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THE FAIR WAGE-EFFORT HYPOTHESIS AND UNEMPLOYMENT*

GEORGE A. AKERLOF AND JANET L. YELLEN

This paper introduces the fair wage-effort hypothesis and explores its implica-
tions. This hypothesis is motivated by equity theory in social psychology and social
exchange theory in sociology. According to the fair wage-effort hypothesis, workers
proportionately withdraw effort as their actual wage falls short of their fair wage.
Such behavior causes unemployment and is also consistent with observed cross-
section wage differentials and unemployment patterns.

I. INTRODUCTION

This paper explores the consequences of a hypothesis concern-
ing worker behavior, which we shall call the fair wage-effort
hypothesis.[1] According to this hypothesis, workers have a concep-
tion of a fair wage; insofar as the actual wage is less than the fair
wage, workers supply a corresponding fraction of normal effort. If e
denotes effort supplied, w the actual wage, and w^* the fair wage, the
fair wage-effort hypothesis says that

(1) $e = \min (w/w^*, 1)$,

where effort is denoted in units such that 1 is normal effort. This

    1. Akerlof and Yellen [1988] contains a summary of the results obtained in this
paper.

hypothesis explains the existence of unemployment. Unemployment occurs when the fair wage w^* exceeds the market-clearing wage.[2] With natural specifications of the determination of w^*, this hypothesis may explain why skill and unemployment are negatively correlated. In addition, it potentially explains wage differentials and labor market segmentation.[3]

The motivation for the fair wage-effort hypothesis is a simple observation concerning human behavior: when people do not get what they deserve, they try to get even. The next section will present five types of evidence for the fair wage-effort hypothesis. *First,* it will draw on psychology, where the fair wage-effort hypothesis corresponds to Adams' [1963] theory of equity. Numerous empirical studies have tested this theory. They are, on balance, strongly supportive. *Second,* in sociology the fair wage-effort hypothesis corresponds to the Blau-Homans [1955, 1961] theory of social exchange. Sociological studies, including studies of work situations, show that equity usually prevails in social exchange. *Third,* the fair wage-effort hypothesis accords with common sense. It appears frequently in literature; it is considered obvious by personnel textbooks; and it explains commonly observed taboos regarding discussion of wages and salaries. *Fourth,* the fair wage-effort hypothesis explains wage compression among individuals with different skills. *Fifth,* simple models of the fair wage-effort hypothesis potentially explain empirically observed unemployment-skill correlations; they also explain why unemployment has not fallen with the rise in education despite lower unemployment of more educated workers.

Having reviewed the evidence for the fair wage-effort hypothesis, Sections III and IV construct models using this hypothesis. These models differ in the determination of the fair wage w^*. In Section III w^* is exogenous. In Section IV w^* depends on *relative* wages as well as on market forces. These models provide efficiency wage explanations for unemployment. Yet they are not subject to the criticism that bonding schemes or complicated contracts will reduce or eliminate involuntary unemployment.[4] If such bonds are considered unfair, then they will not be optimal. In relations where fairness is important, grudges due to past events lead to potential

2. For evidence of discrepancies between lay theories of fair wages and market-clearing wages, see Kahneman, Knetsch, and Thaler [1986].
3. Levine [1990] has offered a similar explanation for these phenomena based on worker cohesiveness.
4. For reviews of this literature and the problems with efficiency wage models, see Akerlof and Yellen [1986], Katz [1986], Stiglitz [1987], and Yellen [1984].

future reprisals. In the existing literature this model most closely resembles Summers' [1988] relative wage-based efficiency wage theory. In Summers' model workers compare their own compensation with that of comparable groups in other firms; in our model, in contrast, workers compare their pay with that of coworkers in the same firm.

II. Motivation for the Fair Wage-Effort Hypothesis

A. *Equity Theory*

Adams [1963] hypothesized that in social exchange between two agents the ratio of the perceived value of the "inputs" to the perceived value of the "outcomes" would be equal. In a labor exchange the "input" of the employee is the perceived value of his labor, and the "outcome" is the perceived value of his remuneration. On the firm's side the input is the perceived value of the remuneration, and the outcome is the perceived value of the labor.

In the context of a wage contract, Adams' formula says that the perceived value of the labor input will equal the perceived value of the remuneration. This formula can be translated into economic notation to say that the number of units of effective labor input (denoted e for effort) times the perceived value of a unit of effective labor (denoted w^*) will equal the perceived value of remuneration (denoted w). In other words,

$$e = w/w^*.$$

We wish to emphasize that w^*, the perceived value of a unit of labor, will be the *fair* wage, and not the market-clearing wage.

According to psychologists, with both w and w^* fixed, workers who do not receive a fair wage for input of effort $e = 1$ may change *actual* effort e, or they may change their *perceived* effort. Similarly, they may change their perceived level of remuneration (by redefining the nonpecuniary terms of the job). In the theory below, we shall assume that when wages are underpaid workers adjust actual rather than perceived efforts or the perceived value of the nonpecuniary returns to the job.

Psychological experiments have mainly concentrated on discovering whether individuals who are *overpaid* will increase their effort input since psychologists consider this the surprising prediction of Adams' theory. They consider it obvious that agents who feel underrewarded will supply correspondingly *fewer* inputs [Walster, Walster, and Berscheid, 1977 p. 42]. As might be expected, overre-

ward experiments yield ambiguous results. It has been suggested (Walster, Walster, and Berscheid, 1977, p. 124] that this ambiguity occurs because it is less costly for overpaid agents to increase the psychological evaluation of their labor inputs than to increase actual input. These experimental results are consistent with the hypothesis that overpayment does not increase input, and thus that $e = 1$ for $w > w^*$.

While much less work has been done on underpaid subjects, several studies have obtained supportive results.[5] In one revealing study Lawler and O'Gara [1967] compared the performance of workers who were paid the "going" rate of 25 cents per interview with the performance of interviewers who were seriously underpaid at the rate of 10 cents per interview. The underpaid interviewers conducted far more interviews that were on average of significantly lower quality. Psychologically the lower paid interviewers also had reduced self-esteem—suggesting that workers adjust not only the amount of effort but also their perception of the quality of the labor input when equity is not realized.

In a clever experiment Pritchard, Dunnette, and Jorgenson [1972] hired men to work for a fictitious Manpower firm they realistically set up for their experiment. After the workers had been at work for three days, the firm announced a change in their method of pay. Subjects' earnings were variously adjusted upward or downward. Those subjects with downward adjustments expressed considerable job dissatisfaction on a questionnaire and also performed less well in their work after the change. In a similar experiment Valenzi and Andrews [1971] hired workers at $1.40 per hour, but then announced that, due to the budgetary process involving their grant from the National Institute of Mental Health, some workers would receive more than the stipulated $1.40, and some would receive less. Twenty-seven percent of those who were given the lower wage of $1.20 quit immediately—a result consistent with an upward sloping labor supply curve but also explained by the workers' anger at their unfair treatment.

