Wages, Supervision and Sharing:

An Analysis of the 1998 Workplace Employee Relations Survey

Sarah Brown* and John G. Sessions**

*Department of Economics
University of Leicester
University Road, Leicester
Leicestershire LE1 7RH
England

** Department of Economics and Finance
Brunel University
Uxbridge
Middlesex UB8 3PH
England

Abstract: Instrumental efficiency wage models predict an inverse relationship between wages and supervision with this relationship becoming more pronounced amongst firms that participate in some form of employee sharing. To be sure, our theoretical exposition predicts that an increase in total remuneration will elicit a larger cut in optimal monitoring in 'sharing' rather than 'non sharing' firms. In this paper, we explore these predictions empirically using the British 1998 Workplace Employee Relations Survey. Our results confirm an inverse relationship between supervision and pay but the trade-off is only heightened by the presence of performance related pay and employee share ownership schemes. We also find that employee share ownership and performance related pay are relatively more successful in alleviating the need to monitor, with the rate of profit sharing impacting insignificantly on the level supervision.

Key Words: Monitoring; supervision; profit sharing; employee share ownership; efficiency wages.
JEL Classification: J33, J41, J54.

Acknowledgements: We are grateful to the ESRC Data Archive for supplying the 1998 Work Place Employee Relations Survey. Helpful comments were also received from seminar participants at the Universities of Brunel and Leicester and from participants at the 75th Western Economic Association Annual Conference and the Royal Economic Society 2001 Annual Conference. The normal disclaimer applies.

April 2002

I. Introduction

Efficiency wage theory suggests that employers can improve the productivity or quality of their workforce by paying wages in excess of the opportunity cost of labour. There are two schools of thought as to how these wage premia operate. The 'instrumentalist' view is that employees choose how hard to work by equating the marginal costs and benefits of shirking. Wage premia are thus carrots that employers use, along with the stick of dismissal, to encourage an optimal supply of work effort [Shapiro and Stiglitz (1984), Bowles (1985)]. The 'sociological' approach, in contrast, argues that the premia represent a 'gift' by the firm that appeals to norms of loyalty and mutual obligation on the part of its workforce [Akerlof (1982)]. According to this view efficiency wages elicit effort by creating a climate of co-operation and reciprocity, rather than by entering an instrumental calculation of the expected net benefit of shirking.

It is difficult to test efficiency wage theory since standard competitive models also predict a positive correlation between productivity and wages. Moreover, one would expect to find such payments in situations where it is difficult to observe, and thus measure, worker performance. Economists have therefore attempted to test the theory by focusing on the relationship between wages and other forms of effort procurement. For example, if efficiency wages are successful in eliciting effort then, ceteris paribus, one would expect firms paying such premia to invest fewer resources in monitoring worker behaviour.[1]

An alternative method of improving worker productivity is to divest a share of the firm into the hands of workers. Recent years have witnessed a resurgence of interest in employee sharing. Re-kindled by Weitzman's (1985) purported macroeconomic benefits of profit sharing, attention has turned towards the more readily discernible, and originally lauded, microeconomic benefits of employee sharing broadly defined [Weitzman and Kruse, (1990), Blinder (1990)].

Employee sharing has implications for both instrumental and gift-exchange models of efficiency wages. In terms of the former, a sharing scheme would directly reduce the marginal benefit

[1] See, for example, Bowles (1985), Calvo (1979) and Eaton and White (1983). It is possible, however, that high wages are a necessary compensating differential for occupations that require distastefully high rates of supervision [Aoki (1984)]. Evidence of a positive (negative) relationship between wages and monitoring in the Swedish public (private) sector is obtained by Arai (1994).

of shirking. In the extreme case, a self-employed worker has no incentive to shirk. The temptation to free ride renders the issue somewhat less pellucid when a work group is considered, but even here the exchange environment is affected. Divesting part of the enterprise is perhaps the most generous gift a firm can offer its workforce and if it is via an exchange of gifts that wage premia elicit effort, then the question arises as to the marginal utility that workers derive from such gifts.

An interesting, yet hitherto unexplored, question thus arises as to the relationship between employee sharing and the wage-monitoring nexus. A priori one would expect sharing to mitigate the need to monitor. Whether it augments or assuages the relationship between pay and supervision, and thus its effect on the shape of the trade off, is rather less obvious.

In this paper we explore the effects of 'sharing' (i.e. profit sharing, performance related pay and employee share ownership plans) on the relationship between supervision and pay. Our empirical results based on the British 1998 Work Place Employee Relations Survey suggest an inverse relationship between supervision and pay with this trade-off being more pronounced amongst firms operating employee share ownership or performance related pay schemes. This finding would appear to lend support to instrumental efficiency wage considerations. We also find that employee share ownership plans and performance related pay are relatively more successful in alleviating the need to monitor.[2]

The paper is set out as follows: Section II discusses some background issues concerning the relationship between pay, supervision, and sharing. Section III sets out the theoretical underpinning to our study whilst Section IV describes our data and methodology. Our empirical results are presented in Section V and our final comments in Section VI.

II. Background

Wages and Monitoring

Economists have long recognised that there are substantial differences in the rewards to similar occupations across industries. It is only recently, however, that they have associated these variations

[2] We use the terms 'supervision' and 'monitoring' interchangeably in what follows. Although supervisors have different functions at different firms, and firms may utilise other forms of technology to monitor employees (e.g. computers), the supervisor-to-staff ratio is likely to be highly correlated with the extent of employee monitoring [Groshen and Kruegger (1990)].

with differences in monitoring. In one of the earliest studies Dunlop (1957) observed that the highest paying trucking firm in Boston in 1951 was paying its drivers 1.88 times that of its lowest paying competitor. At any point in time such a range of pay could reflect a transitory demand shock driving up wages in particular industries along short-run inelastic labour supply curves. If this were the case, however, one would not expect to see the same industries remaining at the top (or bottom) of the distribution decade after decade. Yet industry wage differentials over the past century have been remarkably persistent [see, for example, Garbarino (1950), Slichter (1950), Cullen (1956), Reder (1962), Bell and Freeman (1985) and Krueger and Summers (1987)].

Two regularities emerge from the various attempts to account for such assiduity vis. higher wages are usually associated with: (i) higher profits and /or concentration [see Dickens and Katz (1987) and Krueger and Summers (1987)]; and (ii), larger plant and /or firm size [see Brown and Medoff (1985), Kruse (1992)]. The first finding might be interpreted as support for Akerlof's (1982) gift-exchange model of efficiency wages.[3] And assuming that monitoring costs increase with plant size, the second would seem to confirm the wage-monitoring trade-off predicted by Shapiro and Stiglitz (1984).[4]

Measuring the trade-off between wages and monitoring explicitly, however, has proved almost as vexing as studying the direct effect of high wages on employee behaviour. Two problems are particularly irksome. The first concerns omitted variable bias. In many employment relationships a single employer optimally chooses both the level of wages and supervision. Such simultaneity is problematic because omitted aspects of human resource policies that affect wages (e.g. employee screening or training procedures) may also be correlated with supervisory intensity and might, therefore, mask the underlying trade-off between wages and supervision.[5]

The second difficulty is the measurement of supervisory intensity. Most studies measure supervision by the ratio of supervisors to supervised. Such 'span of control' measures are problematic because many supervisors spend only a fraction of their work time monitoring non-

---

[3] It could also be the case that there are unobserved quality differences in workers inducing both higher profits and higher wages [Cain (1976)].

