

COHESIVENESS, PRODUCTIVITY, AND WAGE DISPERSION

David Levine
University of California, Berkeley
May 1987, revised October 1988

Abstract: When work groups support the goals of the firm, firms will want to narrow wage dispersion in order to increase group cohesiveness and productivity. This narrowing of wage differentials has several implications: (1) Firms will pay wages that vary less than marginal productivity; (2) Firms that must pay the high end of their wage distribution a particularly high wage will pay all workers particularly high wages; (3) The market ignores the rent that egalitarian wages provide to low-wage workers, and the rent will be under-provided in equilibrium. At the margin, increasing the number of workers in cohesive firms and/or increasing wages for the low end of the wage distribution will increase the total amount of rents, raising national output.

Acknowledgements: This paper was originally part of my Ph.D. thesis. Helpful comments were made by Jennifer Halpern, Larry Katz, Jonathan Leonard, Juliet Schor, and Larry Summers. Taka Ito and Marty Weitzman discussed the Japanese labor market with me. I have also benefitted from reading George Akerlof and Janet Yellen's independently written paper on this topic [1987], as well as from conversations with them. The usual disclaimer applies.

1. Introduction

Economists traditionally study a world in which prices measure the ratios according to which goods exchange and disperse information. Industrial sociologists, managers, and workers have traditionally suggested that price of labor also affects workers' sense of cohesiveness. This paper develops a model where wages play a role in determining the cohesiveness of a work group.¹

The fundamental hypothesis of this paper is that a firm with large wage dispersion will have a less cohesive work groups. In work groups that endorse the goals of the firm, less cohesive workers may find it more difficult to maintain norms of high effort and to coordinate their efforts on behalf of the firm; in this case, lower cohesiveness raises costs.²

Four main conclusions are reached:

(1) Firms that consider worker cohesiveness in setting wages will pay relatively egalitarian wages; that is, wages will vary less than for firms that do not consider cohesiveness, and they will vary less than do marginal products, as typically measured.

(2) Firms that are forced to pay highly-paid workers even higher wages for technological, legal, or bargaining reasons, will match some percentage of the wage increase for other workers. This result matches a widely observed regularity that high-wage industries and firms often pay high wages to all occupations. This regularity cannot be explained by most human capital or efficiency wage theories.

(3) If cohesiveness considerations are important in wage setting then market outcomes will not be Pareto optimal. To maintain egalitarianism and cohesiveness, some firms will pay an efficiency wage to the low end of their wage distribution. The efficiency wage paid provides a rent to the low-wage workers, and may persist in the face of unemployment. Thus, this theory may explain why unemployment is concentrated among the low end of the wage distribution.

1. In the psychological literature, "cohesiveness" has taken on a variety of definitions. In this paper, cohesiveness refers to the propensity to obey group norms because approval of the group is valued.

2. In firms where the worker group opposes the goals of the firm, less cohesive workers may find it more difficult to coordinate their efforts to restrict output, pilfer, bargain for higher wages, and so forth; here, lower cohesiveness lowers costs. This case is discussed below in Section 7.

The market ignores the employment rent received by low-wage workers, and it will be under-provided in equilibrium. Policies affecting either prices or quantities can increase efficiency. At the margin, increasing the number of workers in cohesive firms will increase the total amount of rents, raising national output.

Raising low-end wages can also increase output. Firms will increase wages for the low end of the wage distribution until the increase in labor costs balances the increase in productivity from higher cohesiveness. At the margin, an increase in low-end wages leaves profits unchanged, but raises productivity, output, and welfare for the low end of the wage distribution.

(4) The fact that cohesive firms must pay a rent to some workers may help explain problems that some egalitarian cooperatives and worker-owned firms have. Even if cooperatives would be more efficient than traditional firms with identical work forces, the cooperative may not be able to survive in a competitive economy if they are constrained to pay relatively egalitarian wages -- "stars" at the egalitarian firm will exit to other firms.

This difficulty of maintaining high cohesion in a competitive labor market may shed some light on the success of the Japanese industrial relations system. Many of the efficiency gains from higher cohesiveness can be realized if there are certain types of restrictions on labor mobility -- mobility restrictions such as those found in the Japanese primary labor market. Neoclassical theory stresses how obstacles to mobility will stop factors from moving to their most productive use. If cohesiveness is important, the losses stressed by neoclassical theory may be more than offset by the gains to cohesiveness and productivity that egalitarian wage policies provide.

2. The Basic Assumption, and Evidence

The productivity function in this paper assumes that wage dispersion lowers cohesiveness, and that lower cohesiveness lowers productivity. As such, the model is concerned those workers that have interdependent tasks. The model will be most relevant for firms which rely upon group norms to ensure high levels of effort. Evidence is provided below that these conditions are often met.

Morton Deutsch, who has been studying the relationship between egalitarianism and productivity for over 40 years, claims that "when efficiency requires efficient cooperation, almost any movement towards a democratic egalitarian structure increases effectiveness." [Deutsch, 1988] Several laboratory studies support the idea that it can increase productivity to pay egalitarian wages when

there is so much antagonism and rivalry among coworkers that overrewarding the lesser contributors may prevent dissatisfaction and disruptive behavior. (Goode 1967; Lawler 1971; Steiner 1972). [Cook and Hegtvedt, 1983: 222-223.]

