	$-yaf(a)$	$-\frac{\beta_{12} T f(a) w_u}{w_r^2}$

The signs obtained from the solutions to the analysis of comparative statics are as follows ($\underline{\equiv}$ means equal in sign and $f(a)$, always positive, was eliminated where possible)

$$(15) \quad \frac{dw_u}{dy} \underline{\equiv} - (1+a)(1+\beta_{12} T/w_r)$$

$$\frac{da}{dy} \underline{\equiv} - \frac{\beta_{11} T(1+a)}{w_r^2}$$

$$(16) \quad \frac{dw_u}{dT} \underline{\equiv} - \frac{\beta_1}{w_r} (y + \beta_{22} T f(a)) + \beta_2 f(a) [1 + \beta_{12} T/w_r]$$

$$\frac{da}{dT} \underline{\equiv} \frac{1}{w_r} \left[\frac{\beta_{11} \beta_2 T}{w_r} - \beta_1 (1 + \beta_{12} T/w_r) \right]$$

$$(17) \quad \frac{dw_u}{d\sigma} \underline{\equiv} - ya(1 + \beta_{12} T/w_r)$$

$$\frac{da}{d\sigma} \underline{\equiv} - ya\beta_{11} T/w_r^2$$

$$(18) \quad \frac{dw_u}{dw_r} \underline{\equiv} \frac{T}{w_r^3} \{ [\beta_1 w_r + \beta_{11} w_u] [y + \beta_{22} T f(a)] - f(a) [1 + \beta_{12} T/w_r] \beta_{12} T w_u w_r \}$$

$$\frac{da}{dw_r} \underline{\equiv} - \frac{\beta_{11} \beta_{12} T^2 w_u}{w_r^4} + \frac{T}{w_r} [1 + \beta_{12} T/w_r] [\beta_1 w_r + \beta_{11} w_u]$$

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Three magnitudes play a pivotal role in determining the signs of the derivatives in eqs. (15)-(18). The most important of the three is the complementary factor, $(1 + \beta_{12}T/w_r)$, already encountered in the discussion of the second order conditions. The other two magnitudes affect only eqs. (18) and they will be introduced below. Table 1 summarizes the effect of the exogenous variables on the controls, w_u and a .

Increasing y raises the net value of operating the firm. It therefore induces the firm to increase the probability of operation by reducing the cut-off point a ; this effect is independent of the sign of $(1 + \beta_{12}T/w_r)$ and whatever that sign, $da/dy < 0$. Recall also that we are assuming $a < 0$, and $(1+a) > 0$. With a negative complementarity factor, a and w_u reinforce each other and $dw_u/dy > 0$. If, however, $(1 + \beta_{12}T/w_r) > 0$, the firm will trade-off wages for job security in reacting to increased y .

The effects of a change in T are identified only if $(1 + \beta_{12}T/w_r) < 0$. Then job security and wages will be increased to reduce turnover. When $(1 + \beta_{12}T/w_r) > 0$, the comparative statics effect is not identified.

Since $\beta_2 < 0$, the right-hand side of (8'b) is negative. This implies that the term in the square brackets in eqs. (17) is also negative (recall $a < 0$). This determines the corresponding signs in Table 1: job security is reduced in reaction to increased variance of product price; the reaction of wages, w_u , depends on whether security and pay are substitutes or not.

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Table 1

Comparative Statics--The Effect of the Complementarity Factor

	Sign of $1 + \beta_{12}T/w_r$	
	<u>negative</u>	<u>positive</u>
$\frac{dw_u}{dy}$	+	-
$\frac{da}{dy}$	-	-
$\frac{dw_u}{dT}$	+	?
$\frac{da}{dT}$	-	?
$\frac{dw_u}{d\sigma}$	-	+
$\frac{da}{d\sigma}$	+	+
$\frac{dw_u}{dw_r}$	+	?
$\frac{da}{dw_r}$?	+

Notes:

The signs in the Table are derived from eqs. (15)-(18).

The signs of da/dy and $da/d\sigma$ are unaffected by the magnitude of $(1 + \beta_{12}T/w_r)$.

It is assumed that $\beta_{12} < 0$, $(\beta_1 w_r + \beta_{11} w_u) > 0$.

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The change in the non-standardized cut-off point, in terms of product price, is

$$\frac{d(\sigma a)}{d\sigma} = a \left(1 + \sigma \frac{da}{d\sigma}\right)$$

and, depending on the sum in the parentheses, it may be positive or negative.