In what is probably the most revealing experiment, Schmitt and Marwell [1972] gave workers a choice: whether to work cooperatively in pairs or to work alone. When pay was equal, workers chose to work in pairs. However, workers were willing to sacrifice significant earnings to work alone when the pay in pairs was unequal.

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5. Reviewers consider this implication of equity theory obvious; some experiments have yielded contradictions of the theory, but in all cases there are easy alternative explanations [Goodman and Friedman, 1971].

B. Relative Deprivation Theory

The economic consequences of the fair wage-effort hypothesis depend on how the fair wage is determined.[6] According to relative deprivation theory, peoples' conceptions of fairness are based on comparisons with salient others. Psychological theory, however, offers little guide as to which reference groups will be salient. There are three natural possibilities: individuals may compare themselves with others in similar occupations in the same firm, with those in dissimilar occupations in the same firm, or with individuals in other firms. In the model constructed in Section IV below, workers compare themselves with others in the same firm. If workers compare themselves with similar others who are "close substitutes," we find that equilibrium will be segregated and workers of different abilities will work in different firms. Labor is allocated inefficiently, but there is no unemployment. If workers, however, compare themselves with others who are "dissimilar" or "complements" in production, equilibrium is characterized by unemployment for low-skill workers or by dual labor markets with pay disparities for low-skill workers.

Although the behavioral consequences of relative deprivation have been hard to document (for natural reasons), there is very good evidence that relative deprivation generates feelings of dissatisfaction. (This corresponds exactly to the model proposed in Section IV.)

Martin [1981] has done an ingenious experiment in a near-field situation which shows that workers are likely to experience feelings of relative deprivation when there are unequal wages. Technicians at a factory were asked to imagine themselves in the position of a technician earning the average pay in a firm similar to their own. They were first asked which pay level—highest or lowest pay of technicians; highest, average, or lowest pay of supervisors—they would most like to know for comparison to their own wage. Most technicians wanted to know the pay of the highest level of technicians—which is consistent with our model that people work less hard if they are paid less than they deserve but not harder if they receive more than they deserve. Those people who receive less are of comparatively little interest (and therefore have little positive influence on work); whereas those people who are paid more are of considerable interest and, if the ratio is deemed inequitable, can have considerable negative impact.

6. Most experiments make an implicit assumption regarding the wage considered fair: either some stated wage, a previously received wage, or wages received by others.

The second part of Martin's experiment is of further impor-
tance for our model. After workers had made their comparison
choice, they were then given a pay plan and asked to rate it on the
basis of being dissatisfying, expected, or just. When the difference
in pay of the supervisors and technicians was large, the technicians
found the pay levels to be dissatisfying and unjust. This gives an
empirical basis for the assumption in Section IV that low paid
workers will feel relatively deprived when workers of other groups
receive high wages.

C. Social Exchange Theory

Sociologists, as well as psychologists, have developed a version
of equity theory. Blau's model of exchange [1955] hypothesizes that
there will be equivalent rewards net of costs on both sides of an
exchange. Blau's model was motivated by his empirical study [1955]
of the helping behavior of agents in a government bureaucracy. The
agents who did investigative work would consult with other agents
concerning difficult problems. Although consultation with other
agents, rather than with the supervisor, was against the official rules
of the agency, and its existence was denied by the supervisor, on
average, agents had five contacts with other agents per hour, most of
which were consultations. In this agency agents varied in expertise.
Blau noticed that agents of average expertise would consult agents
with the greatest expertise only infrequently. In contrast, agents of
equal ability consulted with each other frequently. This suggested a
puzzle to Blau: why did the average agents not ask for more help
from the experts? According to his explanation, the average agents
refrained from consulting the experts more because they found it
difficult to reciprocate. They were able to pay each expert with
gratitude and respect; but there were diminishing returns to the
experts from receiving gratitude. The exchanges between the
average agents and the experts, Blau concluded, were not carried
beyond the point where the two sides of the exchange were of equal
value.

Homans [1961] has proposed a similar theory, based on his own
observations, Blau's study, and on work on conformity by social
psychologists led by Festinger. The Blau-Homans theory is a
general theory of social exchange. Homans develops a key proposi-
tion regarding social exchange when the subjective equalities are
not met on the two sides of an exchange: "The more to a man's
disadvantage the rule of distributive justice fails of realization, the
more likely he is to display the emotional behavior we call anger"
[Homans, 1961, p. 75]. In simple English, if people do not get what

they think they deserve, they get angry. It is this simple proposition that underlies our model. Workers whose wage is less than the fair wage w^* will be angry. The consequence of this anger is to reduce their effective labor input below the level they would offer if fully satisfied. This relation is given the simple, natural, functional form $e = w/w^*$ for $w < w^*$.

D. Empirical Observations of Work Restriction in the Workplace

Sociologists have documented the existence of output restriction in the workplace. In his classic study of 1930 Mathewson [1969] records 223 instances of restriction in 105 establishments in 47 different locations. These observations were recorded from his work experiences as a participant observer, interviews with workers, and from the letters of six colleagues, who were also participant observers. According to Mathewson, "occasionally workers have an idea that they are worth more than management is willing to pay them. When they are not receiving the wage they think fair, they adjust their production to the pay received." This is an exact statement of the fair wage-effort hypothesis. The following, from the bulletin board of a machine shop, expresses the fair wage-effort hypothesis poetically:

> I am working with the feeling
> That the company is stealing
> Fifty pennies from my pocket every day;
> But for ever single pennie [sic]
> They will lose ten times as many
> By the speed that I'm producing, I dare say.
> For it makes one so disgusted
> That my speed shall be adjusted
> So that nevermore my brow will drip with sweat;
> When they're in an awful hurry
> Someone else can rush and worry
> Till an increase in my wages do I get.
>
> No malicious thoughts I harbor
> For the butcher or the barber
> Who get eighty cents an hour from the start.
> Nearly three years I've been working
> Like a fool, but now I'm shirking—
> When I get what's fair, I'll always do my part.
> Someone else can run their races
> Till I'm on an equal basis
> With the ones who learned the trade by mining coal.
> Though I can do the work, it's funny
> New men can get the money
> And I cannot get the same to save my soul [Mathewson, 1969, p. 127].