[4] Studies that find explicit evidence of a wage-supervision trade-off include Krueger (1991) and Kruse (1992). Somewhat ambiguous results are reported in Neal (1993), Fitzroy and Kraft (1986) and Brunello (1995).

[5] The presence of wage bargaining would, of course, abate this problem.

supervisors and their inclusion in a measure of monitoring intensity may exasperate any bias resulting from the simultaneous determination of wages and supervision [Kruse (1992)].

A good illustration of this latter issue is found in the study by Leonard (1987) which regresses the wages of staff workers across six occupations on the supervisor-to-staff ratio in a sample of US high technology firms. Leonard's results indicate a positive, but generally insignificant, relationship between pay and supervision and lead him to conclude against the shirking efficiency wage model. The absence of correlation may, however, result from endogeneity problems relating to a possible substitution between supervisors and staff workers in the production function. Any production technology exhibiting a non-zero marginal rate of technical substitution between supervisory and non-supervisory inputs will induce a positive trade-off between wages and the supervisor-to-staff ratio.[6] Only if supervisory and staff wage rates vary independently, or if the supervisor-to-staff ratio is exogenously determined, will it be possible to statistically identify the impact of supervision on wages from such a regression. In Leonard's analysis it is likely that any trade-off between supervision and pay is biased and perhaps dominated by such substitution effects.

An imaginative attempt to circumvent this type of endogeneity problem is undertaken by Groshen and Krueger (1990) who focus on the supervisor-to-staff ratios for various registered occupations across 300 US hospitals. The specificity of their study is rationalized by Federal regulations which render the supervisor-to-staff ratio largely exogenous. Consistent with the monitoring version of efficiency wage theory they find a strong hospital-specific effect on wages that cuts across occupations – if a hospital paid relatively high wages to one occupation it was likely to pay relatively high wages to other occupations as well. The inter-occupational pattern of the supervisor-to-staff ratio, however, was much less uniform. The wages of staff nurses, for example, were negatively correlated with the extent of supervision which suggested that such workers did not receive compensating premia in return for closer supervision. The authors conclude that although their findings suggest a wage-monitoring trade-off, they are also consistent with the alternative

[6] Assume, for example, a Cobb-Douglas production function $Q = AL^a S^b$ where L and S denote non-supervisory and supervisory inputs respectively and where Q denotes output. If the firm faces a competitive cost function $C = wL + rS$ then cost minimization implies $S/L = (b/a)(w/r)$ such that increases in w – the wage rate of non-supervisory workers – will raise the supervisor-to-staff ratio even if supervision has no direct effect on employee utility or monitoring.

explanation that hospitals which supervise their staff more closely might prefer to employ low-quality/low pay workers.

A similar focus on a specific industry enables Rebitzer (1995) to girdle the omitted variable problem. Here the focus is contract workers in the US petrochemcial industry. Such workers are answerable to two different employers – the host plant and the contractor - who together shape the personnel practices governing their employment contracts. Concerns about legal liability limit the degree to which host plants can interfere in the human resource practices of the contractors. As a result, estimates of the effects of host safety supervision on the wages set by contractors are relatively less embroiled by omitted variable bias than estimates derived from conventional employment relationships. Rebitzer finds evidence that high levels of supervision are indeed associated with lower wage levels, and since the likely effect of omitted variable bias is to reduce the observed trade-off between supervision and wages, he concludes that such evidence is likely to be a conservative estimate of the wage-supervision trade-off.

Two other studies that find generally supportive evidence of a wage-supervision trade-off are Krueger (1991) and Kruse (1992). Krueger examines pay in company-owned fast-food outlets where managers were paid a fixed salary and in franchised outlets where the owner's income depended on the outlet's performance. Krueger hypothesises that pay in company-owned outlets would be relatively high because supervision by highly motivated owners is less costly than supervision by hired managers. Consistent with this hypothesis, he finds total compensation to be approximately 2 (3.5) per cent higher in company-owned outlets. Kruse investigates the 1980 Survey of Job Characteristics and concludes that hourly wages increase with establishment size even after controlling for personal characteristics, occupation and industry. Moreover, employee self-reported supervision was found to exhibit a generally negative relationship with wages - daily supervised workers received 12 per cent lower pay than their weekly supervised counterparts ceteris paribus.[7]

[7] It should be noted that Kruse concedes that whilst such findings are generally consistent with efficiency wage theory, they are also compatible with the idea that supervision is negatively correlated with otherwise unobserved higher ability.

Studies that fail to find conclusive evidence of a wage-monitoring trade-off include Neal (1993), Fitzroy and Kraft (1986) and Brunello (1995). Neal (1993), using supervision data from the 1977 wave of the Panel Survey of Income, finds that workers in high-wage industries are at least as intensively supervised as low-wage, secondary sector workers, and no evidence that inter-industry differences in monitoring contribute to inter-industry wage differentials. Similarly, Fitzroy and Kraft (1986) find the supervisor-to-staff ratio to be insignificantly related to wages in a sample of 65 West German metalworking firms. Brunello (1995) explores the relationship between pay and both the quantity (proxied by the supervisor-to-staff ratio) and quality of supervision (proxied by factors such as the age and experience of the supervisors). Without controlling for quality, a small but significant trade-off between pay and the supervision ratio is found for both manual and non-manual workers. The inclusion of quality measures, however, abates the trade-off to the extent of insignificance in the case of manual workers.

Employee sharing

Employee sharing has implications for instrumental and gift-exchange models of efficiency wages, impacting on both the marginal net benefit of shirking and on the wider exchange environment.[8] An interesting, yet hitherto unexplored, question thus arises as to the consanguinity of pay, supervision and sharing. Introspection would suggest that sharing alleviates the need to monitor. Whether it augments or assuages the relationship between pay and supervision, and thus its effect on the shape of the trade off, is less clear.

In terms of the instrumental approach one might expect the trade-off to be sharpened – an increase in remuneration inducing a larger cut in monitoring ceteris paribus. The conventional efficiency wage trade-off between pay and monitoring arises because an increase in the former will increase the expected net benefit of not shirking – if a worker chooses to shirk he/she runs some risk of being detected, fired, and thus of not receiving the extra pay. Since it is in the firm's interest to give the worker a zero net benefit, it can economise on monitoring and thus raise the utility of

[8] Indeed: 'Offering workers increased involvement in decision-making, a financial stake in the performance of the firm, disclosing information about, inter alia, future investment plans and the firm's financial situation, and the development of communication channels between management and workers, are all seen as central to encouraging loyalty, motivation and commitment and, thereby, to reducing the need to invoke close monitoring.' [McNabb and Whitfield (1998), p.174].

shirking by giving workers a bigger chance of obtaining the pay. If a sharing scheme relates, or is perceived by workers to relate, individual remuneration to individual effort, then the net benefit of shirking is increased further – a shirker faces the compounded loss of being detected and of losing money.

If, however, it is through an exchange of gifts that wages induce effort then the situation is less clear. A rise in wages may be regarded as a gift on the part of the firm and thus may induce more effort and less need to monitor. Similarly, a sharing arrangement between the firm and its workforce could generate the same feelings irrespective of the level of remuneration. If wages are increased in a sharing firm then the crucial issue is the marginal utility the workforce derives from this gift – is it more or less than they would have derived had they received such wages in a conventional non-sharing environment?