Two-tier wage plans, where newer workers are paid lower wages provide a natural experiment for the cohesiveness theory. "The lower-paid workers often do just what is required and no more, and sometimes refuse to help the higher-paid workers." [Salpukas, NYT 1987, D22, cited in Akerlof and Yellen, 1988: 11]

Economist Richard Belous of the Conference Board emphasizes, "Two-tier contracts are losing ground not only because they're unpopular with many workers, but because many companies are finding that they're not cost-effective." [cited in Business Week, April 25, 1988: 16]

Social scientists who study workplace behavior have often noted that wide disparities in pay between co-workers hurt employee morale and productivity. The morale that suffers most is presumably that of the lowest paid workers. And these workers often risk being fired by being openly disruptive on the job. The employer's response in such instances, however, is often not to discharge the disruptive workers, but to reduce the pay disparities that precipitated the trouble in the first place. [Frank, 1985: 55]

Further corroborating evidence from economic theory, field research, laboratory experiments, the experience of worker owned and managed companies, the personnel literature, and the Japanese experience is surveyed after the theoretical results are derived. All of these sources show that increased wage dispersion can reduce cohesiveness, and reduce productivity.

3. Modelling the effects of wage dispersion on cohesiveness

Assume that there are two types of workers, H and L, and output is measured net of fixed costs and intermediate inputs. Let w_H and w_L be the wages of worker type H and L, with $w_H > w_L$. The assumptions that (1) productivity depends upon cohesiveness, and (2) cohesiveness depends upon wage dispersion can be formalized as

$$1) \quad q = C(w_L/w_H) f(H, L);$$

$$f_1, f_2, f_{12}C' > 0; \quad f_{11}, f_{22}, C'' < 0$$

where q is output and C measures cohesiveness.

Output markets are competitive, and the price of output is normalized to one. Assume that the supply of H workers is such that their equilibrium wage is also unity, while R is the reservation wages of L workers.³

4. Cohesiveness Considerations Lead to Egalitarian Wages

It follows immediately that firms with production function (1) will pay wages that are more equal than will firms with standard production functions. To see this, examine the firm's profit-maximization problem. Firms set labor demand for L and H and wages to maximize profits (π), subject to the condition that they pay at least workers' reservation wages.

The reservation wage constraint will bind for high-paid workers. On the other hand, if a firm pays L workers more than their reservation wage, it gains greater cohesiveness and productivity. If C' is large enough for a firm paying reservation wages, the firm will reduce its costs by increasing its wage to L workers. The precise condition is that the change in profits when w_L increase,

$$2) \quad d\pi/dw_L = fC'(R)/w_H - L ,$$

be positive for a firm paying reservation wages and choosing H and L optimally.⁴

In this model, the firm increases the wages to L workers until the marginal benefit of greater in cohesiveness just balances the cost of higher wages. The principle is identical to that of efficiency wage models, where firms increase wages until

3. Equation (2) also assumes that only the relative levels of wages affect cohesiveness, and not their levels.

The cohesiveness effects discussed here can occur at many different scales. Sociologists have not provided a clear explanation of how workers determine their reference groups. My reading of the evidence suggests that cohesiveness effects are most important at the work group level. There also appear to be larger scale effects, where, for example, firm-level wage differentials affect worker cohesiveness and productivity. The scale of the cohesiveness effect is elided in the model presented below, since there are only two types of workers.

4. For the rest of the paper, assume that the firm in question is not at the corner solution, so w_L is above the reservation wage of L workers. This assumption is analogous to the assumption in an efficiency wage model that the productivity function has sufficient curvature to ensure an interior optimum.

the marginal benefits of increased incentives, reduced turnover, and so forth balance the cost of higher wages. (Katz [1986] reviews standard efficiency wage models.)

Evidence that firms pay relatively egalitarian wages is surveyed below. Robert Frank claims that "many firms apparently would rather maintain ongoing relationships with costly consulting organizations than hire the same consultants directly." [1985: 80] One possible explanation is that firms do not like to hire highly paid workers who would disrupt the internal pay structure, and reduce cohesiveness. [ibid.]

5. Firm Wage Effects

A further implication of the cohesiveness assumptions is that firms that must pay their high-paid workers a particularly high wage will also pay their low-wage workers relatively well. If rent-sharing, efficiency wage, or human capital explanations imply that H workers must be paid more than at most firms, cohesiveness considerations imply that L workers will also be paid more at those firms.

To see this effect most clearly, we will examine a simplified version of the model. (The Appendix examines the general case.) Assume that output in the sector we are studying is produced with a fixed-coefficients production function:

$$(3) \quad q = \min(L, \alpha H) C(w_L/w_H) \quad \alpha > 1$$

With the fixed-coefficients production function (3), the elasticity of w_L with respect to w_H is

$$(4) \quad \frac{dw_L}{dw_H} \frac{w_H}{w_L} = \frac{C''(f/L) + (w_H/w_L)}{C''(f/L)(w_H/w_L)} .$$

This elasticity is always between zero and one.⁵

5. The assumption that the second cross derivative of C is positive ensures that the numerator is negative, and smaller in absolute value than the denominator.