In the introduction to the reprinted edition of Mathewson, Donald Roy, a sociologist known for his own worker participant observations of restriction in a machine shop, relates a story from his own experience [1952]. A machine crew were discontent because of what they considered an unfair ratio between wages and profits. A laminating machine in this factory apparently had extremely odd performance: it would operate perfectly for a long time and then go mysteriously awry. Sheets of heavy paper in the process of lamination would suddenly tear and stick to the machine's rollers, necessitating difficult and sticky work to unwrap the material. The crew operating the machine was putting too much stress on it, causing the paper to tear and stick. Despite the necessity of cleaning the rollers (an unpleasant job relative to tending the working machine) they considered this operation worthwhile to redress their grievances [Roy, 1969, p. xxiv]. The preceding story illustrates that workers reduce their effective labor power if they feel they are getting less than they deserve. It also indicates that they may feel that they deserve a wage higher than that required to induce them to be physically present at their jobs; further, the remuneration of dissimilar agents—in this case the profit earners—enters their calculation of their fair wage.

Studies by Mathewson and Roy are examples of the work of the human relations school of organization. According to this school of thought, workers have considerable control over their own effort and output. This ability of workers to exercise control over their effort, and their willingness to do so in response to grievances, underlies the fair wage-effort hypothesis.

A recent report in *The New York Times* [Salpukas, 1987] concerns the problems generated by two-tier wage systems. Despite the considerable savings in labor costs, many of the companies that adopted such systems are now phasing them out due to the resentment of employees on the job as well as the high turnover generated by the low wages. These wage systems have "produced a resentful class of workers who in some cases are taking their hostility out on customers" [Salpukas, 1987, p. 1]:

"The attitude on the airplane can be a big problem," said Pat A. Gibbs, the head of the Association of Professional Flight Attendants, which represents the attendants at American [Airlines]. "You can tell that the anger is there." Robert L. Crandall, American's chairman and chief executive, acknowledged in a recent speech that quality of service has suffered because of the pressures that deregulation has brought to cut labor costs.

The lower-paid workers often do just what is required and no more, and sometimes refuse to help the higher-paid workers. . . . 'Having people work side by

side for different pay is difficult' said Mr. Olson of Giant Foods. About half of the supermarket chain's workers are in the lower pay tier [Salpukas, 1987, p. D22].

E. Literature, Jealousy, and Retribution

Jealousy and retribution, the relation between equity and performance, are not recent discoveries of psychologists and sociologists: they are part of everyone's experience. Literature offers many excellent examples, such as the story of Joseph [*Bible,* Genesis, 37–50]. Joseph's father, Jacob, loved him more than all his children and made him a coat of many colors. When Joseph's brothers saw that their father loved him most of all, they hated him. One day when Joseph was in the countryside they threw him into a pit, from which he was fortuitously rescued and sold into slavery. When Jacob heard of Joseph's presumed death, he wept inconsolably. This sad story of Jacob, Joseph, and his brothers is an example of management failure made worse by inequitable rewards.

F. Personnel Management Texts

Textbooks on personnel management regard the need for equitable treatment of workers as obvious. By way of illustration Dessler [1984, p. 223] writes:

The need for equity is perhaps the most important factor in determining pay rates. ... Externally, pay must compare favorably with those in other organizations or you'll find it hard to attract and retain qualified employees. *Pay rates must also be equitable internally in that each employee should view his or her pay as equitable given other employees' pay rates in the organization.* (Emphasis in last sentence added.)

Kochan and Barocci, who view equity as most important in "experts,' " opinions of compensation systems, quote approvingly from a War Labor Board project (by William H. Davis): "There is no single factor in the whole field of labor relations that does more to break down morale, create individual dissatisfaction, encourage absenteeism, increase labor turnover and hamper production than obviously unjust inequalities in the wage rates paid to different individuals in the same labor group within the same plant" [Kochan and Barocci, 1985, p. 249].

Carroll and Tosi [1977, p. 303] write: "Pay satisfaction is influenced by what an individual gets as compared to what he wants and considers fair. The fairness of pay (perceived equity of pay) is determined largely by an individual's comparison of himself and his pay to other reference persons and theirs [sic]."

G. Wage-Salary Secrecy

Most employees do not openly discuss their wages and salaries except with close friends. Organizations often have a policy of secrecy in regard to wages and salaries. These practices of silence and secrecy are evidence that others' pay is not a matter of indifference to most workers. Personnel textbooks recommend openness about compensation schedules (e.g., Henderson [1982], pp. 444–46) but also caution at the same time the need for an active program to explain wage and salary payments. The need for such a program is another indication of the common concern about others' pay.

Explaining the equity of a compensation system may not be easy. Most workers believe that remuneration should be according to performance (see Dyer, Schwab, and Theriault [1976] for a survey of managers which documents this belief). However, most workers view their own performance as superior. In four separate surveys taken by Meyer [1975], between 68 percent and 86 percent of workers considered their own performance in the top quartile. In the model of Section IV there is wage compression: wages have less dispersion than their market-clearing levels. Such low dispersion may be partly attributed to workers' positively biased estimation of their own performance: if pay accorded with performance, workers would view the scale as inequitable.

H. Wage Patterns

The models in Section IV predict wage patterns that are consistent with empirical findings. These findings constitute additional evidence in favor of our model.

Many studies have documented consistent wage differentials across industries. Slichter [1950] found a correlation between the wages of skilled and unskilled workers by industry. Dickens and Katz [1986], with a far more detailed classification of occupation than skilled and unskilled, find similar correlations across industries; those industries which have high wages for one occupation also have high wages for other occupations. Krueger and Summers [1988] find industry wage differentials in longitudinal regressions controlling for individual characteristics; this suggests that such differentials are not just due to unobserved differences in labor quality. When a given worker moves from one industry to another his or her wage tends to change according to the industry wage differentials. Krueger and Summers show that these industry wage differentials

also appear when adjustments have been made for the quality of employment, suggesting that differentials persist above and beyond what can be explained by compensating wage differentials. While no evidence will ever be totally definitive, since each individual has special characteristics and since each job has its own peculiar attributes, these findings clearly point to the existence of different wage scales across industries.

What explains the phenomenon of industry-wide wage differentials? The explanation offered in this paper is based on fair wages. If firms must pay a high wage to some groups of workers—perhaps because they are in short supply or perhaps to obtain high quality—demands for pay equity will raise the general wage scale for other labor in the firm, who would otherwise see their pay as unfair. Frank [1984] has also documented compression of wages relative to skills. Although he has another interpretation (due to status considerations), his data are consistent with the fair wage-effort hypothesis.

Lazear [1986] and Milgrom and Roberts [1987] have proposed interesting alternative explanations for wage compression. A wage scale with high dispersion gives employees incentives to withhold information from managers in order to increase their influence [Milgrom and Roberts] or to undermine the reputations of other workers [Lazear]. But fair wage-effort models offer better explanations for wage compression among occupations between which there is low mobility, as found by Slichter and Dickens and Katz. If a secretary has no expectation of becoming a manager, the Lazear–Milgrom-Roberts models would not predict compression of the manager-secretary wage differential.