One might expect that any group incentive scheme advocating equal profit shares regardless of individual performance will have little effect on the attitudes and performance of individual workers. For example:

> A dilution or free rider problem seems to arise whenever it is hard to monitor a single person's contribution, as is presumably frequently the case. An externality is present because any one person's reward depends on everyone else's effort. With n members of the group, the extra profit sharing reward associated with marginal effort on any single worker's part is diluted by a factor of 1/n. The result is an inefficiently low level of effort, which is lower as n is larger. [Weitzman and Kruse (1990), p.98].

The problem has been interpreted as a 'prisoners' dilemma' with each worker holding back effort in order to free ride off his/her colleagues. Accepting this argument, one would expect sharing schemes to impact negligibly, if at all, on large organisations.[9]

Dilution aside, however, there are other problems associated with employee sharing. First, all schemes that tie pay to performance expose workers to unwanted risk. The optimal contract must now balance the contradictory requirements of linking pay to effort and limiting risk, and the

[9] There is an important caveat to this argument. If the 'game' is repeated then co-operation may be sustainable. Intuitively, long term employment relationships enable co-operating members to punish their free riding colleagues by, for example, withholding their own effort or ostracising the offending anti-social culprits. Moreover, it has been shown that an insignificantly small amount of co-operation is sufficient to deter free riding [Fitzroy and Kraft (1986)].

optimal profit share is typically inversely related to the degree of risk aversion and/or level of uncertainty, and positively related to the elasticity response of output to increased effort.[10]

And finally, all group incentive schemes have implications for worker participation in management and control. Requiring workers to bear more risk may open the door to demands for co-determination. Whether or not this is desirable remains an open question. The 'property rights' view is that profit sharing is inefficient because it diverts control and ownership towards individualistically oriented workers whose motivation is diluted by free rider issues [Alchian and Demsetz (1972), Jensen and Meckling (1979)]. Participation may, however, raise productivity if workers are better equipped to motivate and monitor each other than management, or if they can provide technical information to management that would otherwise be too costly or time consuming to obtain [O'Dell and McAdams (1987), Kanter (1987)]. Similar benefits might include the potential for improved channels of communication, better conflict resolution, a greater willingness to accept new technology, and an increased possibility of acquiring on-the-job human capital from other workers.[11]

Whatever the true relationship between employee sharing, participation and productivity, this study is hindered by a lack of information regarding the extent of co-determination within the panel of firms. This is potentially serious: "... many studies include variables only on financial participation (return rights) or participation in decision making (control rights), but not both. This is extremely problematic because ... there are strong theoretical reasons to believe that the two rights interact with each other and do so non-monotonically. The omitted variable is severe, and the estimates of the employee ownership variables that arise from such studies may have the wrong sign." [Ben-Ner and Jones (1995), p.551].

---

[10] It should be noted, however, that although risk considerations reduce the optimal profit share, a contract comprising fixed remuneration only is very unlikely [Hart and Holmstrom (1987)].

[11] To ascertain the merit of such arguments Levine and Tyson (1990) surveyed twenty-nine empirical studies of worker participation and found only two concluding against participation. In contrast, fourteen studies found in favour of participation with the remaining thirteen offering somewhat ambiguous results. Levine and Tyson concluded that successful participation requires: (i) some form of profit sharing to reward co-operative behaviour; (ii) guaranteed long term employment to increase the time horizons of workers and so render them more adaptable to change, (iii) relatively narrow wage differentials to promote group cohesiveness; and (iv) guaranteed worker rights - for example dismissal only for just cause.

Somewhat surprisingly there has been relatively little contemporary research into these issues. Several researchers have focused on the extreme case of employee-owned firms and co-operatives [see, for example, Greenberg (1986), Bartlett et al (1992)] but to our knowledge no one has explored the situation within profit sharing firms.

III. Theoretical Underpinning

Some insight into the possible relationship between employee sharing and supervision may be discerned from the following expository model. Assume that workers are homogenous risk neutral with utility functions of the form $u = m - e$. m represents income and e represents effort. Employed workers make a discrete all or nothing choice as regards the provision of effort to their employer such that $e = (0, \bar{e})$, $\bar{e} > 0$. The firm has access to some monitoring technology defined though the function $p(k)$ where k denotes the value of resources devoted to monitoring and $p(k)$ the probability that a shirker will be detected.[12] We assume $p'(k) > 0$ $p''(k) < 0$, $p(0) = 0$ and $\lim_{k \to \tilde{k}} p(k) = 1$.[13] Detection implies instantaneous dismissal and unemployment utility b.[14]

Fixed Wages

Consider first the fixed wage scenario. The firm's problem is to maximise profits subject to the constraints that the worker receives at least his/her reservation utility (viz. $b + \bar{e}$) and that, once employed, he/she does not shirk. This latter necessitates the worker being paid the lowest wage that satisfies the 'non-shirking constraint' (NSC):

$$w - \bar{e} \geq p(k)b + [1 - p(k)]w \tag{1}$$

Satisfaction of (2) implies an optimal (viz. 'efficiency') wage of:

$$w^* = \frac{\bar{e} + p(k)b}{p(k)} \tag{2}$$

---

[12] To avoid unnecessary complications we assume that the criteria on which this judgement is based are verifiable by an independent arbitrator such that there is no dispute about the firm's assessment.

[13] It is thus technically possible for the firm to perfectly monitor worker performance. Since our focus of interest is not the optimal level of monitoring we assume that production and monitoring technologies are such that it is always in the interests of the firm to monitor imperfectly.

[14] Allowing technically dismissed shirkers some chance of re-employment would not change the qualitative aspects of our conclusions.

such that workers receive some employment rents but are just indifferent between shirking and not shirking. The trade-off between wages and monitoring follows:

$$\frac{dk}{dw} = -\frac{p(k)^2}{p'(k)}\bar{e} < 0 \tag{3}$$

Fixed Wages with Remunerative Shirking Costs

Consider now a more general case in which the individual's wage is some function of his/her performance such that there is some remunerative penalty associated with shirking. To be sure, assume that the shirking wage is given by $w = w(1-z)$ where $z \in (0,1)$ is a parameter denoting the remunerative cost associated with shirking. If $z = 0$ then we return to the standard fixed wage case as above. As z increases the individual suffers an increasing financial penalty from shirking and in the limit loses all his/her wage as z approaches unity. The non shirking constraint is now:

$$w - \bar{e} \geq p(k)b + [1 - p(k)]w(1-z) \tag{4}$$

Satisfaction of which implies an efficiency wage of:

$$w^* = \frac{\bar{e} + p(k)b}{p(k)(1-z) + z} \tag{5}$$

The nature of the z parameter is crucial to the shape of the wage-monitoring trade off. The two limiting cases are:

$$\lim_{z \to 0} w^* = \frac{\bar{e} + p(k)b}{p(k)} \tag{6}$$

$$\lim_{z \to 1} w^* = \bar{e} + p(k)b \tag{7}$$

As z tends to zero there is no remunerative cost associated with shirking and we derive the efficiency wage defined in equation (2) above. As z tends to unity the remunerative cost associated with shirking is absolute and the efficiency wage is consequently reduced. Moreover, considering the effect of monitoring on the efficiency wage it is apparent that:

$$\lim_{z \to 0, k \to \tilde{k}} w^* = \bar{e} + b^* \tag{8}$$

$$\lim_{z\to 1, k\to \tilde{k}} w^* = \bar{e} + b^* \tag{9}$$

$$\lim_{z\to 0, k\to 0} w^* = \infty \tag{10}$$

$$\lim_{z\to 1, k\to 0} w^* = \bar{e} \tag{11}$$

Thus irrespective of the remunerative cost associated with shirking the firm can hold the worker down to his/her reservation wage providing it perfectly monitors.

