WHY DO FIRMS PREFER MORE ABLE WORKERS?*

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October 1992

ABSTRACT

This paper proposes an explanation of the compression of compensation relative to marginal products within firms and argues that this compression is an important feature of labor markets. The key element of the proposed explanation is that workers' perceptions of fairness, and their productivities, depend to a large extent not on their compensations relative to their contributions, but simply on their compensations relative to other workers'. With this assumption — which is supported by a wide range of evidence — compression of wages relative to marginal products can raise productivity. This phenomenon accounts for firms' preferences for higher-ability workers, wage secrecy, the firm size-wage effect, and many features of inter-industry and inter-firm wage differentials.

* I am grateful to George Akerlof, Laurence Ball, and Christina Romer for helpful comments, and to the National Science Foundation and the Sloan Foundation for financial support.

I. INTRODUCTION

In most markets, prices rise with general quality so that buyers have optimal levels of quality. In the automobile market, for example, a typical buyer identifies some target level or range of general quality and then searches for cars within that general category whose particular features most appeal to him or her. The cost of a car rises essentially one-for-one with its general quality, and thus there is no reason to expect the highest quality cars to generate the most surplus for the buyer; rather, large surplus is generated when a buyer is able to find a car that fits his or her particular needs and tastes well.

This account does not appear to describe what occurs in the labor market. Consider a firm that is attempting to fill a position. There will generally be a variety of applicants, and they will typically differ in terms of observable characteristics that are relevant to likely performance on the job — education, experience, punctuality, articulateness, and so on. In most circumstances, the firm does not have some target level of ability; rather, faced with a variety of applicants who are interested in the position, it offers the position to the most able. Equivalently, typically the workers that a firm would least like to lose are its most able. Personnel management texts and hiring and interviewing guides, for example, simply take it as given that the goal of the hiring process is to find the most talented possible worker.[1] Although applicants are occasionally rejected because they are "overqualified," such cases attract attention precisely because they are unusual; if firms had target levels of ability or were unconcerned with workers' general abilities, rejection of applicants for being overqualified would be no more noteworthy than rejection for being underqualified.

This commonplace fact is inconsistent with standard theories of the operation of labor markets. If the labor market is perfectly competitive, then workers are paid their marginal products and firms do not obtain surplus from any type of worker. More importantly, simply assuming the existence of frictions in the labor market, so there is the possibility of firms and workers obtaining rents, does not account for firms' preference for high-ability workers. Even in the presence of frictions, one would still expect compensation to fully reflect general ability, just as the price of a car fully reflects its general quality. If this were true, a firm would hire on the basis of workers' idiosyncratic "matches" with the firm rather than on the basis of general ability. Moreover, as I show in Section II of the paper, if the marginal product of ability is heterogeneous across jobs and if there are frictions but no other labor market imperfections, firms will have target levels of ability rather than always preferring more able workers. Intuitively, beyond some ability level the increase in productivity from greater ability in a given job will be smaller than the increase in the wage needed to attract the worker.

The result that standard models cannot account for the preference for

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[1] See, for example, Dessler (1984, Chs. 5-6), Beach (1975, Chs. 9-10), Fear and Chiron (1990), and Yates (1988).

more able workers is quite general. Unless there is some cost to the firm of raising the wages it offers to higher-ability workers (beyond the direct costs of the higher wages themselves), a firm that makes wage offers that rise much less than one-for-one with applicants' prospective contributions, and that therefore hopes that its highest-ability applicants accept its offers, cannot be optimizing; such a firm should simply raise the wages it offers to high-ability workers relative to those it offers to low-ability workers.[2]

This paper argues that there is in fact a cost to firms of paying more to relatively high-ability workers, and that it takes the form of increased complaining and reduced effort, and hence lower productivity, on the part of relatively low-ability workers. If perceptions of fairness depend to some extent simply on relative wages within a firm (rather than on the relation of wages to marginal products), then when wages rise one-for-one with marginal products low-ability workers feel unfairly treated. In this situation, raising the wages of low-ability relative to high-ability workers improves the morale and effort of the low-ability workers without causing the high-ability workers to feel unfairly treated. Thus -- assuming the presence of some kind of friction in the labor market, so that departures of wages from marginal products are possible -- wage compression will arise. Section III of the paper presents evidence from psychology, personnel management, and other fields that perceptions of fairness do take this form, and then builds a model incorporating this effect.

Finally, Section IV demonstrates that the model can account for a variety of labor-market phenomena -- not just firms' preference for more able workers and the compression of wages relative to marginal products, but also

[2] Obviously one could explain firms' preference for higher-ability workers by positing that the labor supply curves faced by individual firms were less elastic for higher-ability workers. This is not appealing.

expenditures on screening job applicants, secrecy about workers' pay, the tendency of larger firms to pay higher wages, and many of the features of wage differentials across industries and across firms. Thus the model appears to capture an important aspect of labor markets.

Frank (1984), Lazear (1989), Akerlof and Yellen (1990), and Levine (1991) also present models of wage compression. Yet the types of "wage compression" considered in all of these papers differ fundamentally from that considered here. In all of the models in these papers, expected compensation equals expected marginal product; thus the theories cannot account for firms' preference for more able workers and for the other labor-market phenomena accounted for by the model presented here. In Frank's model, wages are compressed relative to marginal products, but because workers derive utility from their relative standings within the firms that they work for, total compensations are not.[3] In Lazear's model, wages are compressed relative to marginal products only after workers have established long-term relationships with the firm and the firm has acquired more information about workers' marginal products. (See also Milgrom and Roberts, 1988.)

Akerlof and Yellen's and Levine's models are most similar to that presented here. Most importantly, they emphasize the importance of perceptions of fairness in the determination of productivity and wages. Because, however, they assume a frictionless labor market, in their models fairness considerations lead to a compression of wages relative to what they would be in a Walrasian economy, but not to a compression of wages relative to

[3] In its title, Frank's paper poses the question, "Are workers paid their marginal products?" In his model (as he acknowledges), the answer to this question is yes: compensation, correctly measured, equals marginal product for workers of all ability levels. In my model, in contrast, the answer to Frank's question is no: compensations differ from marginal products because of the presence of frictions, and more importantly, that difference varies systematically with ability.

marginal products or to the other phenomena accounted for by the model of this paper.

II. A BASELINE MODEL

This section presents a baseline model of wage determination and worker-job matching in an economy with workers of heterogeneous abilities and jobs with heterogeneous skill requirements. The model both demonstrates how wages and marginal products are related when fairness is unimportant and serves as the starting point for the more complicated analysis of the model with fairness considerations in Section III.

The key ingredients of the model are heterogeneity and an absence of complete and instantaneous matching of workers and jobs. Together, these assumptions imply that when a worker is employed by a firm, in general both obtain some surplus; in a frictionless, competitive market, in contrast, individuals are indifferent about which particular agents they transact with. Because the focus of Section III is on firms' choice of their wage policies, I assume throughout that wages are set by firms rather than determined by bargaining. I also assume for simplicity that search is undertaken by workers and not by firms. Given the specific form I assume for search costs, however, in equilibrium firms in fact set wages so as to divide the surplus from an employment relationship equally between themselves and the employee.

A. Workers

The economy is set in continuous time, and I focus on its steady state throughout. The economy consists of workers and jobs. Workers are characterized by a, their "ability," and jobs by θ, their "skill requirement."

For simplicity, workers' utility is linear in their wages. Thus the flow utility of a worker employed at wage w is simply w. The worker acts to maximize the expected discounted value of lifetime utility. I consider the limiting case as the discount rate approaches zero; thus maximizing the expected present value of utility is equivalent to maximizing expected utility per unit time.