The behavior of union-nonunion wage differentials is also consistent with the fair wage-effort hypothesis. According to Freeman and Medoff [1984], when plants are unionized, white-collar workers receive boosts in fringe benefits, although their wages do not increase significantly. In 1982 when General Motors negotiated wage concessions with its union employees and thereafter announced bonuses for its executives, the loss of morale amid the ensuing uproar forced a retraction of the proposed bonuses. GM and the UAW subsequently negotiated an "equality of sacrifice" agreement that required white-collar and blue-collar workers to share equally in reductions or increases in pay.[7]

7. See Freeman and Medoff [1984].

TABLE I
UNEMPLOYMENT AND SKILL

Unemployment rates by occupation, April 1987[a]	
Managerial and professional specialty	2.1
Technical, sales, and administrative support	4.3
Service occupations	7.6
Precision production, craft, and repair	6.5
Operators, fabricators, and laborers	9.8
Unemployment rates by education, 1985[b]	
Less than 5 years	11.3
5 to 8 years	13.0
1 to 3 years of high school	15.9
4 years of high school	8.0
1 to 3 years of college	5.1
4 years or more of college	2.6

a. *Source.* U. S. Department of Labor, *Employment and Earnings,* 34 (May 1987), p. 21, Table A-12.
b. *Source.* Summers [1986], Table 4, p. 350.

I. *Patterns of Unemployment*

As a general rule, unemployment is lower for occupations with higher pay and for workers with greater education and skill. These facts are illustrated in Table I.[8] Most efficiency wage models offer no natural explanation for these unemployment-skill correlations. Skilled work is probably more difficult to monitor than unskilled work. Worker-discipline models (in the style of Bowles [1985], Foster and Wan [1984], Shapiro and Stiglitz [1984], and Stoft [1982]) would thus predict higher unemployment for skilled than for unskilled labor, unless shirking yields significantly greater utility to unskilled than to skilled workers. In contrast, the fair wage-effort model provides a potential explanation of these correlations.

III. A RUDIMENTARY MODEL OF UNEMPLOYMENT WITH THE FAIR WAGE-EFFORT HYPOTHESIS

A. *The Model*

This section presents the simplest model of unemployment embodying the fair wage-effort hypothesis. It is assumed that there is a single class of labor with an exogenously determined fair wage

8. Also see Reder [1964].

w^*. The assumption that the fair wage is exogenous will be relaxed in Section IV. The effort e of a given type of labor, according to the fair wage-effort hypothesis, is (equation (1), repeated here):

(1) $e = \min (w/w^*, 1)$,

where w is the wage paid and w^* is the exogenously determined fair wage. If the worker receives more than the fair wage, he contributes full effort of 1. If the worker receives less than the fair wage, he reduces effort proportionately (to maintain the balance between inputs and outcomes).

There are a large number of identical firms, so that the product market is perfectly competitive. The production function is of the form

(2) $Q = \alpha e L$,

where Q is output, e is average effort of laborers hired, and L is the labor hired.

Finally, there is a fixed supply of labor, $\overline{L}$, which will work independent of the wage rate.

B. Equilibrium

In the competitive equilibrium of this model, the unemployment rate is either unity, with no labor hired, if α is less than w^*, or zero, with all labor hired at the wage α, if α exceeds w^*. This occurs because, under the fair wage-effort hypothesis, the marginal cost to the firm of a unit of effective labor is at least as large as w^*, whereas the marginal product of a unit of effective labor is α.

The quantity of effective labor input is the product of e, the average effort of the workforce, and L, the number of workers hired. From the production function, the marginal product of a unit of effective labor is a constant, α. The marginal cost of a unit of effective labor to the firm is w/e—the wage per unit of effort. According to the fair wage-effort hypothesis, (1), this marginal cost is w^* for all wages less than or equal to w^*, and w for wages in excess of w^*. The firm's demand for labor depends on the relationship between the marginal cost and marginal product of effective labor. There are two cases.

Case I: $\alpha < w^*$. If $\alpha < w^*$, the marginal cost of effective labor is at least as large as w^*, regardless of the wage paid by the firm. Since the marginal cost of effective labor exceeds its marginal product, the firm cannot operate profitably. In this case, the demand for labor is zero, and the unemployment rate is unity.

Case II: $\alpha > w^*$. If the aggregate supply of labor exceeds the

aggregate demand for labor so that there is unemployment, the firm is free to set its wage at any level. It will choose the wage that minimizes w/e, the marginal cost of effective labor.[9] If the firm chooses to pay any wage between zero and w^*, the marginal cost of effective labor is w^*. Since the marginal cost of effective labor is lower than labor's marginal product, α, every firm should hire an infinite amount of labor, resulting in aggregate excess demand for labor. Under these circumstances, competition for workers will force firms to pay wages in excess of w^*. The demand for labor will also be infinite for any wage between w^* and α, since the marginal product of a unit of effective labor continues to exceed its marginal cost. In contrast, if the wage paid exceeds α, marginal cost exceeds the marginal product of effective labor, and the demand for labor is zero. Since the demand for labor is infinitely elastic at the wage $w = \alpha$, equilibrium is characterized by full employment with all firms paying the "market-clearing" wage, $w = \alpha$.

C. Discussion

This rudimentary model describes an equilibrium in which employment and the distribution of income are partially determined by the usual economic fundamentals of tastes, technology, and endowments. But in the unemployment case, conceptions of fairness, embodied in the parameter w^*, also affect the equilibrium. In a trivial sense w^* could be said to reflect tastes; insofar as $w < w^*$, workers prefer to provide proportionately lower effort; but this is not the conventional use of the word tastes. We have assumed that workers reduce effort, not because they are better off doing so in any objective sense, but rather because they are mad. People who are mad (in the American use of the term as well as in the English use of the term) are likely to engage in acts that do not maximize their utility.

Because the model is so very simple and completely linear, the unemployment rate is either zero or one. There are many natural remedies for this. If the production function has diminishing returns, the equilibrium unemployment rate could lie between zero and one. If there are different classes of labor, each with its own value of α and w^*, those laborers with $\alpha > w^*$ will be employed, and those with $\alpha < w^*$ will be unemployed. For each class of labor the unemployment rate would be zero or one, but the aggregate

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9. According to the fair wage-effort hypothesis, this wage is not unique. Any wage between zero and w^* results in the same effective cost of labor—w^*. Later, we shall assume that in cases of indifference, the firm chooses to pay the fair wage, w^*.

unemployment rate would lie between zero and one. If w^* depends monotonically on the unemployment rate, with $w^*(0)$ being infinity and w^* (1) being zero, there will also be an equilibrium unemployment rate between zero and one. Such a dependence makes sense. At high unemployment rates people may be grateful to be employed so they consider the fair wage low; at low unemployment rates they are unlikely to consider themselves lucky to be employed, and so the fair wage may be high.