The wage-monitoring trade-off is given by:

$$\frac{dk}{dw} = \frac{[p(k)(1-z)+z]^2}{p'(k)[bz-(1-z)\bar{e}]} \tag{12}$$

with limits:

$$\lim_{z\to 0} \frac{dk}{dw} = -\frac{p(k)^2}{p'(k)\bar{e}} < 0 \tag{13}$$

$$\lim_{z\to 1} \frac{dk}{dw} = \frac{1}{p'(k)b} > 0 \tag{14}$$

The trade-off depends crucially on the value of z. With no remunerative shirking costs we derive the conventional inverse relationship. With complete costs the trade off is positive, the expected utility of shirking increasing with the level of with monitoring since it is now in the worker's interest to be detected and fired since only then will any remuneration be received. The critical z value occurs when:

$$bz^* - \left(1-z^*\right)\bar{e} = 0 \quad \to \quad z^* = \frac{\bar{e}}{\bar{e}+b} \tag{15}$$

Thus the trade off is negative (positive) for values of z less than (greater than) z^*. The key point is illustrated in Figure I below.

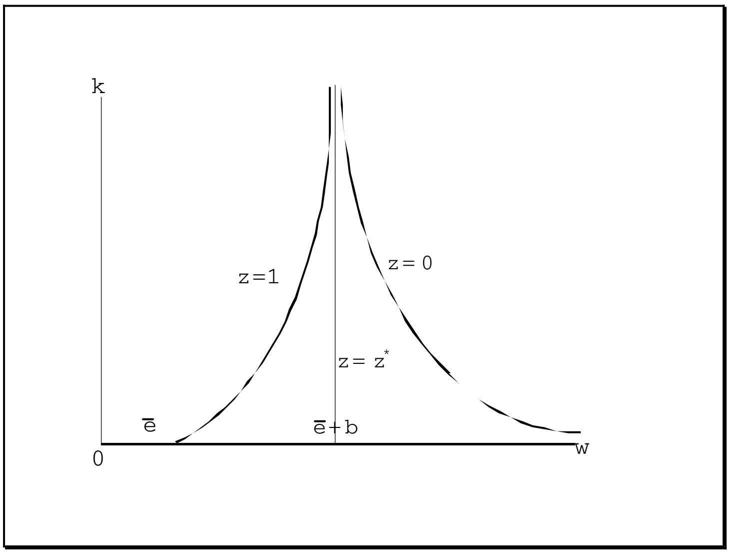

Figure I: Wage-Monitoring Trade Offs

Wages, Monitoring and Sharing

We now develop a somewhat more formal model of employee sharing. We assume for simplicity that firms employ a single worker and face a stochastic revenue function $f(e;q_i)$ where q_i is a parameter representing a random shock to demand or productivity. We assume that q_i takes one of two values, q_H with probability s or q_L with probability $(1-s)$. q_i is revealed to both the worker and the firm after the employment contract has been signed and impacts on revenue as follows:

$$f(\bar{e},q_H) > f(\bar{e},q_L) = f(0,q_H) > f(0,q_L) \tag{17}$$

We envisage a simple employee sharing contract of the form:

$$w = (1-l)\bar{w} + l f(e;q_i) \tag{18}$$

where w represents total remuneration, $\bar{w}$ the component of total remuneration that is 'fixed' (i.e. independent of worker performance), and $l \in [0,1]$ the level of worker equity (vis. the fraction of total remuneration that depends on individual effort).[15]

The NSC now takes the form:

[15] We assume in what follows that the extent of worker equity, as measured by l, is exogenous being fixed by custom or government directive. This is obviously a simplistic assumption and a fuller exposition would seek to explain the distribution of different contractual arrangements.

$$
\begin{aligned}
&s\left[(1-\lambda)\overline{w}+\lambda f\left(\overline{e},q_H\right)\right]+(1-s)\left[(1-\lambda)\overline{w}+\lambda f\left(\overline{e},q_L\right)\right]-\overline{e}\\
&\geq \\
&p(k)b+\left[1-p(k)\right]\left\{s\left[(1-\lambda)\overline{w}+\lambda f\left(0,q_H\right)\right]+(1-s)\left[(1-\lambda)\overline{w}+\lambda f\left(0,q_L\right)\right]\right\}
\end{aligned}
\tag{19}
$$

It is apparent from the above that the probability of detection is given by the probability that the firm monitors plus the probability that it does not monitor but that the worker is 'unlucky', viz. $p(k)+(1-s)\left[1-p(k)\right]$. We can therefore reduce equation (17) to:

$$
(1-\lambda)\overline{w}+\lambda\left[sf\left(\overline{e},q_H\right)+(1-s)f\left(\overline{e},q_L\right)\right]-\overline{e}\geq(1-\tilde{s})b+\tilde{s}\left[(1-\lambda)\overline{w}+\lambda f\left(0,q_H\right)\right]
\tag{20}
$$

where $\tilde{s}=s\left[1-p(k)\right]$. Solving for the base wage yields:

$$
\overline{w}=\frac{1}{(1-\lambda)(1-\tilde{s})}\left[(1-\tilde{s})b+e-\lambda\left\langle sf\left(e,q_H\right)-\left\{s\left[2-p(k)\right]-1\right\}f\left(e,q_L\right)\right\rangle\right]
\tag{21}
$$

and implies total 'efficiency' remuneration of:

$$
w^{*}=b+\frac{1}{(1-\tilde{s})}\left(e-\lambda s\tilde{s}\Delta f\right)
\tag{22}
$$

where $\Delta f= f\left(e,q_H\right)- f\left(e,q_L\right)$. Totally differentiating this expression yields the trade-offs between pay, supervision and sharing:

$$
\left.\frac{dk}{d\lambda}\right|_{dw=0}=\left\{\frac{s(1-\tilde{s})\Delta f}{p'(k)\left(\lambda s\Delta f-e\right)}\right\}
\tag{23}
$$

$$
\left.\frac{dk}{dw}\right|_{d\lambda=0}=\left\{\frac{(1-\tilde{s})^{2}}{p'(k)s\left(\lambda s\Delta f-e\right)}\right\}
\tag{24}
$$

$$
\frac{d^{2}k}{dw\,d\lambda}=-\left\{\frac{(1-\tilde{s})^{2}\Delta f}{p'(k)\left(\lambda s\Delta f-e\right)^{2}}\right\}
\tag{25}
$$

Equation (25) is unequivocally negative. The sign of equations (23) and (24) depend crucially on the term $\left(\lambda s\Delta f-e\right)$. If $\Delta f\leq\left(e/\lambda s\right)$ then equations (23) and (24) are negative such that profit sharing firms face the same inverse trade-off but monitor relatively less than their non-profit sharing counterparts.[16] If $\Delta f > (e/\lambda s)$ then equations (23) and (24) are positive implying that profit sharing firms monitor relatively more and face an upward sloping trade off.

Under these assumptions, $s\Delta f = \epsilon$ such that $\lambda s\Delta f < \epsilon$ and equations (23) - (25) are all negative implying that: (a) sharing firms devote relatively less resources to monitoring than their non-sharing counterparts; (b) like their non-sharing counterparts, sharing firms also face a trade-off between total remuneration and monitoring; and (c) the trade-off between total remuneration and monitoring is heightened amongst sharing firms - an increase in total remuneration induces a relatively larger decline in monitoring amongst sharing firms ceteris paribus.