Matches between workers and jobs end with exogenous probability ρ per unit time. When a worker becomes unemployed, he or she is not able to find a new job instantly. Instead there is a search technology that leads to the formation of new matches. The search is undertaken by workers, with firms influencing the formation of matches only through the impact of the wages they offer on worker search.

Workers know the wages offered by firms with vacancies; they then choose how much effort to exert to attempt to obtain job offers from these firms. Let X be the number of vacancies, $\tilde{f}(\theta)$ be the probability density function of the skill requirement in the vacant jobs,[4] and $w(a,\theta)$ be the wage earned by a worker of ability a in a job with skill requirement θ. The worker treats all of these as exogenous, although all are endogenous in general equilibrium.

If a worker makes job applications at rate n per unit time to a firm with a vacancy, he or she is hired by the firm with probability βn per unit time. The utility cost of the applications is $cn^2/2$ per unit time. Letting $n(a,\theta)$ denote the worker's application rate to vacancies with skill requirement θ, it follows that the total cost per unit time of the applications is

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[4] Below I assume that θ is distributed continuously across all jobs; since the vacancy rate proves to be a continuous function of θ, θ is also distributed continuously across vacant jobs. Thus a density function for the distribution of θ across vacancies exists.

$$C(a) = \int_{\theta} \frac{1}{2}c[n(a,\theta)]^2 f(\theta)d\theta \ , \tag{1}$$

and the total probability per unit time of becoming employed is

$$B(a) = \int_{\theta} \beta n(a,\theta)f(\theta)d\theta \ , \tag{2}$$

where $f(\theta) = \tilde{f}(\theta)X$.

This specification assumes that there are increasing marginal costs of more applications to a single job but constant marginal costs to applying to more jobs. The essential feature of this assumption is that more effort is needed to double the probability of obtaining a job offer from a single firm than to replicate that probability at another firm; this ensures that the worker applies to many firms. The stronger assumption of no interactions at all between applications at different jobs serves to make the model tractable.

Let $v(a)$ denote the level of average utility per unit time that a worker of ability a is able to obtain. When the worker obtains a job paying wage w, he or she enjoys a utility windfall of $[w - v(a)]/\rho$ -- the utility gain per unit time, $w - v(a)$, times the expected period of employment, $1/\rho$. Thus the expected benefit per unit time of applying at rate n to a job paying w is $\beta n[w - v(a)]/\rho$. Since the cost per unit time is $cn^2/2$, $n(a,\theta)$ is given by:

$$n(a,\theta) = \begin{cases} \beta[w(a,\theta) - v(a)]/\rho c & \text{if } w(a,\theta) \geq v(a) \\ 0 & \text{otherwise} \ . \end{cases} \tag{3}$$

Thus $v(a)$ is also the worker's reservation wage.

Equation (3) can be used to derive an expression that implicitly defines $v(a)$. Let $\Theta(a)$ be the set of θ's such that $w(a,\theta) \geq v(a)$. Then (1)-(3) imply

$$(4) \qquad C(a) = \int_{\theta\varepsilon\Theta(a)} \frac{1}{2}\frac{\beta^2}{\rho^2 c}[w(a,\theta) - v(a)]^2 f(\theta)d\theta \ ,$$

$$(5) \qquad B(a) = \int_{\theta\varepsilon\Theta(a)} \frac{\beta^2}{\rho c}[w(a,\theta) - v(a)]f(\theta)d\theta \ .$$

On average, the worker is unemployed fraction $\rho/(\rho + B(a))$ of the time, receiving flow utility $-C(a)$. Of the time spent employed, fraction $\beta^2[w(a,\theta) - v(a)]f(\theta)/[\rho cB(a)]$ is in jobs with skill requirement θ, with flow utility $w(a,\theta)$. Thus the worker's average utility per unit time is given by

$$(6) \qquad v(a) = \frac{B(a)}{\rho+B(a)} \int_{\theta\varepsilon\Theta(a)} \frac{\beta^2[w(a,\theta) - v(a)]f(\theta)}{\rho cB(a)} w(a,\theta)d\theta$$

$$- \frac{\rho}{\rho+B(a)} \int_{\theta\varepsilon\Theta(a)} \frac{1}{2}\frac{\beta^2}{\rho^2 c}[w(a,\theta) - v(a)]^2 f(\theta)d\theta$$

$$= \frac{1}{\rho+B(a)} \frac{\beta^2}{\rho c} \frac{1}{2} \int_{\theta\varepsilon\Theta(a)} [w(a,\theta)^2 - v(a)^2]f(\theta)d\theta \ .$$

It is straightforward to show that there is a unique $v(a)$ that satisfies (6). Thus expression (6) implicitly defines $v(a)$ and $\Theta(a)$.

B. Firms

When a worker with ability a is employed in a job with skill requirement θ, he or she produces output at rate $y(a,\theta)$ per unit time. For simplicity, I assume that $y(\cdot)$ takes the specific form $y(a,\theta) = a\theta$. Thus more able workers produce more output ($y_1 > 0$) and the marginal product of ability is larger in jobs with higher skill requirements ($y_{12} > 0$). The firm's flow profits are $a\theta - w(a,\theta)$ if it employs a worker of ability a; flow profits are zero if the job is vacant. The firm chooses the wages that it offers to maximize expected profits per unit time.

Let U be the number of unemployed workers, and $\tilde{g}(a)$ the probability density function of ability among the unemployed. Then, analogously to (2), the probability per unit time that a vacancy is filled is

$$(7) \qquad K(\theta) = \int_a \beta n(a,\theta) g(a) da ,$$

where $g(a) = \tilde{g}(a)U$. Using (3) and letting $A(\theta)$ be the set of a's for which $w(a,\theta) \geq v(a)$, the firm's expected profits per period are therefore

$$(8) \qquad \pi(\theta) = \frac{1}{K(\theta)+\rho} \int_{a \varepsilon A(\theta)} \frac{\beta^2}{\rho c}[w(a,\theta) - v(a)][a\theta - w(a,\theta)]g(a)da .$$

The firm chooses $w(a,\theta)$ to maximize this expression. The first order condition is

$$(9) \qquad w(a,\theta) = v(a) + \frac{a\theta - [v(a) + \pi(\theta)]}{2}$$

for values of a such that $a\theta \geq v(a) + \pi(\theta)$. Thus $A(\theta)$ is the set of a's for which $a\theta \geq v(a) + \pi(\theta)$; for a's not in $A(\theta)$, the firm chooses any wage less than v(a) and attracts no applicants. Equation (9) shows that the firm sets wages to split the surplus between itself and its workers; this occurs because of the quadratic cost of applications.

Substituting (9) into (3), (7), and (8) yields:

$$(10) \qquad K(\theta) = \int_{a \varepsilon A(\theta)} \frac{\beta^2}{\rho c} \frac{a\theta - [v(a) + \pi(\theta)]}{2} g(a)da ,$$

(11) $$\pi(\theta) = \frac{1}{K(\theta)+\rho} \frac{\beta^2}{\rho c} \frac{1}{4} \int_{a \varepsilon A(\theta)} [(a\theta - v(a))^2 - \pi(\theta)^2] g(a) da .$$

Equation (11) implicitly defines $\pi(\theta)$ and $A(\theta)$, given v(a). One can that there is a unique $\pi(\theta)$ satisfying (11).