Evidence: There is a strong regularity that if some occupations in an industry, or some workers at a firm, are paid high wages, then all occupations are paid high wages. Dickens and Katz [1986], Katz [1986], and Groshen [1986] all find large non-transitory industry and firm effects on wages that span occupations. (An exception is Leonard [1986], who does not find strong firm effects on wages.)⁶

6. Increasing low-end wages can increase efficiency

When wages influence worker cohesiveness as well as allocation, the market outcome is in general inefficient. To fix the scale of the firm, assume there is one firm in this sector, and in equilibrium one H worker works there. In equilibrium, αL workers are employed at this firm.

The other sector of the economy consists solely of L workers. In this sector, they produce and are paid R units of output, where $R < 1$. Assume that the firm using the technology in equation (3) is profitable in equilibrium; that is,

$$5) \quad \pi = \alpha C(R) - 1 - R\alpha > 0 .$$

With the production function of equation (1), the first-order condition for an interior solution for the firm is to set the elasticity of C with respect to the wage equal to the elasticity of f with respect to L:

$$(6) \quad \frac{\delta C}{\delta w} \frac{w}{C} = \frac{\delta f}{\delta L} \frac{L}{f} .$$

Firms can increase w_L one percent, or for the same cost they can increase L one percent. The first order condition (8) implies that in equilibrium these two actions must be equally productive at the margin.

6. Firm wage effects are also predicted by some equity versions of efficiency wage theory. Equity theories are closely related to the cohesiveness model here. Any evidence for equity wages that takes place where group interaction is important is also evidence for the theory in this paper. It is very difficult to distinguish whether firms pay relatively high wages to the low end of the pay scale to reduce their sense of inequity, or to raise the cohesiveness of the work group.

Rent-sharing theories also imply this pattern of wages, but only if all workers at a firm have some bargaining power. For many workers, it is unclear how they can exert leverage against firms.

National output varies as C varies. With the fixed-coefficients production function (3), peak efficiency is reached when $w_L = w_H$, and cohesiveness is maximized. Although the perfectly egalitarian policy is the most productive, this increase in productivity is not a Pareto improvement, since the increase in w_L to equal w_H requires redistribution from firms to L workers.

A marginal increase in w_L does not have these redistribution effects: L workers gain and profits are constant. To see this, examine the change in output when the wage is increased.

$$(7) \quad \frac{\delta Q}{\delta w_L} = \frac{\delta C}{\delta w_L} L > 0$$

On the other hand, the first order condition for a firm's profit maximization implies that small changes in w_L do not affect profitability. Thus marginal increases in w_L raise output and the welfare of L workers, and do not change profits.

The intuition of this result is straightforward: firms see an increase in wages as a cost, to be balanced by the rise in cohesiveness and productivity. To society, the wage is a transfer, while the increase in productivity is an increase in output.

The General Case: With a variable proportions production function such as equation (1), the increase in w_L will cause the firm to hire fewer L workers. This effect reduces national output, since the marginal product at the firm was w_L , and in the other sector it is only R. Let ϵ be the own-wage elasticity of L ($dL/dw_L * L/w_L$). The total change in national output (Y) when w_L increases is

$$8) \quad dY/dw_L = \left[(w_L - R) \epsilon + w_L \right] (L/w_L)$$

As long as the elasticity of demand for L workers is not too large, total output rises when w_L increases.⁷ The reduction in labor demand in the cohesive firm reduces output. This effect acts against the increase in Y noted in equation (7). (The assumption of fixed coefficients sets ϵ to zero by assumption.)

7. The result that increasing wages increases GNP is different in this efficiency wage model than in the models of Shapiro and Stiglitz [xx] or Bulow and Summers [xx]. In those models, effort is a one-zero choice, and there is no benefit to the firm from raising the wage to already-working employees. In this model, effort is a continuous variable, and marginal raises in wages affect productivity but leave profits unchanged.

Assuming that cohesive firms give a 33% pay bonus to L workers (i.e., $w_L/R = 1.33$), dY/dw_L is positive unless ϵ is greater than 4 in absolute value. (The closer w_L and R are, the larger ϵ must be to make dY/dw_L negative.) Very few studies estimate labor demand elasticities of such a magnitude, suggesting that dY/dw_L is positive. (Hammermesh surveys the literature on wage elasticities of demand. [1986: 464])

7. Subsidizing cohesive firms can increase productivity

It is easier to see that the market will under-provide employment at cohesive firms. Because the market disregards the rent that L workers earn at firms that rely upon cohesiveness, it will under-provide both cohesiveness and these rents. Welfare could be improved if the government encouraged low-wage employment at firms that were particularly reliant upon cohesiveness as a way to motivate workers. Increasing employment at the cohesive sector raises national output by w_L , while removing one worker from the alternative sector only reduces output by $R (< w_L)$.