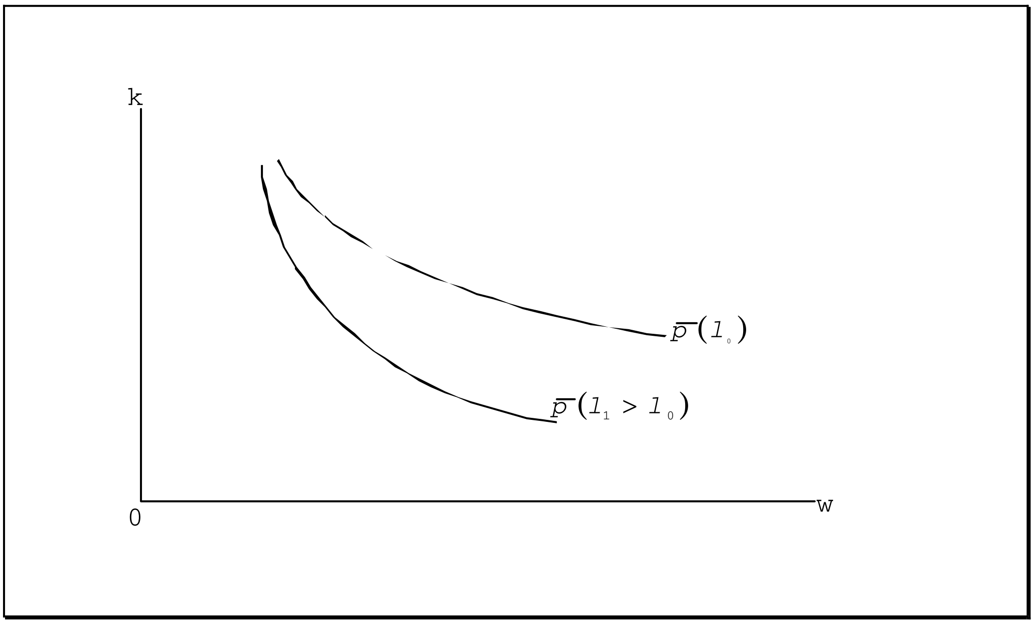

Figure II: Optimal Pay-Monitoring Trade Offs: $dk/dw < 0$

The latter is illustrated graphically in Figure II above. The two curves represent iso-profit lines in (w, k) space. An increase in the sharing coefficient sharpens the trade off between pay and monitoring. Intuitively, raising pay within a sharing firm will induce a relatively larger cut in monitoring expenditure: (i) the less sensitive is the monitoring function - i.e. the smaller is the fall in the probability of detection brought about by the reduction in monitoring; (ii) the larger is the level of effort required by the firm; and (iii) the larger is the potential loss to shirking that is independent of the firm's ability to monitor vis. $\lambda\Delta f$ - that is the share of profits given over to workers multiplied by the reduction in profits induced by the worker's decision to shirk. This will be zero for non-

[16] Note that $Df = 0$ - akin to the $z = 0$ case previously - ensures the conventional inverse trade off.

sharing firms. Within a large sharing environment it could be zero – the second term of the product in particular is likely to be negligible. It is very unlikely, however, to be positive and if the sharing arrangements are made over smaller sub-divisions then our predictions would hold.[17]

These predictions are, however, derived from a stylised instrumental exposition of efficiency wages. More generally, we would expect efficiency wages to operate in both an instrumental and gift exchange capacity, and it remains open to question as to how workers might interpret such gifts within a sharing environment. Do they confer increasing or diminishing marginal utility? If employee sharing is interpreted favourably by workers, does the additional gift of supra-competitive wages elicit relatively more or less effort in a sharing or a non-sharing firm? The sociological basis of gifts renders such issues virtually impenetrable to theoretical exposition and it is thus to our empirical evidence that we are obliged to turn.

IV. Data and Methodology

Data

Our data are derived from 1998 Cross-Section Workplace Employee Relations Survey (WERS) which is the fourth in a Government funded series of surveys conducted at British workplaces. The other three surveys were conducted in 1980, 1984 and 1990. The aim of the survey is to provide nationally representative data on the current state of workplace relations and employment practices in Britain and it is regarded as a principal source of information pertaining to changes in British industrial relations. The overall purpose of the WERS is 'to provide information on the state of management-employee relations in Britain.'

The National Centre for Social Research is responsible for sampling and statistical consultancy, the conduct of the fieldwork, coding and preparation of the final data. The WERS comprises three main sections; the 'Management Questionnaire', the 'Worker Representative Questionnaire' and finally the 'Employee Questionnaire'. For the purposes of this study, we have used the data from the 'Management Questionnaire' – the survey population being all British workplaces with at least ten employees except for those in agriculture, hunting and forestry, fishing,

[17] Note that the level of monitoring expenditure will also determine the shape of the trade-off depending upon the linearity or otherwise of the available monitoring technology.

mining and quarrying, private households with employed persons and extra-territorial organisations. Approximately 3,200 firms were asked to take part in the WERS – thereby covering a virtually complete cross-section of the working population in Britain. Out of these 3,200 firms, Management Questionnaires were completed via face-to-face interviews with 2,191 managers yielding a response rate of approximately 80%.[18]

Methodology

Our estimating equation is specified as follows:

$$m_i = aW_i + bZ_i + u_i \tag{26}$$

where $i = 1,\ldots,N$ denotes the firm specific subscript and N denotes the total number of firms in the cross-section. m_i represents the 'monitoring intensity' of firm i whilst W_i and Z_i represent vectors of compensation and firm environment characteristics respectively.

Following Leonard (1987), Gordon (1990, 1994) and Neal (1993), we proxy monitoring intensity via the ratio of supervisory to non-supervisory employees. Supervisors, which include foremen and line managers, are defined in the WERS as 'those people directly concerned with the detailed supervision of work.' The specific question asked in the 'Management Questionnaire' of the WERS is as follows 'what proportion of non-managerial employees here have job duties that involve supervising other employees?' Managers were asked to indicate in which range their firm lay – 0%, 1 – 19%, 20 – 39%, 40 – 59%, 60 – 79%, 60 – 79% or 80 to 99%. From this information, we constructed a 7-point supervision index where 6 (0) represents the highest (lowest) proportion of supervisors. In order to estimate equation (26), a weighted ordered probit model was, therefore, specified. The data was weighted to compensate for the fact that firms had different probabilities of being selected for the survey.[19]

---

[18] The management respondent was defined as 'the senior manager dealing with personnel, staff or employee relations' at the establishment.

[19] The probability of selection was determined by three factors (i) the Standard Industrial classification major group and the size band assigned by the Inter-Departmental Business Register (IDBR) maintained by the Office for National Statistics (ii) whether the establishment on the IDBR accords with the definition of an establishment on the WERS and (iii) the probability that the establishment was selected for the previous WERS as these establishments where possible were excluded from the 1998 WERS.