C. Equilibrium

To complete the description of the model it is necessary to describe the determination of the number of unemployed workers and vacancies, and the distributions of abilities and of skill requirements in these groups. This is straightforward. Assume that there are N workers, and that a is distributed continuously among workers with density function j(a) on support $[a_{MIN}, a_{MAX}]$. Similarly, assume that there are M firms, and that θ is continuously distributed among firms with density function $h(\theta)$ on support $[\theta_{MIN}, \theta_{MAX}]$.[5] Then

(12) $$g(a) = \frac{\rho}{\rho+B(a)} j(a)N ,$$

(13) $$f(\theta) = \frac{\rho}{\rho+K(\theta)} h(\theta)M .$$

Equations (5), (6), and (9)-(13) describe the equilibrium of the economy. Because all of the primitives of the model -- the utility and production functions, the cost of applications, the generation of job offers, and the distributions of ability and skill requirements among workers and jobs -- are continuous, the derived functions v(a), $\pi(\theta)$, and $w(a,\theta)$ and the

[5] One could make M and $h(\theta)$ endogenous by specifying a fixed cost of operation, $b(\theta)$ (with $b(\theta)$ increasing in θ), and assuming entry of firms until profits for all values of θ were zero. This would have no impact on the results that follow.

distributions of a and θ among unemployed workers and vacancies are continuous as well.

D. Characteristics of the Equilibrium

Our main interest is in how the firm's surplus from hiring, $a\theta - [w(a,\theta) + \pi(\theta)]$, varies with the ability of the worker it hires. Equation (9) implies

$$\frac{\partial(a\theta - [w(a,\theta) + \pi(\theta)])}{\partial a} = \frac{1}{2}[\theta - v'(a)] , \tag{14}$$

$$\frac{\partial^2(a\theta - [w(a,\theta) + \pi(\theta)])}{\partial^2 a} = -\frac{1}{2}v''(a) . \tag{15}$$

Thus how the firm's surplus varies with worker ability depends on how worker utility varies with ability.

Equations (5), (6), and (9) can be used to show

$$v'(a) = \frac{\rho+B(a)}{2\rho+B(a)} \frac{B(a)}{\rho+B(a)} \frac{\int_{\theta\varepsilon\Theta(a)} \theta[w(a,\theta) - v(a)]f(\theta)d\theta}{\int_{\theta\varepsilon\Theta(a)} [w(a,\theta) - v(a)]f(\theta)d\theta} > 0 . \tag{16}$$

The ratio of integrals in this expression is the marginal product of ability weighted by the fraction of employment in different types of jobs. $B(a)/[\rho+B(a)]$ is the fraction of time the worker is employed; thus $B(a)/[\rho+B(a)]$ times the ratio of integrals is the average increase in output per unit time from increased ability. Finally, $[\rho+B(a)]/[2\rho+B(a)]$ is the fraction of this increased output that accrues to the worker. When ρ is large relative to B(a), so the worker is rarely employed, half the increase is retained by the worker; when ρ is small relative to B(a), so the worker is usually employed, the worker obtains all of the increase.

Equation (16) implies

$$(17) \qquad v''(a) = \frac{1}{2\rho + B(a)} \frac{\beta^2}{2\rho c} \int_{\theta \varepsilon \Theta(a)} [\theta - v'(a)]^2 f(\theta) d\theta > 0 .$$

Thus the firm's surplus from hiring a worker is a concave function of the worker's ability. This has two implications, one technical and one substantive. The technical implication is that the set $A(\theta)$ -- the a's such that $w(a,\theta) \geq v(a)$ -- is simply an interval: a concave function that is positive at two points must be positive in between. Thus we can write $A(\theta) = [\underline{a}(\theta), \bar{a}(\theta)]$. At $\underline{a}(\theta)$, either $w(a,\theta) = v(a)$ or $a = a_{MIN}$ -- since the firm's surplus is continuous in a, either it is indifferent about hiring its lowest-ability workers, or there are no lower-ability workers to hire. Similarly, at $\bar{a}(\theta)$, either $w(a,\theta) = v(a)$ or $a = a_{MAX}$.

The substantive implication, which follows immediately from the technical one, is that firms have target levels of ability. Consider any job θ where workers of the highest ability level in the economy, a_{MAX}, are not employed. The fact that $\bar{a}(\theta) < a_{MAX}$ implies that the firm's surplus from hiring a worker of ability $\bar{a}(\theta)$ is zero; otherwise it would wish to hire slightly more able workers. The firm's surplus from workers of ability less than $\bar{a}(\theta)$ (and greater than $\underline{a}(\theta)$), however, is strictly positive, and is declining in a beyond some level of a less than $\bar{a}(\theta)$. For the "usual" case of $a_{MIN} < \underline{a} < \bar{a} < a_{MAX}$ (so the firm hires neither the least able nor the most able workers in the economy), the firm's surplus is zero for its least able worker, rises to a peak at some intermediate level of worker ability, and then declines to zero again for the most able worker. That is, the workers the firm would most like to attract are not the most talented it can get, but workers of some intermediate level of ability.

Figure 1 summarizes how output and wages vary with ability for a given firm. Output, $a\theta$, is simply linear in a. Output net of the opportunity cost of the job, $a\theta - \pi(\theta)$, is thus also linear in a. As described above, workers' reservation wage, $v(a)$, is convex in a. $\underline{a}(\theta)$ and $\overline{a}(\theta)$ are the two points where $a\theta - \pi(\theta) = v(a)$. It is workers of ability between $\underline{a}$ and $\overline{a}$ that may be hired by the firm. Over this range, the total surplus from the relationship, $a\theta - [\pi(\theta) + v(a)]$, is divided equally between the firm and the worker. Thus $w(a,\theta)$ lies midway between $v(a)$ and $a\theta - \pi(\theta)$.

Figure 1 also shows $w(a,\theta)$ for a job with higher level of θ. One can show that both $\underline{a}(\theta)$ and $\overline{a}(\theta)$ are increasing in θ: firms with higher skill requirements hire higher-ability workers. Among the workers that are potentially hired in both jobs, for the lower-ability workers wages are higher in the low-skill requirement job, while for the higher-ability workers they are higher in the job with greater skill requirements.

The central result that firms have target levels of ability rather than preferring the most able workers they can attract is highly robust. Only three mild assumptions are needed. The first is that when a worker encounters a firm with a vacancy, the firm hires the worker if and only if both can be made better off by doing so. This assumption is standard in search and matching models, and to assume otherwise would be to assume some imperfection other than frictions in the process of matching. The second assumption is that when the worker is hired, the wage is set so that both the firm and the worker are in fact made better off. Again this assumption is standard, and it would result from any reasonable specification of the bargaining process. The final assumption is simply that no variable (output, bargaining power, rates of job finding and job break-up, and so on) is discontinuous in ability. With these assumptions, the fact that workers of the highest ability level (a_{MAX})