Firms that encourage cohesiveness will typically have characteristics that ensure that work groups will act to help the firm. Research in industrial psychology, sociology, and management has come up with a list of features (in addition to egalitarian pay) that are commonly found in firms that can profit from higher cohesiveness: little use of the threat of firing to motivate, long-term employment relations, profit sharing, just-cause employment policies, and good working conditions. (See, for example, Beer et al. [1984]; Foulkes [1980]; Ouchi [1981]; McGregor [1960]; Bernstein [1980]; Katzell et al. [1975]; Hinrichs [1978].) Any government policy that reduces the cost of these employment practices will reduce the relative cost of egalitarian pay practices as well.⁸

8. Implications for unemployment

Akerlof and Yellen have used the productivity equation (1) to provide an efficiency wage explanation for the prevalence of unemployment among low-wage workers. [1988] In standard neoclassical variants of efficiency wage theory, the firm pays wages above the workers' reservation level in order to increase the cost of job loss; higher cost of job loss, in turn, should lead to higher effort and lower turnover. (See Katz [1986] for a review.) This argument implies that unemployment will be

8. Many efficiency wage models support the policy of subsidizing jobs that yield rents. (e.g., Bulow and Summers [1986]) The model presented here gives some innovative hints on the types of firms where rent-yielding jobs will be found.

concentrated in occupations where it is difficult to monitor effort and where turnover costs are high.

The facts point in a different direction: unemployment is highest in the low-skilled segments of the labor market, where (compared to professional and managerial jobs) performance is relatively easy to monitor and turnover costs are relatively low. A productivity equation such as equation (1) suggests a resolution: either the equity considerations stressed in Akerlof and Yellen or the cohesiveness considerations stressed here require that low-wage workers receive an above-reservation wage. This form of efficiency wage is specific to the low end of the wage distribution. If the alternative to employment in cohesive firms is unemployment, then the cohesiveness/equity variant of efficiency wages may explain the concentration of unemployment at the low-end of the wage distribution.

9. Corroborative theory and evidence

Economic theory: The wisdom of reducing pay differentials to increase cooperation and productivity is supported by the theoretical arguments of Edward Lazear. He shows that when relative performance determines wages, and workers can affect each others' productivity "equality is desirable on efficiency grounds. The compression of wages suppresses unwanted uncooperative behavior." [1988:5] Extremely high wage differentials motivate non-productive activities that are intended to make a worker look good or to make a colleague look bad -- neither of which is productive for the firm. (See also Ronald Dye [1984].)

Field research: Field research supports the hypothesis that acts to increase egalitarianism can be worthwhile to the firm. James Clark showed that supermarkets where work group members had similar status had higher labor efficiency ratings, lower turnover, lower absenteeism, and more satisfied workers. [Clark, 1960: 470]⁹

Jeffery Pfeffer and Alison Davis-Blake [1988] have studied the effects of wage inequality on the turnover of university administrators. They find that, controlling for occupation, the market wage, many features of the university and job, and several measures of human capital, that workers who are low-paid relative to their university are more likely to turnover. In other words,

9. All of the empirical work is plagued by the possibility of reverse causality. The fact that high-output groups tend to like the firm may have causality running from high output, to high rewards from the firm, to liking the firm. In spite of these possibilities, experimenters have almost exclusively stressed the causality emphasized in the text.

if a worker is poorly paid compared to her department, even if she is well paid compared to her occupational job market, she has an increased probability of turning over.

Laboratory studies: Laboratory studies have typically examined productivity when payment is either by individual piece rates, or completely equal shares of group output. In 10 experimental studies with high task performance interdependence, "use of an equality rule was correlated with higher productivity." [Cook and Hegtvedt, 1983: 222].

"When concern for preserving harmony in a group is paramount, distributions of equal amounts may be deemed appropriate in order to minimize perceived relative deprivation and emphasize members' 'common fate' (Leventhal et al. 1972; Steiner 1972; Smith and Cook . 1973), thus promoting solidarity." [Cook and Hegtvedt, 1983: 222-223.]

Supporting experimental evidence is also provided by Babchuk and Goode, [1951], Julian and Perry, [1967], and Bales [1950]. (Lott and Lott review the literature before 1963; see especially pages 296-298. [1965])¹⁰

Worker owned firms: Several groups of worker-owned firms have prospered, all of which rely upon high levels of cohesiveness to maintain norms of high effort. In all cases, low dispersion of income is used in order to maintain cohesion among the workers.

In the Pacific Northwest there are approximately 18 worker-owned plywood mills which maintain extremely egalitarian wages structures--all worker-owners are paid identically.