Drago and Perlman (1989) support the use of supervision as a proxy for monitoring, although they acknowledge that supervision may occur for non-monitoring purposes – for example, to co-ordinate production. Indeed, monitoring may not entail direct supervision but may instead rely on factors such as output measurement and piece rates. More problematic, the number of supervisors might be high because monitoring is difficult [Allgulin and Ellingsen (1998)] or that supervisors only spend a fraction of work time monitoring [Rebitzer (1995)]. Despite these problems, the relative paucity of data compels us – like so many other researchers – to rely on the proxy defined above.[20]

We incorporate a number of variables into our analysis to control for compensation and environmental factors within the firm. Full variable definitions and summary statistics for the explanatory variables are detailed in Tables I and II in the Appendix. Wages clearly play a key role in our analysis. It is apparent, however, that a potential issue of endogeneity may exist with respect to wages and, hence, in the empirical specifications that follow we instrument for our wage proxy variable.[21]

In particular, and given our objective of investigating the relationship between supervision, pay and employee sharing, we include three variables representing the proportion of non-managerial employees participating in profit sharing, employee share ownership or performance related pay schemes. It is apparent from Table II that the average rate of supervision is relatively lower amongst 'sharing' firms (i.e. those operating profit sharing, employee share ownership or performance related pay schemes). It is misleading, however, to read too much into this since there are significant differences across the two types of firms that may themselves be correlated with employee sharing and/or supervision. To control for such factors we turn to our econometric analysis.

V. Results

[20] One exception is Kruse (1992) who proxies monitoring by an employee reported measure of how often the supervisor checks his/her work.

[21] Over-identifying instruments for the wage equation include industry dummy variables as well as the proportion of managers, senior administrative and professional staff, the proportion of technical staff, the proportion of clerical and secretarial staff, the proportion of craft and skilled service staff, the proportion of protective and personal service staff, the proportion of sales staff and the proportion of operative, assembly and routine unskilled staff.

Our ordered probit results are set out in Tables III and IV following. We estimated three specifications focusing on the relationship between supervision and wages, supervision and 'sharing' and supervision and the interaction between wages and 'sharing'. In general, our results are reasonably robust across all three specifications. In all three specifications, we find evidence of a highly significant inverse relationship between wages and supervision as predicted by the instrumental efficiency wage model. The magnitude of this effect is especially heightened in specification (i) where the variables relating to sharing schemes are omitted. In Specification (ii) we augment our basic model with variables denoting the extent of profit sharing, employee share ownership and performance related pay. It is apparent that the extent of participation in employee share ownership and performance related pay schemes, in accordance with our theoretical priors derived from the instrumental efficiency wage model, appears to be strongly inversely related to supervision. It is surprising to note, however, that the extent of participation in profit sharing schemes is insignificantly related to supervision.

In specification (iii), we include three variables that capture the interaction between wages and the extent of participation in profit sharing, employee share ownership and performance related pay. To be specific, our aim is to explore the prediction encapsulated by Equation (25) of a heightened trade-off between remuneration and monitoring in 'sharing' firms. Our empirical results accord with the instrumentalist model in the case of performance related pay and employee share ownership but this is not, however, the case for profit sharing.[22]

Table VI presents the marginal effects of changes in selected regressors for the seven probabilities pertaining to each level of the supervision index. In specification (iii), it is apparent that for values of the supervision index ranging from 2 to 6, in accordance with our theoretical priors, the marginal effects are negative for the four explanatory variables – % PS, % ESOP, % PRP and wages. The marginal effects are largest for the ESOP variable indicating that employee involvement in the firm may be more important in effort elicitation that remuneration per se. This overall pattern is

[22] The ethereal nature of the gift exchange approach hinders econometric interpretation. Our results, however, may be interpreted as suggesting that the marginal utility of a gift of higher wages is increased within 'sharing' firms – workers in these firms may be responding to the higher wages by requiring less monitoring.

repeated in specifications (i) and (iii) with the exception of the interactive term between % PS and wages. As noted above, however, the estimated coefficient on this term is statistically insignificant.

Other results, which accord with efficiency wage considerations, include the following. In all three specifications monitoring is inversely associated with dismissals and redundancies yet positively associated with the extent of new recruitment. Firms experiencing difficulties filling vacancies appear to monitor more – these firms may have a strong incentive to encourage their current work force to 'work' rather than 'shirk'. The extent of supervision is also positively associated with the amount of discretion that employees harbour over their work. Fixed term contract employment is inversely associated with the extent of supervision. It might be the case that concerns regarding the renewal of such contracts are sufficient to spur individual performance.

We also incorporate employment as a proxy for firm size, differences in which may induce differences in monitoring with turnover and adverse selection costs encouraging larger firms to pay higher wages [Brunello (1995), Kruse (1992), Bulow and Summers (1986)]. Surprisingly, the estimated coefficient on employment is insignificant and hence does not lend support to the hypothesis that large firms devote more resources to monitoring. Finally, off-the-job training is positively associated with supervision suggesting that firms investing heavily in training are more inclined to monitor perhaps in order to ensure returns from the expansion of human capital.

VI. Final Comments

Instrumental efficiency wage models predict an inverse relationship between wages and supervision with his relationship becoming more pronounced amongst firms that participate in some form of employee sharing. To be sure, our theoretical exposition predicts that an increase in total remuneration will elicit a larger cut in optimal monitoring in 'sharing' rather than 'non sharing' firms.

In this paper, we have explored these predictions empirically using the British 1998 Workplace Employee Relations Survey. Our results confirm an inverse relationship between supervision and pay but the trade-off is only heightened by the presence of performance related pay and employee share ownership schemes. We also find that employee share ownership and performance related pay are relatively more successful in alleviating the need to monitor, with the rate of profit sharing impacting insignificantly on the level supervision.

Some caution is, however, warranted. Although introspection would suggest otherwise, we are unable to dismiss the possibility that it is supervision, or some other factor, which drives employee sharing. It may be the case, for example, that firms operating employee share ownership plans are able to economise on monitoring because they are relatively more receptive to the needs and desires of their employees, who themselves respond positively to this ethos, with the implementation of the employee share ownership plan being but one of many such by-products.

Appendix

Table I: Variable List and Definitions

Variable	Definition
Supervise	% of non-managerial employees who are supervisors
Wage Proxy	Index denoting operating costs accounted for by wages, salaries and other labour costs such as pensions and national insurance as a proportion of sales revenue[23]
% PS	% of non-managerial employees who received profit related pay in the past 12 months
% ESOP	% of non-managerial employees participating in employee share ownership scheme
% PRP	% of non-managerial employees who received performance related pay in the past 12 months
Dismissal Decision	Dummy Variable = 1 if supervisors have the final decision about dismissing workers for unsatisfactory performance
Trained Supervisors	% of supervisors who have been trained in 'people management' skills[24]
Off-the-job Training	% of employees who have received formal 'off-the-job' training over the past 12 months
Training Days	Average number of days per employee received in 'off-the-job' training over the past 12 months
Vacancy Difficulties	Dummy variable = 1 if firm has had difficulty filling non-managerial, senior administrative or non-professional vacancies in the last 12 months
Discretion	Index denoting how much discretion employees have over their work
Pace	Index denoting how much control employees have over the pace of their work
Piece Rates	Dummy variable = 1 if individual performance or output is measured by piece rates
Fixed Term Contracts	% of employees employed on fixed term contracts
Female	% of female employees
Part-Time	% of part-time employees (i.e. employees working fewer than 30 hours per week)
Dismissals	Number of dismissals over the past 12 months
Redundancies	Number of redundancies over the past 12 months
New Entrants	Number of people starting work over the past 12 months
Young	% of employees aged less than 20
Old	% of employees over age of 50
Ethnicity	% of employees from non-white ethnic background
Trade Union Members	Number of trade union members / number of employees
Firm Size	Number of employees

[23] The 'Employee Questionnaire' represents an alternative source of wage data. For this survey, a sample of employees, randomly selected from all employees, was asked to indicate in which band their wage or salary lay. A maximum of 25 employees were selected from each firm. Given that in very large firms such a sample size is somewhat small and may not, therefore, be representative of the workplace as a whole, we decided to use the alternative source of wage information presented in the 'Management Questionnaire'.