Many assumptions in the preceding model call for generalization. For example, w^* should be endogenized. w^* may depend on the wages of other workers who are salient in the worker's life, the profits accruing to the firm's owners,[10] or the worker's past wage history. The production function may be nonlinear; labor of different types may be complements or substitutes; and effort may not enter the production function multiplicatively. The next section explores the consequences of several such complications.

IV. A RELATIVE DEPRIVATION MODEL OF THE FAIR WAGE

This section develops a model with two labor groups, both of which behave according to the fair wage-effort hypothesis. Various outcomes are possible. In one type of equilibrium all firms hire both kinds of labor. In this case, the group with the lower wage experiences some unemployment, while the group with the higher wage rate is fully employed. Thus, skill, as endogenously defined by earnings, and unemployment are negatively correlated. Equilibria are also possible in which there is a primary and a secondary labor market. Low-skill workers in such an equilibrium experience no unemployment, but there is a wage differential between jobs in the two sectors, and primary sector jobs are rationed. Although not explicitly modeled, wait unemployment could naturally occur. Finally, equilibria also occur in which the two types of labor do not work together. Such equilibria are inefficient.[11]

A. Assumptions

The key behavioral assumptions concern *endowments, tastes, technology,* and *fairness.*

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10. The introduction of profits as a determinant of the fair wage explains the finding of Dickens and Katz [1987] and Krueger and Summers [1987] that industry wage premiums are correlated with industry concentration and profitability. It also provides an additional reason, based on fairness, why the premiums paid to different occupations within an industry are positively correlated.

11. Romer [1984] has considered a model with heterogeneous productivities and a common just wage and has reached similar conclusions.

Endowments. The total supply of labor of types 1 and 2 are $\bar{L}_1$ and $\bar{L}_2$, respectively.

Tastes. Each worker supplies his or her total labor endowment to the market.

Technology and Market Structure. There are a fixed number of identical, perfectly competitive firms. Each firm has a neoclassical production function F, which is adequately approximated by a quadratic form in the effective labor power of the two types of labor:

$$(3) \quad F = A_0 + A_1(e_1 L_1) + A_2(e_2 L_2) - A_{11}(e_1 L_1)^2$$

$$+ A_{12}(e_1 L_1)(e_2 L_2) - A_{22}(e_2 L_2)^2,$$

where L_1 and L_2 are the labor inputs of types 1 and 2 and e_1 and e_2 are their respective levels of effort.[12]

Fairness. The key assumptions of the model concern fairness. In this regard there are three assumptions. The first is the fair wage-effort hypothesis. The second defines the fair wage in a natural way. And the third says that in cases of indifference to profits firms choose to pay fair wages.

(i) *The fair wage-effort hypothesis.* According to the fair wage-effort hypothesis,

$$(4) \qquad\qquad e_1 = \min\,(w_1/w^*_1, 1);$$

$$(5) \qquad\qquad e_2 = \min\,(w_2/w^*_2, 1).$$

(ii) *Fair wages: determination of w^*.* In the introductory section we motivated the idea of the reference wage. We shall assume here that one determinant of the fair wage w^* is the wage received by other members of the same firm. Thus, the fair wage of group 2 depends on the wages received by group 1, and symmetrically, the fair wage of group 1 depends on the wages received by group 2.

We also assume that market conditions influence fair wages. Workers in low demand, all else equal, view their fair wage as lower than workers in high demand. While the study of lay theories of fairness by Kahneman, Knetsch, and Thaler [1986] shows that people's views of fairness do not correspond exactly to market clearing, it clearly reveals that market forces have some impact on the prices and wages that people consider fair. Accordingly, we shall

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12. We assume that A_1, A_2, A_{11}, and A_{22} are positive. A_{12} may be positive, in which case the two labor types are termed complements, or A_{12} may be negative, in which case the labor types are termed substitutes.

here assume that a second determinant of w^* is the market-clearing wage.

Combining the two arguments, we posit that the fair wage w^* of a group is a weighted average of the wage received by the reference group and the market-clearing wage.[13] Accordingly, we write

$$(6) \qquad w_1^* = \beta w_2 + (1 - \beta)w_1^c$$

$$(7) \qquad w_2^* = \beta w_1 + (1 - \beta)w_2^c,$$

where w_1^c and w_2^c are the "market-clearing wages" of groups 1 and 2, respectively.

We define the market-clearing wages, w_1^c and w_2^c, as those wages that would clear the market for labor of a given type in a simple neoclassical economy where workers exert full effort regardless of the wage they are paid. Fixing $e_1 = e_2 = 1$, the quadratic production function (3) yields labor demand functions of the simple form,[14]

$$(8) \qquad L_1 = a_1 - b_1 w_1 + c_1 w_2$$

$$(9) \qquad L_2 = a_2 + b_2 w_1 - c_2 w_2.$$

We assume that "own" wage effects are stronger than "cross" wage effects so that $b_1 > c_1$ and $c_2 > b_2$.[15]

The *Marshallian* definition of the market-clearing wage would be

$$(10) \qquad w_1^c = w_1 - (\overline{L}_1 - L_1)/b_1;$$

$$(11) \qquad w_2^c = w_2 - (\overline{L}_2 - L_2)/c_2.$$

The Marshallian market-clearing wage is that wage which, with the other wage held constant, is just enough lower to induce the hiring of the total labor supply of $\overline{L}_1$ or $\overline{L}_2$, respectively.[16] In contrast, we

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13. Alternatively, we could assume that the fair wage depends inversely on the unemployment rate of the group. This assumption yields similar results.

14. In terms of the parameters of the production function F:

$$a_1 = (A_2 A_{12} + 2A_1 A_{22})/\blacktriangle; \quad b_1 = (2A_{22})/\blacktriangle; \quad c_1 = -A_{12}/\blacktriangle;$$

$$a_2 = (A_1 A_{12} + 2A_2 A_{11})/\blacktriangle; \quad b_2 = -A_{12}/\blacktriangle; \quad c_2 = (2A_{11})/\blacktriangle,$$

where $\blacktriangle = 4A_{11}A_{22} - A_{12}^2 > 0$.

15. In terms of the production function, this means that $2A_{22} + A_{12} > 0$ and $2A_{11} + A_{12} > 0$.

16. The reader may wish to note that payment of such a wage while keeping the other wage fixed implies disequilibrium in the other labor market. The Walrasian equilibrium concept of jointly market-clearing wages produces similar results.

define the *Walrasian* market-clearing wages as those that *jointly* clear both markets.[17]

In summary, the fair wages of types 1 and 2 labor are weighted averages of the wages of the other labor group and its respective Marshallian market-clearing wage ((6) and (7)).