The plywood cooperatives have shown large productivity gains. When the IRS challenged the cooperatives for paying higher than industry wages and deducting the bonus as labor costs, the tax

10. There is also substantial evidence from the behavioral sciences demonstrating that egalitarian policies can increase cohesiveness, and separate evidence that cohesive workers can be more productive. Moscovici [xx: 349], Stotland and Patchne [1961], Stotland and Dunn [1962], Jeffery Pfeffer and Nancy Langton [1988], Morton Deutsch [1986], and Karen Cook and Karen Hegtvedt [1983] provide evidence on the positive relationship between egalitarian rewards and cohesiveness. Bass and Barrett et al. [1972], Hoogstraten and Vorst [1978], and Ouchi [1981]. Cartwright and Zander [1960], Seashore [1954], Darley, Gross, and Martin [1952], and O'Reilly, et al. [1987] present evidence linking cohesiveness with productivity and other performance measures (e.g., absenteeism and turnover).

court judges were satisfied that the workers' 25 to 60 percent higher productivity justified the wages. [Bernstein, 1976: 19] The firms use few supervisors and foremen, and are highly reliant upon the cohesiveness of the work group to support norms of high effort.

The coops have suffered the problems predicted by this theory. Several of them have had to hire highly paid outside workers to avoid disrupting egalitarian internal pay scales and cohesiveness. [Bernstein, 1976: 20]

The plywood cooperatives typically have sufficient efficiency gains to pay the egalitarian rents to L workers. Nevertheless, in bad years the cooperatives' wages falls below the market wage for highly skilled workers. There is thus some migration of the most highly skilled workers from the cooperatives to the rest of the industry. [ibid.: 20]

Israeli kibbutzim are other highly worker-owned enterprises that have been highly productive. Kibbutzim are extremely egalitarian, with all members receiving almost identical incomes in kind (e.g., housing, appliances, and so forth). Kibbutzim are almost entirely reliant upon cohesiveness to maintain norms of high effort, since there are no wage differentials, no permanent promotions, and no threat of firing.

In the kibbutz, a lack of wage differentials and the inability to fire employees does not lead to lowered motivation or to the firm's demise. There is evidence that kibbutz enterprises are more productive than similar non-kibbutz establishments. Latane et. al. note Leon's findings that 1963 yields per cow on the kibbutz were 27% higher than for the rest of Israel's herds, and in 1960 yields were 75% higher than England's. In 1959, the kibbutz chickens produced 22% of the country's eggs with only 16% of the birds [1979]. Barkai presents more recent evidence that kibbutzim are highly productive compared to traditional firms. [1977]

Danish coops, Mondragon, Swedish coops, Utopian worker-owned communities Amana (refrigerators) and Oneida (tableware) were very egalitarian. They motivated with cohesiveness enforcing norms of high effort. [Ouchi 1981: 82]

Personnel literature: The personnel literature also stresses the importance of egalitarian pay for inducing cohesiveness in participatory firms. Edward Lawler notes that reducing pay differences can increase "the perception of social equity and the perception that everyone is a full member of the enterprise." [1981: 225] This sentiment is echoed by Andrew Grove, a founder of Intel, who notes that

it is much easier for low-level members of the organization to participate in decisions if the organization doesn't separate its senior and junior people with limousines, plush offices and private dining rooms. Status symbols do not promote the flow of ideas, facts and points of view. So while our egalitarian environment may appear to be a matter of style, it is really a matter of necessity, a matter of long-term survival. [1983: 23]

Witte summarizes his experience with participatory firms by noting that they have a tilt "toward equality." [Witte, 1980: 162] He claims that "a strong interlocking relationship appears" linking participation and equal rewards. [Witte, 1980: 162]

William Ouchi notes how firms that pay egalitarian wages to promote cohesiveness a few workers "will be underpaid and may leave for their better options." [1981: 120]

The Harvard Business School text Managing Human Resources makes the converse point: egalitarian policies that increase productivity may founder because they will not retain highly paid workers. The text emphasizes how bonus schemes can cause behavior that is not useful for the firm. Nevertheless, the authors note that "to attract and keep high performance individuals, some organizations feel compelled to offer some sort of bonus or incentive regardless of their potential for motivating dysfunctional behavior." [Beer et al., 1984: 145] In other words, firms must give up some of the beneficial properties of a cohesive work force in order to retain highly paid workers.¹¹

In a very different context, Freeman and Medoff find that wage differentials for skilled workers are substantially smaller in union than in non-union firms. They state that unions tend to reduce wage differentials "for reasons of worker solidarity and

11. The result that an increase in mobility can reduce efficiency is not new. Hirshman, in Exit, Voice, and Loyalty, gives the example of school systems. If there are only public schools, the most concerned and wealthy parents will act to increase the quality of schooling for all children. Permitting private schools to exist will permit these parents to remove their children from public schools. If the externality they provided others in the private school system was large, the increase in mobility can reduce a plausible social welfare function. [1970]

Similarly, in the model presented above there are complementarities in production. Thus, H workers at egalitarian firms are providing a positive externality for L workers at their firms. The market does not weigh the rents that L workers lose when H workers exit, and inefficient outcomes can occur.

organizational unity." [1984: 80] Firms that would like to increase cohesiveness can use the same mechanism.

10. The Japanese Analogy

Japanese primary labor market firms have egalitarian wage distributions and highly cohesive and productive workers. The egalitarianism can be extreme: for example, all workers in a peer group are often paid identically for their first several years at a firm.