[24] Examples of 'people management' skills include leadership, team building, motivation and co-operation skills; communication skills; counselling; handling discipline and grievance matters; interviewing techniques; effective job organisation; problem analysis and decision making.

Table II: Descriptive Statistics

	All Firms (n = 2191)				Sharing Firms (n = 985)		Non-Sharing Firms (n = 1233)	
Variable	Mean	S.Dev	Min	Max	Mean	S.Dev	Mean	S.Dev
Wage Proxy	2.26	1.28	0.00	4.00	1.90	1.17	2.54	1.29
% PS	0.26	0.42	0.00	1.00	0.58	0.45	–	–
% ESOP	0.11	0.27	0.00	1.00	0.25	0.36	–	–
% PRP	0.13	0.32	0.00	1.00	0.31	0.42	–	–
Supervise	1.64	1.25	0.00	6.00	1.55	1.20	1.71	1.28
Dismissal Decision	0.08	0.27	0.00	1.00	0.08	0.27	0.07	0.26
Trained Supervisors	0.40	0.39	0.00	1.00	0.47	0.40	0.36	0.38
Off-the-job Training	0.48	0.37	0.00	1.00	0.50	0.36	0.46	0.38
Training Days	3.24	2.84	0.00	10.00	3.40	2.84	3.11	2.83
Vacancy Difficulties	0.43	0.50	0.00	1.00	0.47	0.50	0.39	0.49
Discretion	1.80	0.87	0.00	3.00	1.72	0.85	1.86	0.88
Pace	1.70	0.89	0.00	3.00	1.68	0.88	1.71	0.90
Piece Rates	0.01	0.11	0.00	1.00	0.03	0.16	0.00	0.03
Fixed Term Contracts	0.04	0.09	0.00	0.50	0.03	0.07	0.05	0.10
Female	0.49	0.29	0.00	1.00	0.42	0.26	0.55	0.29
Part-Time	0.26	0.28	0.00	1.00	0.20	0.26	0.30	0.29
Dismissals	2.29	6.94	0.00	162.00	3.02	9.01	1.72	4.67
Redundancies	4.72	27.60	0.00	835.00	6.59	36.18	3.27	18.23
New Entrants	43.66	112.37	0.00	2665.00	53.23	131.61	36.22	94.14
Young	0.06	0.11	0.00	0.89.00	0.07	0.11	0.06	0.11
Old	0.15	0.12	0.00	0.86.00	0.13	0.10	0.16	0.12
Ethnicity	0.05	0.10	0.00	0.89.00	0.05	0.10	0.05	0.10
Trade. Union Members	0.31	0.35	0.00	1.00	0.31	0.35	0.31	0.34
Firm Size	288.74	847.31	10.00	28971.00	300.47	449.83	279.63	1057.75

Table III: All Firms

Dependent Variable: SUPERVISE - Weighted Ordered Probit Model

Variable	Specification (i) Coeff	Specification (i) T Stat	Specification (ii) Coeff	Specification (ii) T Stat	Specification (iii) Coeff	Specification (iii) T Stat
Wage Proxy	-0.0713	-10.691	-0.0430	-6.254	-0.0470	-6.767
% PS	–	–	-0.0215	-1.001	–	-
% ESOP	–	–	-0.3167	-5.502	–	-
% PRP	–	–	-0.2954	-10.777	–	-
% PS*Wage	–	–	–	–	0.0116	1.697
% ESOP Wage	–	–	–	–	-0.0981	-4.763
% PRP*Wage	–	–	–	–	-0.0629	-7.242
Dismissal Decision	0.5357	15.570	0.5146	14.895	0.5213	15.092
Trained Supervisors	0.7625	35.847	0.8003	36.036	0.7884	35.380
Off-the-job Training	0.1120	6.371	0.1520	8.277	0.1465	7.738
Training Days	0.0006	0.278	-0.0008	-0.340	-0.0009	-0.040
Vacancy Difficulties	0.2739	20.794	0.2581	9.192	0.2617	19.404
Discretion	0.0170	2.180	0.0221	2.814	0.2081	2.663
Pace	-0.0333	-4.228	-0.0357	-4.534	-0.0336	-4.276
Fixed Term Contracts	-0.2391	-3.300	-0.2795	-3.872	-0.2556	-3.528
Piece Rates	-0.2175	-1.069	-0.1635	-0.567	-0.1846	-0.651
Female	0.0928	4.014	0.0953	4.100	0.1044	4.488
Part-Time	-0.2025	-8.965	-0.2330	-10.146	-0.2159	-9.348
Log Dismissals	-0.1615	-10.199	-0.1751	-11.083	-0.1712	-10.735
Log Redundancies	-0.0594	-2.585	-0.0639	-2.830	-0.0637	-2.789
Log New Entrants	0.1065	13.270	0.1081	13.208	0.1086	13.260
Young	0.3110	7.127	0.2829	6.400	0.2935	6.660
Old	0.2203	4.748	0.1391	2.960	0.1911	4.082
Ethnicity	0.0135	0.291	0.1021	2.033	0.0727	1.463
Trade Union Members	-0.0095	-0.394	0.0197	0.789	0.0063	0.255
Log Firm Size	-0.0228	-1.310	-0.0053	-0.301	-0.0116	-0.665
Constant	0.7974	14.146	0.7106	12.423	0.7023	12.437
Log Likelihood Function	-3043.173		-3033.148		-3036.996	
Restricted Log Likelihood	-3157.561		-3157.561		-3157.561	
Chi-Squared Statistic	228.7757 20 d.f.		248.8255 23 d.f.		241.1304 23 d.f.	
Number of Observations	2191		2191		2191	

Table IV: All Firms

Dependent Variable: SUPERVISE – Weighted Ordered Probit Model (Marginal Effects)

	Supervision Index						
Variable	0	1	2	3	4	5	6
				Specification (i)			
Wage	0.0166	0.0101	-0.0117	-0.0061	-0.0036	-0.0018	-0.0035
				Specification (ii)			
% PS	0.0050	0.0031	-0.0036	-0.0018	-0.0011	-0.0005	-0.0010
% ESOP	0.0732	0.0453	-0.0526	-0.0269	-0.0157	-0.0080	-0.0152
% PRP	0.0683	0.0422	-0.0491	-0.0251	-0.0147	-0.0074	-0.0142
Wage	0.0099	0.0061	-0.0071	-0.0037	-0.0021	-0.0011	-0.0021
				Specification (iii)			
% PS*Wage	-0.0027	-0.0017	0.0019	0.0010	0.0006	0.0003	0.0006
% ESOP*Wage	0.0227	0.0140	-0.0162	-0.0084	-0.0049	-0.0025	-0.0047
% PRP*Wage	0.0146	0.0090	-0.0104	-0.0054	-0.0031	-0.0016	-0.0030
Wage	0.0109	0.0067	-0.0078	-0.0040	-0.0023	-0.0012	-0.0023

References

Akerlof, G.A. (1982). 'Labor Contracts as Partial Gift Exchange.' Quarterly Journal of Economics, 97, pp. 543-569.