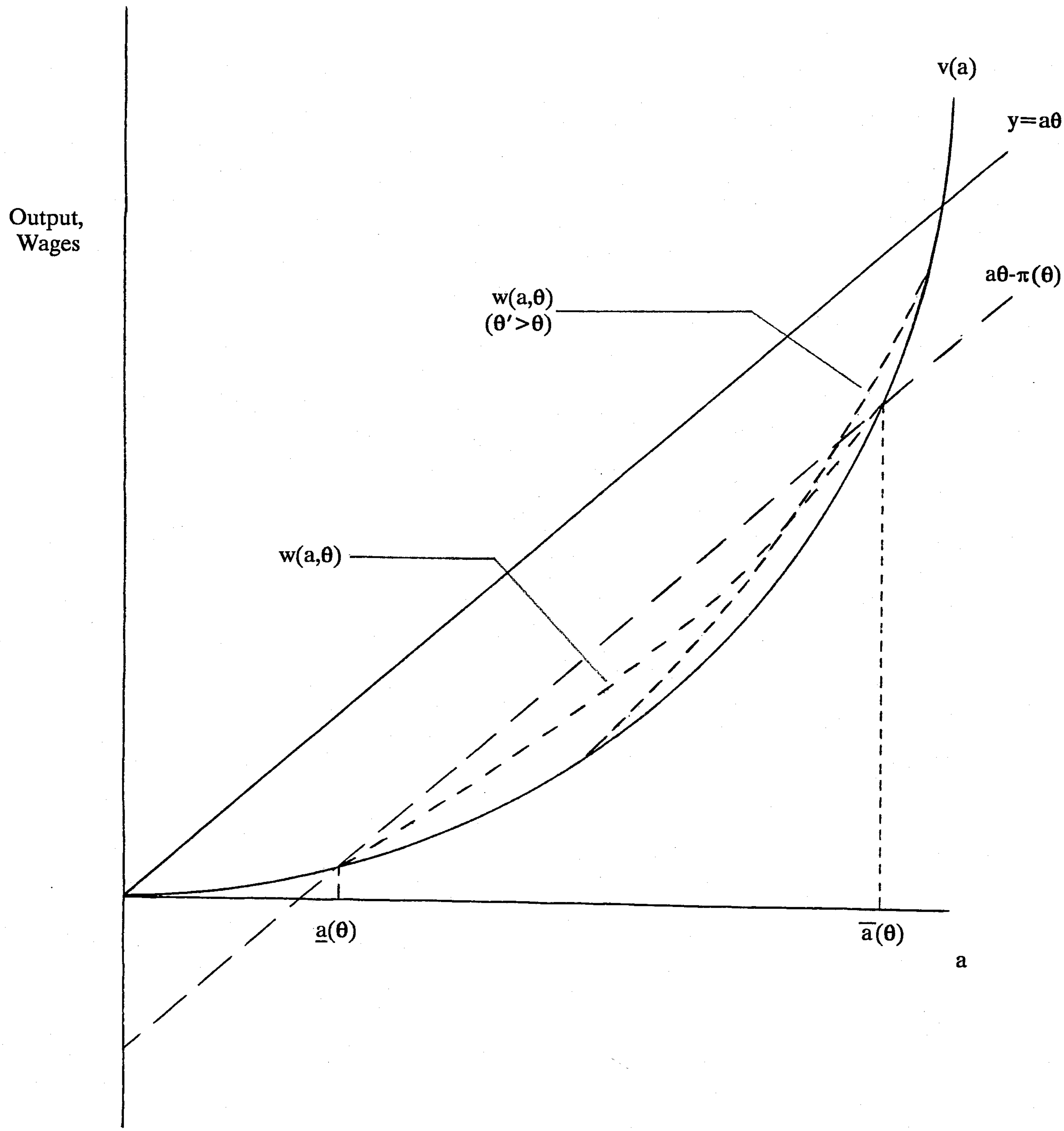

Figure 1. Output and Wages as Functions of Ability in the Basic Model.

are not hired some type of job implies that the employer would not gain from hiring such workers. Continuity then guarantees that the firm gets zero surplus from the most able type of worker that is hired in this type of job, and strictly prefers less able workers.[6]

If, however, there are interactions between the wages offered to workers of different ability levels, this argument may fail. In the next section I develop a model in which offers of high wages to high-ability workers reduce the effort of low-ability workers. In this situation, it can represent an optimum for a firm to make only modest wage offers to high-ability workers -- and thus be in a position where it would obtain considerable surplus were those offers accepted -- because the benefits from an increased probability that the offers would be accepted if the wages were increased would be offset by lower productivity of lower-ability workers.

[6] If employers advertised openings at preset and unchangeable wages, their preference for more able workers would not be puzzling: at a given wage, a more able worker is clearly preferable to a less able one. But an explanation of firms' desire to hire more able workers based on fixed wages faces two difficulties. First, in the vast majority of jobs, compensation is not unchangeable -- employers can, and do, offer higher compensation to more able workers through workloads, job assignments, prospects for raises and promotions, and very often the starting wage itself. Yet employers' preference for more able workers is not restricted to the limited set of jobs (such as some unionized and government jobs) where wages are largely preset. Second, and more important, this proposed explanation simply raises a different puzzle: why would an employer refuse to adjust wages in response to ability differences? In the model of this section, for example, an employer who hires at a fixed wage fails to form matches with some workers that it should hire, and thus reduces its profits with no offsetting gain.

III. A MODEL OF WAGE COMPRESSION

A. Motivation

Standard models cannot account for firms' preference for more able workers. In this section I therefore present an alternative. Its central ingredient is an assumption that greater wage dispersion within a firm, even if it is based on variation in observable ability, reduces productivity: increases in the wages of high-ability workers relative to low-ability workers increase complaining and reduce effort on the part of low-ability workers, and these detrimental effects of wage dispersion exceed any positive effects on the effort of high-wage workers.

Akerlof and Yellen (1990) and Levine (1991) present a wide variety of evidence that workers' perceptions of whether they are being treated fairly by their employers have important effects on their effort.[7] The key question for this paper concerns the specific form of notions of fairness and of their impact on productivity. If workers' perceptions of what was fair varied one-for-one with their marginal products, then a change in wage dispersion in either direction from the dispersion of marginal products would reduce effort. A reduction in the relative wages of high-ability workers, for example, would cause high-ability workers to feel unfairly treated, and thus to reduce their effort.

[7] Greenberg (1990) provides striking new evidence on this point. Wages were temporarily reduced in two similar plants of a firm. In one of the two plants, chosen at random, the reasons for the reduction was carefully and sympathetically explained to the workers; in the other only a cursory explanation was given. Employee theft rose dramatically less in the plant where the careful explanation of the cuts was provided.

In fact, however, the effort choices of low- and high-ability workers do not appear to be symmetric in this way. That is, the perceptions of workers of different abilities of what is "fair" do not adjust to the point where perceptions of fairness and actual wages are in balance; rather, it is low-paid, low-ability workers who are likely to believe that their wages are unfairly low. In this situation, increases in wage dispersion reduce productivity, while decreases in dispersion raise it.[8] Two general types of evidence support this view of workers' perceptions of fairness.

The first type of evidence is the direct evidence provided by observers of the labor market. Consider for example the evidence provided by the authors of personnel management textbooks. An important message of such textbooks is that it is the effort of low-ability workers that is most easily affected by pay policies. Fairness and rewarding ability and accomplishment are generally viewed as <u>distinct</u> functions of a pay system. Beach (1975, pp. 643-644), for example, lists two of the four goals of a compensation system as "to induce and reward better performance" and "to keep employees content, to minimize quitting, and to reduce employee complaints and grievances due to inadequate or inequitable wage rates." Dessler (1984, p. 345), after discussing the adverse effects of unjustified pay differences on the morale and productivity of low-paid employees, notes that "even if the employee in a similar job who is being paid more actually deserves the higher salary ..., it's possible that his lower paid colleagues, viewing the world through their own point of view, may still convince themselves that they are underpaid

[8] Akerlof and Yellen and Levine make this assumption in their models. As discussed in the introduction, because they assume that the labor market is frictionless, in their model this assumption leads to higher unemployment among low-ability workers and to compression of wages relative to the Walrasian equilibrium, but not to compression of wages relative to marginal products.

relative to him." The possibility that the higher paid employee may feel that the wage differential is too small is not mentioned.