Andrew Weiss [1987] studied wages of male university graduates in a large Japanese electronic company. He reports that, controlling for age, the top decile earned 50 to 60% more than the bottom decile. Not controlling for age, the maximum differential is approximately four to one. (To measure inequality over a worker's lifetime, it is appropriate to use the age-corrected measures.) In the US, pay differentials within a firm are typically two or three times as large as in the Japanese firm. The age-corrected differentials are perhaps 500% as large as those of a Japanese firm. (See also Rohlen [1975: 207] and Ronald Dore [1973: 98-102].)

In the large Japanese firm "group morale and commitment are sponsored through activities arranged to reduce the sense of rank, age, and even sex differences."¹² [Rohlen, 1975: 188]

Ezra Vogel reports that:

Although there are pay differentials later in the career based on performance and responsibility, these are small compared to those accounted for by seniority pay. When differentials appear, they have more psychological than monetary significance. Equal pay tends to dampen competition and strengthen camaraderie among peers during their early years....In a basic social sense, all those with the same seniority are considered as equals.

12. The theory of motivation discussed in this chapter is not meant to deny the importance of other facets. Workers in Japanese primary labor market are undoubtedly also motivated by the competition to be promoted. At high levels, those not promoted in this tournament eventually leave the firm. The fear of job loss is probably also important. While Japanese firms stress long-term employment relations, large wage differentials and steep age-earnings profiles imply that the cost of job loss for a sacked primary-sector worker is enormous..

Those with higher positions continue to dress like others, often in company uniforms, and peers retain informal terms of address and joking relationships. Top officials receive less salary and fewer stock options than American top executives, and they live more modestly. [1979: 140-141. Emphasis added.]

Implications for Productivity: The negative welfare and productivity implications of restricted mobility are clear: workers can be stuck in a job, even if its characteristics are badly matched to the workers' tastes; workers will not always be where their marginal revenue products are highest; workers can get trapped receiving less than their marginal product; and long-term employment relations make it difficult to contract the firm when demand is low.

There are also important gains from restricted mobility. Firms find it easier to invest in firm-specific human capital, and some moral hazard problems are alleviated in long-term relationships. Finally, the lack of mobility makes it possible to pay relatively narrow wage differentials, maintain a more cohesive work force, and not lose the firm's best workers.

Ouchi emphasizes that egalitarianism and the trust that it engenders is the feature that, "perhaps more than any other, accounts of the high levels of commitment, of loyalty, and of productivity in Japanese firms." [1981: 81]

Why Don't Japanese Workers Exit?: If, as suggested above, Japanese firms pay compressed wages, it is important to understand why the best workers are not hired away by firms that are willing to pay them closer to their marginal products.

There are several answers to this question. The focus of this paper is cohesiveness, and the long-term employment relations and lack of outside hires can contribute to cohesiveness. The high investment in firm specific human capital made possible by these long-term relations makes it difficult for outsiders to be as productive as insiders. For example, firms are typically managed by a cohort of employees who have been a peer group at the firm their entire careers.

The firms in question pay extremely steep wage profiles to workers, so young workers are relatively cheap. Furthermore, firms that hired new employees at high levels would reduce the number of promotions available for lower ranks, and thus reduce their motivation. Any new firm that entered and tried to hire from existing firms would face problems establishing a reputation as a good employer. Finally, there appears to be a cultural component: changing firms is considered an unacceptable thing to do for most senior workers in the Japanese primary labor market.

Results: The results of the Japanese employment system are well-known. Workers are reputed to be much more dedicated to their jobs, and committed to the success of the firm. Work groups are highly cohesive, and productivity is extremely high and growing.¹³

11. The Negative Effects of Cohesiveness on Productivity

This paper has examined cases where greater cohesiveness promotes productivity. When the work group opposes the goals of the firm, it is in the interests of the firm to divide the workers so they cannot act collectively. The importance of this divide and conquer strategy has been a major theme of Marxist analysis of the workplace [Edwards 1979; Reich and Devine, 1981; Gordon, Edwards, and Reich, 1982], as well as some recent neoclassical work. [Breton and Wintrobe, 1982] More cohesive work groups can restrict output, bargain for higher wages, assist each other in pilferage, and so forth. The firm may find it optimal to pay wage differentials larger than differences in marginal productivity, to reduce cohesiveness. [Bowles: 1985]¹⁴

12. Conclusions

This paper has modelled several implications of the assumption that relative wages can affect workers' cohesiveness, and thus their productivity. This hypothesis has four implications: (1) Some firms will pay relatively egalitarian wages; (2) Firms that must pay the high end of their wage distribution a particularly high wage will pay all workers particularly high wages; (3) At the margin, an increase in wages for the low end of the wage distribution can increase efficiency: it increases welfare for low wage workers and total output, and

13. There are important disadvantages to the Japanese system as well. Workers stuck in bad jobs find it almost impossible to leave; the system of cohesiveness is predicated upon the presence of large secondary and tertiary sectors, and upon discrimination against women and foreigners; and so forth. Nevertheless, the relation between egalitarian wage policies, cohesiveness, and productivity works fairly well.