Alchian, A. and Demsetz, H. (1972). 'Production, Information Costs, and Economic Organisation.' American Economic Review, 62, pp. 777-795.

Allgulin, M. and T. Ellingsen (1998) 'Monitoring and Pay.' Working Paper Series in Economics and Finance No. 245, Stockholm School of Economics.

Aoki, M. (1984). 'The Competitive Game Theory of the Firm', Oxford, Basil Blackwell.

Arai, M. (1994). 'Compensating Wage Differentials versus Efficiency Wages: An Empirical Study of Job Autonomy and Wages.' Industrial Relations, 33 (3), pp. 249-262.

Bartlett, W., J. Cable, S. Estrin, D.C. Jones and S.S. Smith. (1992). 'Labor Managed Cooperatives and Private Firms in North Central Italy: An Empirical Comparison.' Industrial and Labor Relations Review, 46 (1), pp. 103-118.

Bell, L. and R.B. Freeman. (1985). 'Does a Flexible Industry Wage Structure Increase Employment? The US Experience.' National Bureau of Economic Research Working Paper, 1604, Cambridge: Mass.

Ben-Ner, A. and D.C. Jones. (1995). 'Employee Participation, Ownership and Productivity: A Theoretical Framework.' Industrial Relations, 344, pp. 532-554

Blinder. A. (1990). Paying for Productivity: A Look at the Evidence. Washington D.C: The Brookings Institution.

Bowles, S. (1985). 'The Production Process in a Competitive Economy: Walrasian, NeoHobbesian and Marxian Models.' American Economic Review, 75, pp. 16-36.

Brown, C. and J.L. Medoff. (1985). 'The Employer Size Wage Effect.' Journal of Political Economy, 97, pp. 1027-1059.

Brunello, G. (1995). 'The Relationship between Supervision and Pay: Evidence from the British New Earnings Survey.' Oxford Bulletin of Economics and Statistics, Volume 57 (3), pp 309-322.

Bulow, J.I and L.H. Summers. (1986). 'A Theory of Dual Labor Markets with Application to Industrial Policy, Discrimination and Keynesian Unemployment.' Journal of Labor Economics, 4, pp. 376-414.

Cain, G. (1976). 'The Challenge of Segmented Labor Market Theories to Orthodox Theory.' Journal of Economic Literature, 14, pp. 1215-1257.

Calvo, G. (1979). 'Quasi-Walrasian Theories of Unemployment.' American Economic Review, 69, pp. 102-107.

Cullen, D. (1956). 'The Inter-Industry Wage Structure: 1899-1950.' American Economic Review, 46, pp. 353-369

Dickens, W.T. and L.F. Katz. (1987). 'Industry and Occupational Wage Patterns and Theories of Wage Determination.' In K. Lang and J. Leonard (eds.) Unemployment and the Structure of Labor Markets. Oxford: Blackwell.

Drago, R. and R. Perlman. (1989). 'Supervision and High Wages as Competing Incentives: A Basis for Labour Market Segmentation Theory.' in Microeconomic Issues in Labour Economics, R. Drago and R. Perlman (Editors), Harvester Wheatsheaf, London.

Dunlop, J. (1957). 'The Task of Contemporary Wage Theory.' In J. Dunlop (ed.) The Theory of Wage Determination. London: Macmillan

Eaton, B.C. and W.D. White. (1983). 'The Economy of High Wages: An Agency Problem.' Economica, 50, pp. 175-181.

Fitzroy, F., and K. Kraft. (1986), 'Cooperation, Productivity and Profit Sharing.' Quarterly Journal of Economics, 102 (1), pp 23-35.

Garbarino, J. (1950). 'A Theory of Inter-Industry Wage Structure Variation.' Quarterly Journal of Economics, 64, pp. 282-305.

Gordon, D.M. (1990). 'Who Bosses Whom? The Intensity of Supervision and the Discipline of Labor.' American Economic Review, 80 (2), Papers and Proceedings, pp. 28-32.

Gordon, D.M. (1994). 'Bosses of Different Stripes: A Cross-National Perspective on Monitoring and Supervision.' American Economic Review, 84 (2), Papers and Proceedings, pp. 375-379.

Greenberg, E.S. (1986). Workplace Democracy: The Political Effects of Participation, Ithaca, New York, Cornell University Press.

Groshen, E. and A. Krueger. (1990). 'The Structure of Supervision and Pay in Hospitals.' Industrial and Labor Relations Review, Special Issue, 43, pp. 134S-146S.

Hart, O. And B. Holstrom. (1987). 'The Theory of Contracts.' In. Bewley, T.F. ed., Advances in Economic Theory - Fifth World Congress, pp. 71-155. Cambridge: Cambridge University Press.

Jensen, M. C. and Meckling, W. H. (1979). 'Rights and Production Functions: An Application to Labour-Managed Firms and Codetermination.' Journal of Business, 52 pp.469-506.

Kanter, R.M. (1987). 'The Attack on Pay.' Harvard Business Review, 65, pp.60-67.

Krueger, A. (1991). 'Ownership, Agency and Wages: An Examination of Franchising in the Fast Food Industry.' Quarterly Journal of Economics, 106, pp.75-102.

Krueger, A. and L. F. Summers. (1987). 'Reflections on the Inter-Industry Wage Structure.' In K. Lang and J. Leonard (eds.).) Unemployment and the Structure of Labor Markets. Oxford: Blackwell.

Kruse, D. (1992) 'Supervision, Working Conditions and the Employer Size Effect.' Industrial Relations, 31, pp. 229-249.

Leonard, J. (1987). 'Carrots and Sticks: Pay, Supervision and Turnover.' Journal of Labor Economics, 5 (4), S136-S152.

Levine. D. I and L. A. Tyson. (1990). 'Participation, Productivity and the Firm's Environment.' In A. Blinder, ed., Paying for Productivity: A Look at the Evidence. Washington, D.C.: The Brookings Institution.

McNabb, R and K. Whitfield. (1998). 'The Impact of Financial Participation and Employee Involvement on Financial Performance.' Scottish Journal of Political Economy, 45 (2), pp.171-187.

Neal, D. (1993). 'Supervision and Wages across Industries.' Review of Economics and Statistics, LXXV, pp.409-417.

O'Dell, C. and J. McAdams. (1987). People, Performance and Pay. Austin, Texas: American Productivity Centre.

Rebitzer, J. B. (1995). 'Is there a Trade-off between Supervision and Wages? An Empirical Test of Efficiency Wage Theory.' Journal of Economic Behavior and Organization, 28, pp.107-129.

Reder, M. (1962). 'Wage Differentials: Theory and Measurement.' In Aspects of Labor Economics. Princeton: Princeton University Press (for National Bureau of Economic Research).

Shapiro, C. and J. E. Stiglitz. (1984): Equilibrium Unemployment as a Worker Discipline Device. American Economic Review, 74, pp.433-44.

Slichter, S. (1950). 'Notes on the Structures of Wages.' Review of Economics and Statistics, 32, pp.80-91.

Weitzman, M. (1985). 'The Simple Macroeconomics of Profit-Sharing.' American Economic Review, 75, pp.937-953.

Weitzman, M. L. and D. L. Kruse. (1990). 'Profit Sharing and Productivity.' In A. Blinder, ed., Paying for Productivity: A Look at the Evidence, Washington, D.C.: The Brookings Institution.