The authors of such books simply presume that compensation should (and does) rise less than one-for-one with workers' contributions, and that the only question is to what extent pay should be related to performance. The dangers of a strong relation between pay and performance, in these authors' view, are that any errors that cause pay differences to exceed differences in marginal products are virtually certain to cause discontent, and that even differences that are justified by differences in marginal products may do so. Pay differentials that systematically fall short of differences in marginal products, in contrast, are expected to cause discontent only if the situation is extreme. (See for example Milkovich and Newman, 1984, and Belcher and Atchison, 1987.)[9] In short, these authors believe that workers generally do not view a policy of making rewards proportional to contributions; a "fair" allocation is one that moves in the direction of more equal rewards.

Leventhal, Michaels, and Sanford (1972) provide direct evidence that fairness and payment according to contributions are perceived as distinct objectives: when experimental subjects are asked to allocate rewards among participants in a project to promote harmony and minimize conflict, they reduce the dispersion in the rewards. Such reallocations make sense only if notions of fairness involve an element of absolute equality rather than simply

[9] Survey questions concerning workers' satisfaction with their pay support this view. Despite the fact (discussed in more detail below) that wages appear to rise much less than one-for-one with marginal products, such surveys consistently find that more highly paid workers in a given job in a firm are more satisfied with their pay (Lawler and Porter, 1963; Dyer and Theriault, 1976; and Rice, Phillips, and McFarlin, 1990). Unless wage variation is dominated by idiosyncratic factors rather than by differences in contributions, this finding implies that workers who are paid less relative to their marginal products are more satisfied with their pay.

rewards proportional to contributions.

Studies of workers' choices of other workers to compare themselves with also suggests asymmetries in workers' perceptions. Patchen (1961) and Martin (1981) find that when workers are asked to compare their pay to that of other workers, they choose disproportionately to compare themselves to more highly paid workers. The combination of this type of asymmetry in workers' choices of comparison groups to assess the fairness of their wages and an effect of perceptions of fairness on effort implies that wage compression raises average effort: compression of wages brings each workers' wage closer to that of his or her comparison group of higher paid workers.

The second type of evidence supporting the presence of asymmetries in workers' perceptions of fairness is indirect. I demonstrate below that the assumption that wage dispersion reduces the effort of low-wage workers accounts for a variety of features of labor markets -- not just employers' preference for high-ability workers, but also such phenomena as the compression of wages relative to marginal products, secrecy about wages, and inter-industry and inter-firm wage differences. Many of these phenomena are difficult to reconcile with standard views of labor markets and of the determination of workers' effort. Thus the theory leads to predictions that distinguish it from alternative theories and that appear to be supported.

The remainder of this section adds fairness considerations to the model of Section II. Part B presents the assumptions. In Part C, I describe the equilibrium and demonstrate some of its features. Finally, because only a limited set of results can be established for the general version of the model, Part D analyzes an interesting special case.

B. Assumptions

I assume that a worker's productivity depends not only on ability, but also on the employer's wage policy -- that is, its w(a) function. Assuming that productivity is affected by the wage policy and not by the wages paid to the particular set of workers employed by the firm at a given time has two advantages. The first is simplicity. To build a model in which productivity depended on actual relative wages, it would be necessary to have firms with multiple workers. The wages a firm offered and the ability levels of the workers it was willing to hire would then vary with its number of vacancies and the abilities of its current employees. It would be necessary to characterize the entire steady state distribution of numbers of employees and their ability levels for all levels of the skill requirement. Such a model would most likely be intractable.

The second advantage is that some dependence of productivity on wage policies rather than on wages actually paid appears necessary to explain firms' preference for more able workers. If only actual wages matter, then rejected offers are irrelevant to productivity. Suppose workers of some ability level were just below the margin of being willing to accept positions at a firm but that the firm strictly preferred that those workers accepted its offers (even accounting for the negative effects on other workers' productivities). Then the firm could make itself better off by rasing the wage it offered to those workers, and thus the initial situation could not be an optimum. If it is the wage offer itself the affects productivity, however, the argument does not apply: offering a high wage would have a cost even when the wage offer had no chance of being accepted. Because the assumption that the wage policy affects productivity is necessary for the central result, and because assuming that rejected offers matter seems realistic, I assume for simplicity that it is only the wage policy that matters.

The feature of the wage policy that affects a worker's productivity is assumed to be the wage offered to a slightly more able worker:

$$(18) \qquad y = y(a,\theta,w'(a,\theta)) ,$$

where $w'(a,\theta)$ denotes $\partial w(a,\theta)/\partial a$. I assume $y_3(\cdot) \leq 0$ for $w'(a,\theta) > 0$ and $y_3(\cdot) \geq 0$ for $w'(a,\theta) < 0$. With this specification, the firm never chooses to make wages decreasing in ability: relative to a policy of constant wages, such a policy would imply that the firm was spending more on less productive workers <u>and</u> suffering a loss in productivity (since $y_3(\cdot)$ is positive when $w'(a,\theta)$ is negative); thus the constant-wage policy would always be superior. A specific example of the $y(\cdot)$ function is

$$(19) \qquad y(a,\theta,w'(a,\theta)) = a\theta - k|w'(a,\theta)|, \qquad k \geq 0 .$$

The assumption that the feature of the wage policy that affects productivity is $w'(a,\theta)$ has both an analytic and a substantive advantage. Analytically, it makes the firm's optimization problem a standard calculus-of-variations problem. Substantively, it states that workers compare their own wages to those of slightly more able workers; the more rapidly wages rise with ability, the larger the detrimental effect on productivity. This is a simple way of capturing the evidence cited above that workers generally choose to compare themselves to more highly paid workers.

C. The General Case

The problem facing workers is the same as before. I assume that it remains the case that v(a) is increasing in a.

The per period profits of a firm with skill requirement θ are now

$$(20)\quad \pi(\theta) = \frac{1}{K(\theta)+\rho} \int_{a\varepsilon A(\theta)} \frac{\beta^2}{\rho c}[w(a,\theta) - v(a)][y(a,\theta,w'(a,\theta)) - w(a,\theta)]g(a)da,$$

where $K(\theta)$ is defined by equation (7), as before. The condition analogous to (9) is

$$(21)\qquad w(a,\theta) = v(a) + \frac{y(a,\theta,w'(a,\theta)) - [v(a) + \pi(\theta)]}{2}$$

$$- \frac{1}{2g(a)} \frac{\partial[(w(a,\theta)-v(a))y_3(a,\theta,w'(a,\theta))g(a)]}{\partial a}$$

for $a\varepsilon A(\theta)$. When fairness considerations are absent (so $y_3(\cdot)$ is uniformly zero), the final term disappears and this expression reduces to equation (9).

One can establish two results about this general version of the model when $y_3 \neq 0$ that differ from those for the neoclassical version. Let $\underline{a}$ and $\bar{a}$ denote the upper and lower bounds of $A(\theta)$. The first result is that at $\underline{a}$ the firm pays workers more than their reservation wage. If the firm paid workers of ability $\underline{a}$ their reservation wage $v(\underline{a})$, $\partial[(w(a,\theta)-v(a))y_3(a,\theta,w'(a,\theta))g(a)]/\partial a$ would be simply $[w'(\underline{a},\theta) - v'(\underline{a})]y_3(\underline{a},\theta,w'(\underline{a},\theta))g(\underline{a})$ at $a = \underline{a}$. Thus the marginal effect on profits of a change in $w(\underline{a})$ would be

$$(22)\qquad -\frac{1}{K(\theta) + \rho}\frac{\beta^2}{\rho c}\, g(\underline{a})\{y - [v + \pi] - [w' - v']y_3\} ,$$

where the functions are evaluated at $(\underline{a},\theta)$. $K(\theta)$, $\beta^2/\rho c$, and $g(\underline{a})$ are all positive. $y - [v + \pi]$ is non-negative. Since $w(\underline{a},\theta) = v(\underline{a})$ by assumption and the firm is hiring workers of ability slightly greater than $\underline{a}$, $w' - v'$ must also be positive. Since this requires $w' > 0$, y_3 must be negative. Thus the expression in (22) is positive, and so $w(\underline{a},\theta) = v(\underline{a})$ cannot be optimal.