We turn now to the effect of w_r , examined in eqs. (18). The signs of the derivatives are affected here by two other magnitudes, in addition to the complementarity factor. One is β_{12} (see eq. (6)); the signs in Table 1 are reported for $\beta_{12} < 0$. The other magnitude is $\beta_1 w_r + \beta_{11} w_u$ and it has the opposite sign of the cross derivative.

$$-\frac{\partial^2 \beta}{\partial w_u \partial w_r} \cong \beta_1 w_r + \beta_{11} w_u$$

The rate of recruiting, β , is depicted in Figure 1 as a function of w_u . As w_r increases, from $w_r(1)$ to $w_r(2)$, the ratio w_u/w_r decreases and the value of the β function increases (recall $\beta_1 < 0$). As the graphs are depicted, for a given w_u the magnitude of β_1 is larger in absolute value, the higher w_r . This is reasonable for, again, the higher w_r the lower the ratio w_u/w_r . If the way the diagram is presented is accepted then

$$-\frac{\partial^2 \beta}{\partial w_u \partial w_r} \text{ and } (\beta_1 w_r + \beta_{11} w_u) > 0$$

This is the assumption incorporated in the signs reported in Table 1. With these assumptions the signs are identified for two of the four possible effects of w_r in Table 1.

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Variable Wages

Up to now wages, w_u , once offered, were constant. But employers may wish to offer variable wages, depending on the realized economic conditions. One possibility is to make the wage payment in eq. (7) $w(1+\alpha\theta)$ where α is a positive parameter to be announced in advance. It can be shown in comparative statics analysis that with plausible assumptions, at least for small values of α ,

$$\frac{dw_u}{d\alpha} < 0, \quad \frac{da}{d\alpha} < 0$$

that is, the higher wage variability the more there is tradeoff between (average) wage level and job security.

This result contradicts Azariadis' (1975) finding of the dominance of wage rigidity in employment contracts. Azariadis' proof (Lemma 1) rests on the assumption that job security is not affected by wage variability. This seems to be an unreasonable assumption, employers can be expected to increase security of jobs if wages are allowed to vary with economic circumstances.

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Market Equilibrium

Let the amounts of capital be given, both in the formal and in the informal sector; so also the area of land in agriculture is given. Sectoral production is a function of labor distribution

$$\begin{array}{ll} (19a) & Y_u = Y_u(L_u) \quad \text{formal sector} \\ (19b) & Y_r = Y_r(L_r) \quad \text{informal sector} \\ (19c) & L_u + L_r = L \quad \text{full employment} \end{array}$$

Concavity of the production functions $Y_i()$ is assumed.

The labor market can be visualized as operating each year in three stages. In the first stage the formal sector recruits βL_u workers for training. In the second stage q percent of the trainees quit and return to the informal sector, then the urban sector is left with L_u workers. In the third stage, another group of workers may be dismissed and they will also return to seek employment in the informal sector. The system (19), particularly the full employment equation (19c), depicts the economy as seen in the second stage. In the analysis below we assume for simplicity that the workers dismissed from the formal sector do not affect the marginal product of labor in the informal sector. The implication of this assumption is that either these workers do not find employment for the year at which they were dismissed or that their numbers are small relative to L_r and their effect on the marginal productivity can be disregarded.

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Employment in the informal sector determines the wage rate

$$(20) \quad Y'_r(L_r) = w_r$$

The firms in the formal sector decide on the parameters a and w_u and on L_u . From the latter's perspective they can be seen as choosing a level of employment to maximize $E\pi$ in (21)

$$(21) \quad E\pi = \int_a^\infty [Y_u(L_u)(1 + \theta) - w_u L_u] f(\theta) d\theta - \beta T L_u$$

The first order condition is

$$(22) \quad Y'_u(L_u) \int_a^\infty (1 + \theta) f(\theta) d\theta = [1 - F(a)] w_u + \beta T$$

In the earlier sections of the paper $Y'_u()$ was the constant y and level of employment--number of openings in each firm--was given.

The market equilibrium is closed with the full employment equation (19c). Given β , or q , the ratio of the wages in the sectors w_u/w_r can be solved from the inverse function β^{-1} for any level of the job security coefficient $1 - F(a)$. We shall not detail this procedure here.

The present model differs from Harris-Todaro's (1970) in that there workers are recruited to the formal sector from the pool of the unemployed, while here they are recruited from the informal sector and those who quit or are laid off return to work in that sector.

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Efficiency

By setting wages w_u which differ from w_r and hence from Y_r' , firms in the formal sector create inefficiency. This was already pointed out in a similar context by Stiglitz (1974) and is shown here for completion. Let a central planner maximize National Product, G in the following,

$$(23) \quad G = \int_a^\infty Y_u(L_u)(1+\theta)f(\theta)d\theta - \beta TL_u + Y_r(L_r)$$

subject to (19c). Assume that the planning instrument is the informal wage rate, w_r , which the planner sets. The employers then hire labor freely to equate $Y_r' = w_r$. The formal sector sets its labor policy and employment, as in a free market, according to eqs. (8a), (8b).

The planner does not take w_r as given and for the planning authority the quit function is

$$(24) \quad q = q(w_u/Y_r'(L_r), 1-F(a))$$

The recruiting function is, as before, $\beta = (1-q)^{-1}$.