14. Janis has emphasized that firms may not want highly cohesive groups because of groupthink -- the process in which highly cohesive groups avoid examining problems with policies that are the consensus of the group.

It is also not the intent of this paper to argue that narrow wage differentials is a sufficient condition for high cohesiveness and high productivity. I only mean to argue that narrower differentials can contribute to greater cohesiveness.

leaves profits unchanged. (4) The market ignores the rent that egalitarian wages provide to low-wage workers, and the rent will be under-provided in equilibrium. At the margin, increasing the number of workers in cohesive firms will increase the total amount of rents, raising national output. This inefficiency is most starkly seen when we note that the cohesiveness efficiency wage paid to low-wage workers may contribute to the high unemployment rate at the low end of the wage scale.

Appendix: The Effects of Changes in w_H on w_L

This appendix examines the elasticity of w_L with respect to w_H under more general conditions than are discussed in the text. The first case has H fixed, but permits L and w_L to vary. I briefly discuss the more general case when q , H and L can all vary.

Constant H Case: Assume that H is given, but that the firm is free to choose the optimal level of L and of w_L . The firm's problem is to maximize profits (π).

$$(A1) \quad \text{maximize } \pi(w_L, L; w_H, H) = f(L; H) C(w_L; w_H) - w_L L$$

I assume that profits are non-negative at the optimum for the relevant range of w_L .

The first order conditions are

$$(A2) \quad \pi_1 = f C_1 - L = 0$$

$$(A3) \quad \pi_2 = f_1 C - w_L = 0$$

To find the effects of changes in w_H , we totally differentiate the first-order conditions and solve for dw_L/dw_H :

$$(A4) \quad \frac{dw_L}{dw_H} = \frac{\pi_{13} - \pi_{12}\pi_{23} / \pi_{22}}{-\pi_{11} + \pi_{12}^2 / \pi_{22}}$$

where

$$(A5) \quad \pi_{11} = f C_{11} < 0$$

$$(A6) \quad \pi_{12} = f_1 C_1 - 1 < 0$$

$$(A7) \quad \pi_{22} = f C_{11} < 0$$

$$(A8) \quad \pi_{13} = f C_{12} > 0$$

$$(A9) \quad \pi_{23} = f_1 C_2 < 0$$

In the case examined in the text, L is fixed by technology. In this case, π_{12} is zero, and dw_L/dw_H simplifies to

$$(A10) \quad \frac{dw_L}{dw_H} = \frac{\pi_{13}}{-\pi_{11}} = \frac{C_{12}}{-C_{11}} > 0$$

When L is permitted to vary, dw_L/dw_H increases. As w_H increases, cohesiveness declines and the marginal product of L workers decreases. This reduces the demand for L. With fewer L workers, the cost of raising their wage (and cohesiveness) declines.

Algebraically, these effects imply that a negative term ($\pi_{12} \cdot \pi_{23} / \pi_{22}$) is subtracted from the numerator and a negative term (π_{12}^2 / π_{22}) is added to the denominator of equation (A10). Both of these effects increase dw_L/dw_H , so the elasticity of low-paid increases when L is permitted to vary.

General Functional Forms: The case with constant H highlights the effects of changes in L on w_L . In the case with general $f(\cdot)$ and $C(\cdot)$, there are additional effects of that work both to increase and to decrease dw_L/dw_H .

Two effects raise dw_L/dw_H . When w_H increases, H falls (own-price effect). Since H and L are complements in production, the fall in H leads to a fall in demand for L. Also, when w_H increases, this reduces cohesiveness. The fall in cohesiveness reduces the marginal product of L workers and demand for L workers. In both cases, with fewer L, an increase in w_L is less expensive, and dw_L/dw_H rises.

These effects are offset by a scale effect. The decrease in scale when w_H increases will lower the benefits of cohesiveness: $C(\cdot)$ multiplies a smaller $f(L, H)$. This reduces the benefits of w_L , and dw_L/dw_H declines.

REFERENCES

- Akerlof, George, and Janet Yellen, "Fairness and Unemployment," American Economic Review, 78, 2, May 1988: 44-49.
- Babchuk, Nicholas and William Goode, "Work Incentives in a Self-Determined Group," American Sociological Review, 16, October 1951: 679-687.
- Barkai, Haim, Growth Patterns of the Kibbutz Economy, North-Holland, Amsterdam, 1977.
- Bass, B. M., and G. V. Barrett, Man, Work and Organizations, University of Chicago Press, 1972.
- Beer, Michael, Bert Spector, et al., Managing Human Assets, The Free Press, NY, 1984.
- Bernstein, Paul, Workplace Democratization, Transaction Books, New Brunswick, NJ, 1980.
- Bowles, Samuel, "The Production Process in a Competitive Economy: Walrasian, Neo-Hobbesian and Marxian Models," American Economic Review, 75, 1, March 1985: 16-36.
- Breton, Albert, and Ronald Wintrobe, The Logic of Bureaucratic Conduct, Cambridge University Press, NY, 1982.
- Bulow, Jeremy, and Lawrence Summers, "A Theory of Dual Labor Markets with Application to Industrial Polciy, Discrimination, and Keynesian Unemployment," Journal of Labor Economics, 4, no. 3, pt. 1, 1986: 376-414.
- Business Week, "Two-Tier Pay May Be Going Underground," April 25, 1988: 16.
- Clark, James V., "Motivation in Work Groups: A Tentative View," in Sutermeister, Robert, ed., People and Productivity, McGraw-Hill, NY, 1969.
- Deutsch, Morton, "Is there a tradeoff between economic efficiency and equity?" Asilomar, 4/17/88.
- Dickens, William, and Lawrence Katz, "Industry and Occupation Wage Patterns and Theories of Wage Determination," mimeo, U.C. Berkeley, 1986.
- Dye, Ronald A., "The Trouble with Tournaments," Economic Inquiry, 22, 1 January, 1984: 147-149.
- Edwards, Richard, Contested Terrain, Basic Books, NY, 1979.