(iii) *Fair Wages Paid When Indifferent.* Finally, we assume that firms have some small preference for paying fair wages. As a result, when their profits are unaffected by payment of fair wages, they prefer to do so.

This model possesses three classes of equilibria. In one type of equilibrium, which is emphasized in the discussion below, all firms hire both types of workers, and some "low-pay" workers are unemployed. We call this the *integrated* equilibrium, since both types of labor work for all firms. In addition, *segregated* equilibria may occur. In *partially segregated* equilibrium some firms hire only low-pay workers, while other firms hire labor of both types. Such an equilibrium has no unemployment, but there are wage differentials for low-pay labor between primary sector (integrated) firms and secondary sector (segregated) firms. In an augmented model such pay differentials could result in "wait" unemployment as workers queue for the better paying jobs. In *fully segregated* equilibrium some firms hire only low-pay workers, while other firms hire only high-pay workers. Both classes of workers are fully employed. Each of these equilibria will be described in turn.

B. Integrated Equilibria

An integrated equilibrium in this model is characterized by some unemployment for "low-pay" workers and full employment for "high-pay" workers. "Low- (high-) pay" workers are endogenously defined as the labor group that receives lower (higher) pay in equilibrium. Low-pay workers receive their fair wage, which is in excess of market clearing. Their employment is determined by firms' demand at this wage. In contrast, "high-pay" workers receive their market-clearing wage, which is in excess of their fair wage.[18] The structure of pay in equilibrium exhibits wage compression due

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17. These wages satisfy the two demand conditions, equations (8) and (9), with $L_1 = \bar{L}_1$ and $L_2 = \bar{L}_2$.

18. This assumes that the parameters of the model are such that the Walrasian "market-clearing" wages of the two groups differ. In the singular case in which the Walrasian wages of the two groups are identical, there is no unemployment. In this special case equilibrium coincides exactly with the Walrasian equilibrium without considerations of fairness.

to considerations of fairness; the higher is β, the lower is the wage differential. Integrated equilibria are likely to occur when there is significant complementarity in production between high- and low-pay workers. This characterization of the equilibrium is straightforward to justify.

First, *there cannot be an equilibrium in which both groups are fully employed and work at full effort* (except in the razor's edge case in which the Walrasian market-clearing wages of both groups are identical). In such an equilibrium both labor groups would receive wages equal to their respective full employment marginal products.[19] Such an equilibrium cannot prevail, however, because workers with lower pay would consider their wage unfair; as a consequence, these workers would reduce effort below the normal level ($e = 1$). Such a reduction in effort raises the marginal cost of effective labor; in equilibrium, "low-pay" workers experience unemployment because the marginal cost of effective labor of this type exceeds their marginal product.

Second, *equilibrium cannot be characterized by unemployment for the more highly paid group.* Suppose that the more highly paid group experiences unemployment. The firm could unambiguously profit from cutting the wage of these workers. Since workers consider it fair to receive lower pay than the other labor group if they are unemployed, the more highly paid workers must be earning a wage in excess of their fair wage. This group accordingly works at full effort ($e = 1$), and the marginal cost of effective labor services (w/e) for this labor type is equal to the wage w. Now consider the consequences of a cut in the pay of this group. The marginal cost of effective labor (w/e) for this group declines. In addition, this wage cut lowers the pay that the other labor group deems fair, potentially raising the effort that these "coworkers" supply, and lowering the marginal cost of *their* services to the firm as well.

Third, *the "low wage" group is paid its fair wage in equilibrium.* Since low-wage workers experience unemployment, firms can set their wage to minimize the effective cost of their labor services. This is the appropriate objective for profit-maximizing firms because the wage that is paid to low-wage workers has no spillover effect on the marginal cost of effective labor services of high-wage

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19. With all workers operating at full effort, the firm's demand for labor would be determined by the labor demand functions (8) and (9). The equilibrium wage rates would be determined by the "market-clearing" condition that the demand and supply be equal for labor of each type.

workers. High-wage workers are paid in excess of their fair wage and work at full effort. The marginal cost of "high-wage" labor services is thus equal to the (high) wage irrespective of the wage paid to low-wage workers. The cost of an effective unit of labor from the "low-wage" group is $w^* = w/e$ if the firm pays any wage between zero and w^* and w if the firm pays in excess of w^*. The "cost-minimizing" wage is nonunique, with the firm's minimum cost of effective labor for the "low-wage" group being w^*. It can achieve minimum cost per effective labor unit by paying any wage between zero and w^*. We have assumed that when profits are unaffected by the firm's wage choice, it will prefer to pay the fair wage. If this assumption is relaxed, there can be "work sharing" equilibria in which a larger number of workers receive less than fair wages and work at less than full efficiency. The equilibrium utilization of "effective" labor services from "low-wage" workers will, however, be identical whether firms pay fair or unfair wages. There could also be equilibria in which different firms pay different wages between zero and w^* to "low-wage" workers.

Fourth, *the "high-wage" group is paid its market-clearing wage in equilibrium.* One might imagine that considerations of fairness could lead to equilibria with shortages of skilled labor, with such "high-wage" workers receiving less than the market-clearing wage; however, such equilibria are not possible in our model due to the assumption of perfectly competitive labor markets. In a situation of skilled labor shortage, any individual firm unable to hire its desired level of skilled labor could raise profits by paying an infinitesimally higher wage than its competitors. Such an increase in wages, however small, would allow this firm to hire as much skilled labor as it wished, thereby increasing profits noninfinitesimally. Profits would increase even if higher wages paid to skilled workers necessitate raising the pay of low-skill workers to maintain fairness.

In order to compute the wages of high and low paid workers and the unemployment rate of low paid workers in equilibrium, it is necessary to identify the "high-pay" group. It follows from the propositions above that the "high-pay" or "skilled" group is the group that would receive higher pay in the corresponding Walrasian equilibrium without fairness effects on efficiency. In the discussion that follows we assume that group 1 is the "high-wage" *skilled* group and group 2 the "low-wage" *unskilled* group. The equilibrium values of w_1 and w_2 and the aggregate employment of the
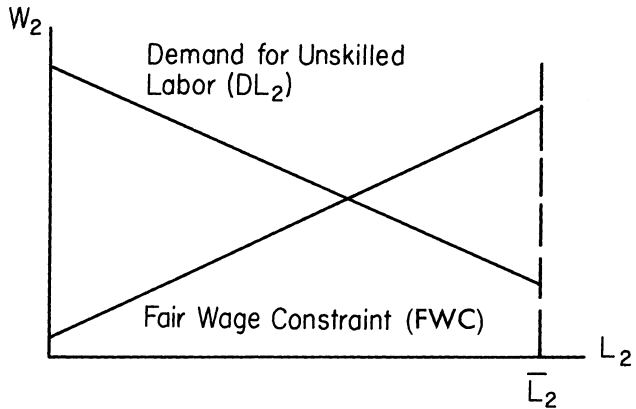
FIGURE I

unskilled labor group 2 are determined by three equilibrium conditions:

(12a) $\qquad w_2 = w_2^* = w_1 - ((1 - \beta)/\beta c_2)(\overline{L}_2 - L_2)$

(12b) $\qquad L_2 = a_2 + b_2 w_1 - c_2 w_2$

(12c) $\qquad w_1 = ((a_1 - \overline{L}_1)/b_1) + (c_1 w_2/b_1).$

According to (12a), the wage of unskilled workers is their fair wage as defined by (7) and (11). For the profit-maximizing firm, workers should be hired to the point where the marginal product of effective labor is equal to its marginal cost. Accordingly, (12b) gives the demand for unskilled workers. Since these workers work at full effort, this is given by the labor demand function (9).[20] Similarly, equation (8) describes the demand for skilled workers. Equation (12c) shows the equilibrium wage of skilled workers, w_1, which equates the demand for these workers, given by (8), with their supply.

The equilibrium is portrayed graphically in Figure I. The downward sloping line in Figure I shows how the demand for unskilled labor, given by (12b), varies as w_2 changes, when w_1 adjusts endogenously according to (12c) to maintain full employ-

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20. We ignore the possibility that (12b) may not be satisfied with equality for any positive value of L_2, in which case there is a corner solution with $L_2 = 0$.

ment for skilled labor. That is, this "labor demand" schedule is a
partial "reduced form" of (12b) and (12c). The upward sloping line
in Figure I is the "fair wage constraint" or "labor supply" schedule
for unskilled labor. This curve is analogous to the "no shirking
constraint" described by Shapiro and Stiglitz [1984]. It shows how
the fair (= actual) wage of unskilled workers varies as their
employment changes when w_1 again adjusts endogenously accord-
ing to (12c) to maintain full employment for skilled labor. The "fair
wage constraint" is a partial reduced form of (12a) and (12c) and is
upward sloping because unskilled workers deem it fair to earn more
as their employment rate rises or their unemployment rate falls.
The slope of this constraint depends critically on β, which is the
weight that workers attach to peer comparisons as opposed to
market-clearing wages in determining fair wage norms. In the
extreme case in which $\beta = 1$, the fair wage constraint is horizontal,
and the fair (= actual) wage paid to unskilled workers is equal to w_1
and independent of the unskilled unemployment rate. In contrast,
if $\beta = 0$, so that workers deem it fair to earn the market-clearing
wage, the fair wage constraint is vertical at $\overline{L}_2$.

C. Comparative Statics: Labor Supply and Productivity Shocks

The system—(12a), (12b), and (12c)—generates predictions
concerning the comparative static effects of labor supply and
productivity shocks on wages and unemployment. We characterize
a productivity shock by a uniform shift in the marginal productivity
of type 1 or 2 labor, parameterized as a change in A_1 or A_2 in the
production function (3). The complete comparative statics of the
model are summarized in Table II. The most interesting results
concern the impact of various shocks on unskilled unemployment.
Movements in unskilled unemployment in this model hinge on the
shock's impact on the Walrasian equilibrium differential between
skilled and unskilled wages. Shocks that raise the Walrasian wage
differential are "resisted" by unskilled workers and thus cause
higher unemployment, while shocks that reduce the Walrasian
differential between skilled and unskilled wages permit unskilled
unemployment to fall.

An increase in the supply of skilled labor *unambiguously*
lowers the unemployment of unskilled workers because it reduces
the Walrasian wage differential between skilled and unskilled
wages. Unskilled employment rises even in the case where skilled
and unskilled labor are substitutes; in this instance, the increase in
skilled labor supply produces a downward shift in the demand for

TABLE II

COMPARATATIVE STATIC EFFECTS OF LABOR SUPPLY AND PRODUCTIVITY SHOCKS

	Effect on:		
Change in:	w_1	w_2	L_2
$\bar{L}_1$	< 0	$\gtreqless 0$ if $\left[1 + \dfrac{b_2(1 - \beta)}{c_2\beta}\right] \gtreqless 0$	> 0
$\bar{L}_2$	$\gtreqless 0$ if $A_{12} \gtreqless 0$	< 0	$0 < \dfrac{dL_2}{d\bar{L}_2} < 1$
$\bar{A}_1$	> 0	> 0	< 0
$\bar{A}_2$	$\gtreqless 0$ if $A_{12} \gtreqless 0$	$\gtreqless 0$ if $\dfrac{(1 - \beta)}{\beta c_2}$ $\times (b_1 c_2 - b_2 c_1) - c_1 \gtreqless 0$	> 0
$\bar{A}_1$ and $\bar{A}_2$ $(d\bar{A}_1 = d\bar{A}_2)$	> 0	> 0	0

unskilled labor, as depicted in Figure II. Nevertheless, the employment of unskilled workers rises because the "fair wage constraint" shifts down by even more. The wage deemed fair by unskilled workers falls by an amount that is equal to the wage cut suffered by skilled workers.

As might be expected, an increase in the supply of unskilled labor leads to an increase in unskilled unemployment. Graphically, this shock shifts the fair wage constraint to the right by the amount
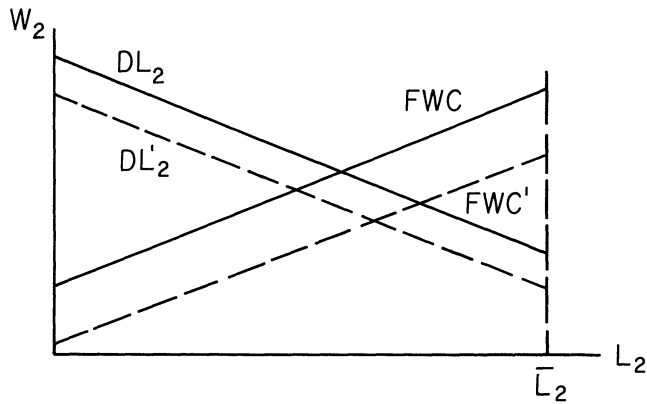

FIGURE II

of the increase in unskilled labor. An increase in the size of a labor force group is commonly believed to result in increases in the unemployment rate of that group. Our model is thus consistent with the observation that the unemployment of teen-agers and highly educated people has increased as these groups have increased their share of the labor force.