Intuitively, if the firm is paying its least able workers exactly their reservation wage, then (since applications are zero when $w = v$), the likelihood that it hires at a given ability level is an increasing function of ability in a neighborhood of $\underline{a}$. But then marginally raising some $w(a)$ in this neighborhood increases the productivity of more workers than it reduces; thus this change increases profits.

The second result is that the firm earns surplus from its most able workers. The argument parallels the previous one. At $\bar{a}$, $w(a,\theta)$ must equal $v(a)$; otherwise the firm could profitably hire slightly more able workers at wage $w(\bar{a},\theta)$.[10] The marginal effect on profits of a change in $w(\bar{a})$ is thus

$$(23) \qquad \frac{1}{K(\theta) + \rho} \frac{\beta^2}{\rho c} g(\bar{a})\{y - [w + \pi] - [w' - v']y_3\} ,$$

where the relevant functions are now evaluated at $(\bar{a},\theta)$. $K(\theta)$, $\beta^2/\rho c$, and $g(\bar{a})$ are again positive. Since the firm is unable to attract workers of ability greater than $\bar{a}$, $w' - v'$ is negative. Finally, y_3 must be negative. If it were zero, w' and $y - [w + \pi]$ would both be zero at $\bar{a}$; but then $y - [w + \pi]$ would be negative for a slightly less than $\bar{a}$. Combining these results, the expression in (23) can be zero only if $y - [w + \pi]$ is positive at

[10] This assumes that $\bar{a} < a_{MAX}$, so that there are more able workers. One can also show that the firm earns surplus from its most able workers in the case $\bar{a} = a_{MAX}$.

$\bar{a}$. The intuition is the same as before, except that now the likelihood that the firm hires at a given ability level is a decreasing function of ability in the relevant neighborhood.

These results show that the strong implication of the previous model that firms are indifferent about losing their most able workers, and that they therefore necessarily have target levels of ability, no longer holds when the reward to ability affects productivity. Little more can be said about the general case. I now present a simple example, however, that shows that it is possible for this effect to be strong enough to cause the firm's surplus to be monotonically increasing in ability. Thus the model has the potential to account for firms' preference for more able workers.

D. An Example

This section demonstrates that a finite effect of wage dispersion on productivity can be enough to produce complete equalization of wages within each firm. A firm that raises the wages of its higher-ability workers, for example, faces both an advantage and a disadvantage: it attracts more high-ability workers, which acts to raise profits, but the productivity of the lower-ability workers falls, which acts to lower profits. When the impact of dispersion on productivity is strong enough, the second effect always dominates and the firm chooses to equalize wages completely. Under these circumstances, the firm obviously prefers more talented workers.

Let worker productivity be given by (19): $y(a,\theta,w'(a,\theta)) = a\theta - k|w'(a,\theta)|$. Suppose tentatively that the firm pays the same wage at all ability levels above some cutoff $\underline{a}(\theta)$. Then the firm's profits are given by

$$(24) \qquad \pi(\theta) = \frac{1}{K(\theta)+\rho} \int_{a \varepsilon A(\theta)} \frac{\beta^2}{\rho c}[w(\theta) - v(a)][a\theta - w(\theta)]g(a)da \; .$$

The optimal w satisfies

$$(25) \quad w(\theta) = \frac{1}{G(a(\theta)) - G(\underline{a}(\theta))} \int_{a=\underline{a}(\theta)}^{\overline{a}(\theta)} [v(a) + \frac{a\theta - [v(a) + \pi(\theta)]}{2}]g(a)da \; ,$$

where $\underline{a}(\theta)$ and $\overline{a}(\theta)$ are defined by $\underline{a}(\theta)\theta - w = \pi(\theta)$ and $v(\overline{a}(\theta)) = w$, respectively. This expression is analogous to (9) in the neoclassical version of the model; the only difference is that now the firm chooses a single wage for all ability levels rather than a different wage for each ability level.

For this to be the profit-maximizing strategy, it must be that no deviation raises profits. Since it can never be profitable for w to be declining in a, only deviations toward making w increasing in a need to be considered. Consider wage policies of form $w(a,\theta) = w(\theta) + \alpha z(a)$, where z(a) is any differentiable and monotonically increasing function. The condition for there to be no profitable deviation from the constant-wage policy is that for any z(a), raising α marginally from zero not raise profits. One can show that this condition is equivalent to

$$(26) \qquad \int_{a=a_o}^{\overline{a}(\theta)} [a\theta + v(a) - \pi(\theta) - 2w(\theta)]g(a)da \; - \; [w - v(a_o)]kg(a_o) \; < \; 0$$

for all $a_o \; \varepsilon \; [\underline{a}(\theta),\overline{a}(\theta)]$. Intuitively, this expression considers the effects of paying marginally more to all workers of ability greater than a_o. The first term shows the effect on profits ignoring the effect of the wage profile on productivity. From (25), it is zero for $a_o = \underline{a}(\theta)$ and positive for larger a_o's. The second term shows the loss in profits from the reduced productivity of workers of ability a_o.

When k is sufficiently large, (26) is negative for all a_o. Even though the first term affects workers of a range of abilities while the second term involves only a single point in the ability distribution, they are of the same order. For example, in the neighborhood of $\overline{a}(\theta)$, (26) simplifies to

$$(27) \qquad [\overline{a}(\theta)\theta - \pi(\theta) - w] - v'(\overline{a}(\theta))k < 0 .$$

This condition is clearly satisfied for k sufficiently large.

When the firm pays the same wage to all workers, its surplus $a\theta - [w(\theta) + \pi(\theta)]$ is monotonically increasing in worker ability. At $\underline{a}$, the firm is indifferent about hiring; at $\overline{a}$, the firm's surplus is maximized and the worker is indifferent about working for the firm. Since the firm's surplus is strictly increasing in worker ability in the case of complete wage equalization, there are presumably cases in which wages are not completely unresponsive to ability but in which it remains the case that the firm always prefers more able workers.

If one were to extend the model to allow for the possibility of simultaneous applications, the firm would prefer the most able applicants and would be willing to devote resources to evaluating applicants' abilities. In the neoclassical version of the model, in contrast, firms would be willing to devote resources to screen applicants only for the purpose of finding applicants close to its target ability level.

It is straightforward to show that (25) implies that if wages are equalized within firms, a firm with a higher skill requirements pays a higher wage. Profits are also increasing in the skill requirement. It follows that $\underline{a}(\theta)$ and $\overline{a}(\theta)$ are both increasing in θ. Thus there is a sorting of firms, with higher skill requirement firms hiring higher-ability workers and paying higher wages to workers of a given ability level. From the workers' side, a given worker is potentially employed at firms with a range of skill requirements; the lower and upper bounds of the range are increasing functions of the worker's ability. The worker's wage (and hence surplus) is increasing in the firm's skill requirement. In the version of the model without skill requirements, in contrast, a firm with higher skill requirements pays more to workers of some ability levels and less to others, and thus a worker's wage and surplus are not monotonic functions of his or her employer's skill requirement.

Figure 2 is the analogue of Figure 1 for the case of complete wage equalization. The wage paid by a given firm is now independent of ability. The range of abilities of the workers that the firm potentially hires is from the level at which output just equals the wage plus the opportunity cost to the firm of filling the position (so the firm is indifferent about hiring) to the point where the wage just equals the worker's reservation wage (so the worker is indifferent about being hired). Over this range, firm surplus is increasing (and worker surplus decreasing) in worker ability. Finally, a firm with a greater skill requirement pays a higher wage and hires a more able range of workers.