Foulkes, Fred, Personnel Policies in Large Nonunion Companies, Prentice Hall, Englewood Cliffs, NJ, 1980.

Frank, Robert, "Are Workers Paid their Marginal Products?" American Economic Review, 74, 4, September, 1984:549-571.

Frank, Robert H., Choosing the Right Pond, Oxford University Press, 1985

Freeman, Richard, and James Medoff, What Do Unions Do?, Basic Books, NY, 1984.

Goodman, Paul S., Elizabeth Ravin, and Marshall Schuminke, "Understanding Groups in Organizations," Research in Organizational Behavior, 9, 1987: 121-173.

Gordon, David M., Richard Edwards, and Michael Reich, Segmented Work, Divided Workers, Cambridge University Press, NY, 1982.

Groshen, Erica, "Sources of Wage Dispersion: How Much do Employers Matter?," mimeo, Harvard University, 1986.

Grove, Andrew, "Breaking the Chains of Command," Newsweek, October 3, 1983: 23.

Hackman, J. Richard, "Group Influences on Individuals in Organizations," in M.D. Dunnette, ed., Handbook of Industrial and Organizational Psychology, Skokie, IL, Rand McNally, 1976.

Hammermesh, Daniel, "The Demand for Labor in the Long Run," in Handbook of Economics, Orley Ashenfelter and Richard Layard, eds., North-Holland, Amsterdam, 1986: ch. 8.

Hinrichs, John, Practical Management for Productivity, Van Nostrand Reinhold, NY, 1978.

Hirschman, Albert, Exit Voice, and Loyalty, Harvard University Press, Cambridge MA, 1970.

Jones, Stephen R. G., The Economics of Conformism, Basil Blackwell, NY, 1984.

Katz, Larry, "Efficiency Wage Theories: A Partial Evaluation," in S. Fischer ed., NBER Macroeconomics Annual, MIT Press, Cambridge MA, 1986.

Katzell, Raymond, Daniel Yankelovich, et al., Work, Productivity, and Job Satisfaction, Harcourt, Brace, Jovanovich, NY, 1975.

Latane, Bibb, Williams, Kipling, and Harkins, Stephen. "Many Hands Make Light the Work: The Causes and Consequences of Social

Loafing," Journal of Personality and Social Psychology, 1979 (37) 822-832.

Lawler, Edward E., III, Pay and Organizational Effectiveness, McGraw-Hill, NY, 1971.

Lawler, Edward E., III, Pay and Organizational Development, Addison-Wesley, Reading MA, 1981.

Leibenstein, Harvey, "Intra-Firm Effort Decisions and Sanctions: Hierarchy versus Peers," in Gilad, Benjamin, and Stanley Kaish, Handbook of Behavioral Economics, Volume A, JAI Press, Greenwich, CN, 1986.

Leonard, Jonathan, "Carrots and Sticks: Pay, Supervision and Turnover," mimeo, University of California, Berkeley, 1986.

Likert, Renis, "An Integrative Principle and an Overview," [1961] in Sutermeister, Robert, ed., People and Productivity, McGraw-Hill, NY, 1969.

Mars, Gerald, Cheats at Work, George, Allen, and Unwin, London, 1982.

McGregor, Douglas, The Human Side of Enterprise, McGraw-Hill, NY, 1960.

Ouchi, William, Theory Z, Avon, NY, 1981.

Reich, Michael and James Devine, "The Microeconomics of Conflict and Hierarchy in Capitalist Production, Review of Radical Political Economy, Winter 1981: 27-43.

Rohlen, Thomas, "The Company Work Group," in Ezra Vogel, ed., Japanese Organization and Decision-making, University of California Press, Berkeley CA, 1975.

Seashore, Stanley E., "Group Cohesiveness in the Industrial Work Group," [1954], in Robert A. Sutermeister.

Vogel, Ezra, Japan as Number 1, Harper and Row, NY, 1979.

Weiss, Andrew, "Incentives and Worker Behavior: Some Evidence," NBER W.P. 2194, March, 1987.

Whyte, William Foote, et al., Money and Motivation, Harper and Row, NY, 1955.

Work in America, Report to the Secretary of Health, Education and Welfare, MIT Press, Cambridge MA, 1972.