A simple way of parameterizing productivity shocks is by a uniform shift in the respective marginal products of the two types of labor. In terms of the production function (3), this corresponds to changes in A_1 and A_2, respectively.[21] Such an increase in the productivity of skilled labor raises the Walrasian wage differential: the Walrasian equilibrium wage of skilled labor rises, and the Walrasian equilibrium wage of unskilled workers remains unchanged. The consequence is an increase in unemployment of unskilled workers who "resist" any widening of the wage differential. Graphically, this shock leaves the demand for unskilled workers unchanged but shifts the fair wage constraint up; unskilled workers consider it fair to receive higher wages when skilled workers receive pay hikes. According to this model, productivity increases of skilled workers produce an uneven pattern of gains. Both skilled and unskilled workers achieve wage gains; but unskilled workers experience an increase in unemployment.

An increase in the productivity of unskilled labor (an increase in A_2) lowers the Walrasian differential between skilled and unskilled wages, and causes an unambiguous reduction in unskilled unemployment.

The model can also be used to analyze the impact of a simultaneous increase in the productivity of skilled and unskilled labor, as might occur if education levels rise across the board. While increases in A_2 lead to a reduction in unskilled unemployment, increases in A_1 have the opposite effect. Our model provides one possible explanation of why unemployment rates in the United States have not fallen in the face of a general increase in education. Summers [1986, p. 348] has calculated that with constant education-specific unemployment rates, increases in education between 1965 and 1985 should have caused a 2.1 percent reduction in unemployment. In our model, as people upgrade their own skill through increased education, they decrease their own probability of unem-

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21. Other possible parameterizations of productivity shocks, such as labor-augmenting neutral changes that alter the effective labor power of a given labor type in the production function (3), lead to less clearcut results.

ployment but increase the probability of unemployment of those with less skill. An across-the-board increase in education consequently may not decrease aggregate unemployment. Indeed, in our model an equal increase in the productivity of skilled and unskilled labor leaves unemployment absolutely unchanged.

The discussion above assumes that the equilibrium of the system is symmetric and integrated, with all firms behaving identically and hiring both types of labor. Asymmetric equilibria are also possible, however, in which firms pursue different hiring strategies but earn identical profits. The system consisting of equations (12a), (12b, and (12c), describes an equilibrium only if two further conditions are satisfied. First, no firm can profitably switch from hiring both types of labor to hiring only low paid labor. Second, firms that hire high-pay workers must also find it optimal to hire some low-pay workers. If the first condition is violated, equilibrium, if it exists, will be asymmetric and segregated: some firms will hire *only* low-pay workers. Two types of segregated equilibria—partially and fully segregated—are possible. We shall discuss these in turn.

D. Partially Segregated Equilibria

Partially segregated equilibrium may occur because, even if the three key equilibrium conditions in equation (12) are satisfied, a firm adopting a "deviant" strategy may earn higher profits. Deviant firms would take advantage of the availability of low-pay, unemployed labor who are willing to work at their reservation wage. In our model, with a vertical labor supply schedule, this wage is zero. Deviant firms hiring only low-pay workers need not be concerned with fairness. The condition under which such deviation is profitable is conceptually simple: starting from a potential equilibrium satisfying (12), a firm hiring only low-pay labor at a zero wage must make greater profit than the firm that hires both types of labor at the fair wage equilibrium. The condition for profitable deviation can easily be described in terms of producer surplus: if the surplus achieved by a firm hiring both types of labor at the integrated equilibrium exceeds the surplus of a firm hiring only low-pay workers at their reservation wage, then no deviation is profitable. A deviant strategy will *not* be profitable if high- and low-pay labor are sufficiently complementary in production. A deviant strategy will *always* be profitable if the two types of labor are perfect substitutes in production.

If deviation is profitable, then exit by deviants would occur. As deviant firms are established, unemployment of low-pay workers is

eliminated, and the wage of low-pay workers in segregated firms is bid up to the point where segregated and integrated firms earn identical profits. A partially segregated equilibrium, provided that it exists, has the following properties: high-pay workers are fully employed at integrated firms; low-pay workers are fully employed but divided between integrated and segregated firms; integrated and segregated firms earn identical profits; "low-pay" workers earn more at integrated than at segregated firms. The equilibrium corresponds to standard descriptions of the dual labor market; jobs for "low-skill" workers occur in both a primary and secondary sector. Good jobs for low-skill workers in the primary sector are rationed. If pay disparities cause "wait" unemployment as workers queue for jobs in the primary sector[22] (a simple modification of our model), then the partially segregated equilibrium would also exhibit unemployment.

E. Fully Segregated Equilibria

The profitable entry of deviant firms, which destroys the potential equilibrium satisfying (12), may lead to an interesting "corner" solution. The fair wage of low-skill workers depends inversely on their unemployment. As deviant firms hire low-pay workers, their unemployment falls, and the fair wage rises.[23] In consequence, integrated firms will reduce their employment of low-pay workers. This process may lead to equilibrium at a corner in which firms with high-pay labor are unwilling to hire *any* low-pay workers at their fair wage. If the two types of labor are perfect substitutes in production, only fully segregated equilibria can occur. Firms hiring high-pay workers are unwilling to hire any low-pay workers, since the marginal product of the first unit of low-pay labor at such firms is less than the fair wage of low-pay workers. Firms hiring low-pay workers are similarly unwilling to hire any high-pay workers. In the absence of integration in the workplace, low-pay workers work at full effort since considerations of fairness do not apply. The introduction of any high-pay workers into a segregated low-pay workplace potentially causes a significant reduction in effort by the low-pay workforce as considerations of fairness become relevant to their effort on the job.

The fully segregated equilibrium has full employment of both

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22. See, for example, Hall [1975].
23. In a more complicated model the fair wage would also depend on the wage differential between the two sectors.

types of labor with no wage differentials, full effort, and market-clearing wages for each group of labor. Still, fairness significantly affects the allocation of resources and efficiency in production, except in the limiting case in which both types of labor are perfect substitutes. In a fully segregated equilibrium considerations of fairness prevent firms from combining labor in the production process, even though it is almost always efficient to do so.

VI. CONCLUSION

This paper has presented a theory whereby effort depends on the relation between fair and actual wages. This framework easily generates involuntary unemployment and rationalizes wage compression. The theory conforms to common sense, and also to sociological and psychological theory and observation.

Like all real efficiency wage models, the equilibrium of our model exhibits neutrality: if all exogenous nominal variables change proportionately, then all endogenous nominal variables also change in proportion; and real variables such as the unemployment rate remain unchanged. As a consequence, this model might be regarded as irrelevant to an explanation of cyclical fluctuations in unemployment. Plausibly, however, the level of nominal wages perceived to be fair does not rapidly change in proportion to shifts in nominal aggregate demand. In this instance, our model predicts that aggregate demand shocks will produce cyclical variations in unemployment, thus yielding demand-generated business cycles.

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