The first order condition for labor distribution that maximizes G in (23) is

$$\begin{aligned} (25) \quad \int_a^\infty Y_u'(1+\theta)f(\theta)d\theta &= \frac{\beta_1 TL_u w_u Y_r''}{(Y_r')^2} + \beta T + Y_r' \\ &= w_u [1-F(a)] \left[\frac{L_u Y_r'' [1-F(a)]}{\beta_1 T} \right] + \beta T + w_r \end{aligned}$$

The second line in (24) is obtained by incorporating (8a)--the policy rule

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followed by the employers--and the equality $w_r = Y_r'$ in the first line.

The cost of labor as envisaged by the firms in the formal sector in a free market is, from (22), $[1-F(a)]w_u + \beta T$. The planning shadow price of labor is the right-hand-side of (24). The two are not equal and the inequality means that a free market solution is, in this case, inefficient. Employment in the free market can be either too high or too low, if, for example

$$L_u Y_r'' [1-F(a)] / (\beta_1 T)^{-1} > w_r - w_r [1-F(a)]^{-1}$$

the planning shadow price is higher than the free market calculated cost and the formal sector employs too much labor.

Of special relevance to developing countries is the surplus labor case. If the assumptions underlying this case prevail, $Y_r'' = 0$ and the planning, efficiency solution, shadow price of labor is $Y_r + \beta T = w_r + \beta T$. It will be higher than the free market calculated cost if in the formal sector $w_u(1-F(a)) < w_r$; and then the formal sector will employ too much labor. Otherwise, the share of the labor force in the formal sector is too small.

Future work

Job security ties resources in the economy, to some extent at least, and reduces their mobility. If economic conditions change, job security may be an obstacle to labor reallocation. But we have seen that as economic fluctuations intensify, job security is reduced. Is this reduction sufficient to eliminate the associated potential inefficiencies?

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FOOTNOTES

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1/ If unemployment and the possibility of moving between firms in the formal sector were not disregarded by assumption in the current analysis, the rate of unemployment, or the probability of being unemployed, and the expected earnings in the alternative firm would have also appeared as arguments in $q()$.

2/ The maximization in (7) is per worker who stays on the job after training and after the quitting stage. These workers can still be dismissed if realized θ is lower than the cut-off level.

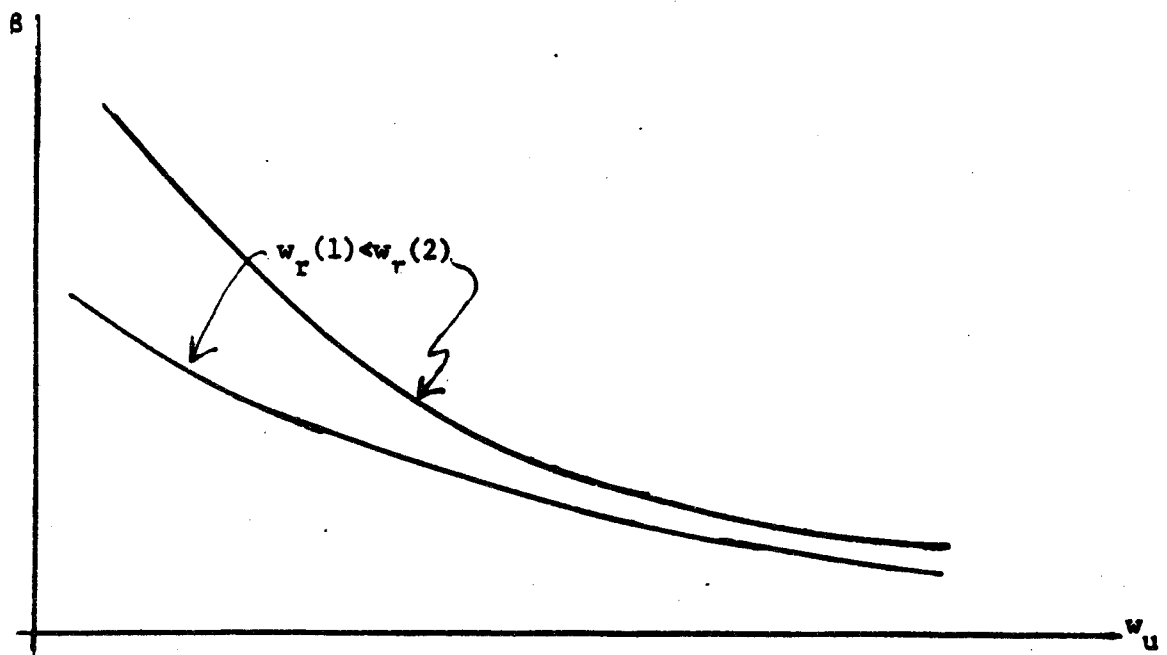


Figure 1 : The function $\beta()$.