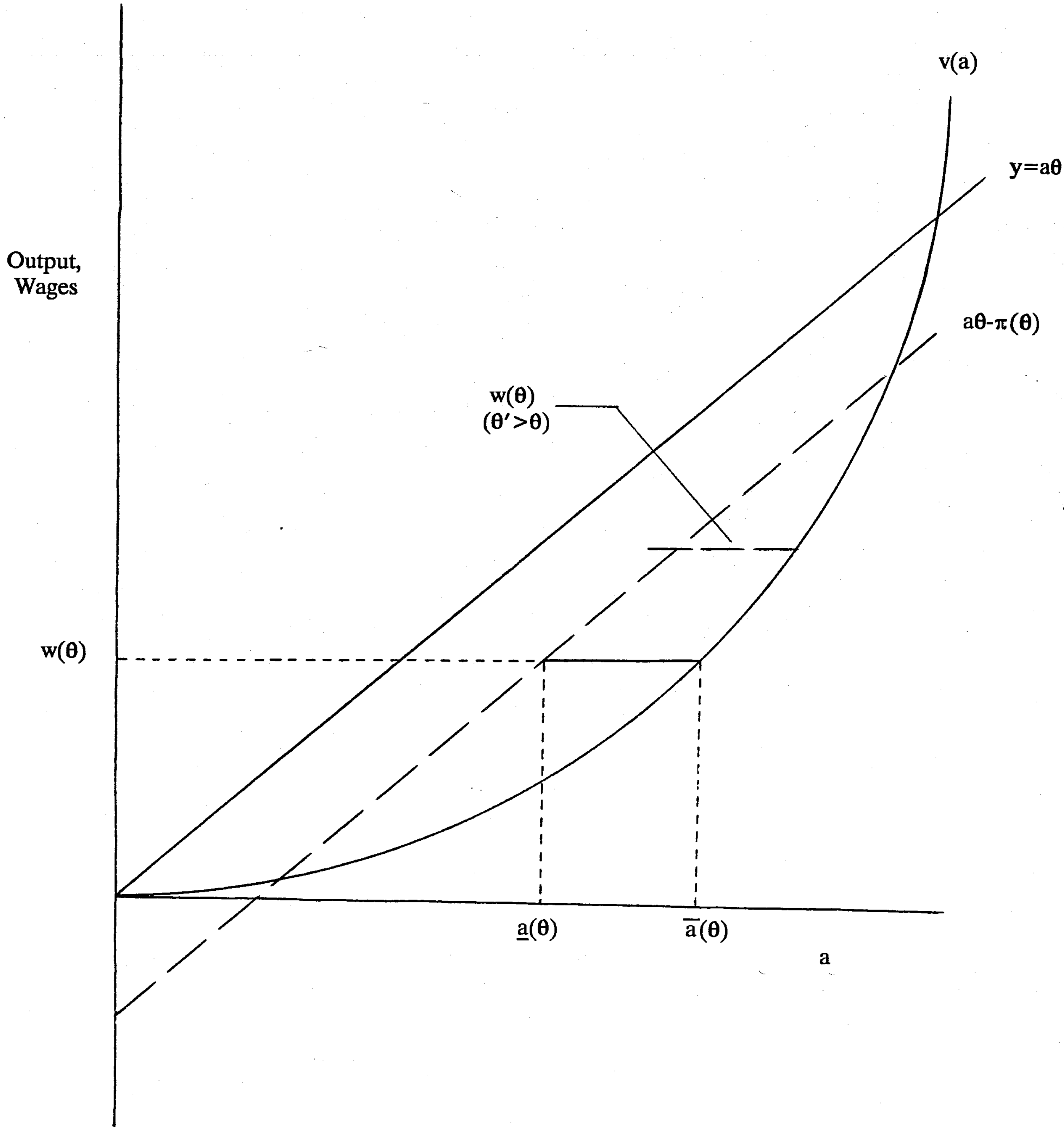

Figure 2. Output and Wages as Functions of Ability with Complete Wage Equalization.

IV. IMPLICATIONS AND CONCLUSIONS

In this section I describe a variety of phenomena that are accounted for by the theory of wage compression arising from the impact of wage differentials on productivity that is presented in this paper. Most obviously, the model provides a simple explanation of employers' preference for high-ability workers, and for the fact that employers devote vast quantities of resources to attempting to determine potential employees' abilities and then attempting to hire the most able. As Section II demonstrates, other theories cannot do this.

The theory accounts for other important phenomena as well. First, it provides a simple explanation of the fact that in many instances wages rise much less than one-for-one with marginal products. As described above, the absence of a one-for-one relation between marginal products and wages is simply presumed by the authors of personnel management and compensation administration textbooks. In addition, Frank (1984) provides extensive evidence of this phenomenon. For a variety of specific occupations where relative productivities can be measured relative accurately, including many situations where pay is based to a considerable extent directly on output, Frank shows that the compensation rises much less than one-for-one with output. Among automobile salespeople, for example, Frank finds that within a dealership, a salesperson who earns an additional dollar of revenue for the firm typically is paid only about thirty cents more. Frank shows that standard explanations, such as risk-sharing, cannot account for these findings.

Second, the common practice among employers of maintaining secrecy about workers' pay is easily explained by an asymmetry between low- and high-ability workers' effort choices. With pay secrecy, workers are forced to place some weight on their own wages in estimating the average wage paid at the firm. Thus low-paid workers tend to underestimate the average wage, and high-paid workers tend to overestimate it. Lawler (1965, 1967) finds that when pay policies are secret, workers indeed misestimate others' wages in this way. If the determination of workers' effort is asymmetric in the way assumed in my model, these errors raise average effort.[11]

The model thus provides a candidate explanation for the well-documented fact that wages are less dispersed in the presence of unions. Unions cause wage policies to be more open. Thus a given change in the dispersion of actual relative wages causes a larger change in the dispersion of estimated relative wages. The result is that the optimal amount of dispersion of actual wages falls. Indeed, experimental studies find that subjects allocate rewards substantially more equally when they are told that the rewards will not be kept secret (Leventhal, Michaels, and Sanford).

The theory also predicts the existence of firms paying different levels

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[11] An alternative explanation of wage secrecy is that it causes workers to systematically overestimate their relative wages. Lawler, however, finds that the opposite occurs.

A question closely related to the question of why employers usually follow a policy of pay secrecy is why they generally give their employees positive feedback about the quality of their work. If effort depends on workers' perceptions of their pay relative to what they deserve, lowering workers' estimates of their performance would cause their effort to rise. Akerlof and Yellen, for example, show that one response to low pay is to revise down estimates of one's abilities. In their model, if the "fair wage" were affected by performance evaluations, a firm could raise its profits by paying low-ability workers wages below the prevailing wage and giving these workers negative performance evaluations. This advantage of negative evaluations disappears, however, if workers' effort depends simply on relative wages rather than on their perceptions of how they are paid relative to their contributions.

of wages. The existence of large inter-industry wage differentials has been extensively documented (see, for example, Krueger and Summers, 1988); in addition, Groshen (1991) demonstrates the existence of large inter-firm wage differentials within industries. As described above, the theory presented here predicts that a firm whose jobs have high skill requirements will pay higher wages to a worker of any given level of ability than a firm where skill requirements are low. The theory thus combines rent-based and ability-based explanations of inter-industry and inter-firm wage differentials. The theory predicts that firms that pay higher wages employ more able workers. (Indeed, if firms prefer more able workers and if paying higher wages allows firms to attract higher-ability workers, virtually any theory of wage differences across firms implies that wage differences are associated with ability differences.) At the same time, the theory also predicts that a worker of a given ability level earns a higher wage at a high-wage firm.

Inter-industry and inter-firm wage differentials have been discussed mainly in the context of efficiency wage theories. Although the theories are consistent with the existence of these differentials, they for the most part do not predict their existence. The theory presented here, in contrast, predicts the existence of firms paying different levels of wages. In addition, the theory is quite successful in accounting for important features of the correlations between the inter-industry differentials and industry characteristics. Dickens and Katz (1987a) find that one of the variables most strongly associated with inter-industry wage differences is the average education level of workers in the industry; that is, a given worker on average earns a higher wage in an industry where his or her fellow workers have greater education. This is precisely in accord with the prediction of the theory that a worker of any given ability level obtains a higher wage in a firm where average ability levels are higher. Dickens and Katz find that industry wage differences are moderately associated with other worker characteristics associated with higher wages, notably average experience and tenure and the fraction of workers who are male. Again this is predicted by my model of pressures toward wage equalization within firms. They also report that industry wage premia are strongly associated with capital-labor ratios, which supports the prediction that wages for a given worker are higher where average skill requirements are higher. Finally, Dickens and Katz (1987b) find that wage differentials are correlated across occupations; this is exactly what one would expect if there were some force tending to compress wages. Again, these facts are not as readily explained by either efficiency wage or neoclassical theories.

This view of inter-industry wage differences is also supported by Gibbons and Katz's (1992) findings concerning the impact of plant closings on workers' wages. Since the theory implies that a worker of a given ability level earns a higher wage in a high-wage industry, it predicts that a displaced worker will earn more if he or she is able to find a job in a high-wage industry; this is what Gibbons and Katz find. In addition, since the theory implies that workers in high-wage industries are more able, it predicts that workers displaced from high-wage industries are more likely to find jobs in other high-wage industries than workers displaced from low-wage industries; again this is what Gibbons and Katz find. As they note, neither pure ability-based nor pure rent-based explanations of inter-industry wage differentials can easily explain these findings.

Finally, this interpretation of inter-industry and inter-firm wage differences appears to be able to account for the link between firm size and wages (Brown and Medoff, 1989). A large firm, simply because of its size, is more likely than a small firm to have some workers to whom it must pay high wages. For example, the greater number of different types of jobs at a large firm implies that the firm is more likely to face a shortage of workers in one particular job classification. Without asymmetry in workers' wage comparisons, this would not raise average wages. But if workers systematically compare their wages to those of higher paid co-workers, a need to pay high wages to one type of worker exerts upward pressure on all of the firm's wages, while an ability to pay low wages to one group does not exert a corresponding downward pressure on firm-wide wages. Thus larger firms must on average pay higher wages. Indeed, a larger firm might choose to respond to the fact that it more often faced upward pressure on its wages simply by adopting a policy of always paying higher wages and generally hiring high-ability workers. This explanation of the employer size-wage effect is consistent with the facts reported by Brown and Medoff.

In sum, the theory of wage compression presented in this paper provides a plausible and parsimonious account of many of the ways in which markets for labor appear to function differently than for other economic goods. Many of these features of labor markets are difficult to reconcile with either neoclassical models or existing non-neoclassical models. A natural question for future work is whether the theory has additional testable implications beyond those pointed out here.

REFERENCES

Akerlof, George A., and Yellen, Janet L. 1990. "The Fair Wage-Effort Hypothesis and Unemployment." Quarterly Journal of Economics 105 (May): 255-283.

Beach, Dale S. 1975. Personnel: The Management of People at Work. Third Edition. New York: Macmillan Publishers.

Belcher, David W., and Atchison, Thomas J. 1987. Compensation Administration. Second Edition. Englewood Cliffs, N.J.: Prentice-Hall.

Brown, Charles, and Medoff, James. 1989. "The Employer Size-Wage Effect." Journal of Political Economy 97 (October): 1027-1059.

Dessler, Gary. 1984. Personnel Management: Modern Concepts and Techniques. Third Edition. Reston, Va.: Reston Publishing.

Dickens, William T., and Katz, Lawrence F. 1987a. "Inter-Industry Wage Differences and Industry Characteristics." In Kevin Lang and Jonathan S. Leonard, eds., Unemployment and the Structure of Labor Markets (Basil Blackwell), 48-89.

Dickens, William T., and Katz, Lawrence F. 1987b. "Inter-Industry Wage Differences and Theories of Wage Determination." NBER Working Paper No. 2271 (July).

Dyer, Lee, and Theriault, Roland. 1976. "The Determinants of Pay Satisfaction." Journal of Applied Psychology 61 (October): 596-604.

Fear, Richard A., and Chiron, Robert J. 1990. The Evaluation Interview. Fourth Edition. N.Y.: McGraw-Hill.

Frank, Robert H. 1984. "Are Workers Paid Their Marginal Products?" American Economic Review 74 (September): 549-571.

Gibbons, Robert, and Katz, Lawrence F. 1992. "Does Unmeasured Ability Explain Inter-Industry Wage Differentials?" Review of Economic Studies 59 (July): 515-535.

Greenberg, Jerold. 1990. "Employee Theft as a Reaction to Underpayment Inequity: The Hidden Cost of Pay Cuts." Journal of Applied Psychology 75 (October): 561-568.

Groshen, Erica L. 1991. "Sources of Intra-Industry Wage Dispersion: How Much Do Employers Matter?" Quarterly Journal of Economics 106 (August): 869-884.

Krueger, Alan B., and Summers, Lawrence H. 1988. "Efficiency Wages and the Interindustry Wage Structure." Econometrica 56 (March): 259-293.

Lawler, Edward E., III. 1965. "Managers' Perceptions of Their Subordinates' Pay and of Their Superiors' Pay." Personnel Psychology 18 (Winter): 413-422.

Lawler, Edward E., III. 1967. "Secrecy about Management Compensation: Are There Hidden Costs?" Organizational Behavior and Human Performance 2 (May): 182-189.

Lawler, Edward E., III, and Porter, Lyman. 1963. "Perceptions Regarding Management Compensation." Industrial Relations 3 (October): 41-49.

Lazear, Edward P. 1989. "Pay Equality and Industrial Politics." Journal of Political Economy 97 (June): 561-580.

Leventhal, Gerald S., Michaels, James W., and Sanford, Charles. 1972. "Inequity and Interpersonal Conflict: Reward Allocation and Secrecy about Rewards as Methods of Preventing Conflicts." Journal of Personality and Social Psychology 23 (July): 88-102.

Levine, David I. 1991. "Cohesiveness, Productivity, and Wage Dispersion." Journal of Economic Behavior and Organization 15 (March): 237-255.

Martin, Joanne. 1981. "Relative Deprivation: A Theory of Distributive Injustice for an Era of Shrinking Resources." Research in Organizational Behavior 3: 53-107.

Milgrom, Paul, and Roberts, John. 1988. "An Economic Approach to Influence Activities in Organizations." American Journal of Sociology 94 (Supplement): S154-S179.

Milkovich, George T., and Newman, Jerry M. 1984. Compensation. Plano, Texas: Business Publications.

Patchen, Martin. 1961. The Choice of Wage Comparisons. Englewood Cliffs, N.J.: Prentice-Hall.

Rice, Robert W., Phillips, Suzanne M., and McFarlin, Dean B. 1990. "Multiple Discrepancies and Pay Satisfaction." Journal of Applied Psychology 75 (August): 386-393.

Yates, Martin John. 1988. Hiring the Best: A Manager's Guide to Effective Interviewing. Boston: Bob Adams Inc.