NBER WORKING PAPER SERIES

COMPLEMENTARITY OF SHARED COMPENSATION AND DECISION-MAKING SYSTEMS: EVIDENCE FROM THE AMERICAN LABOR MARKET

Arindrajit Dube
Richard Freeman

Working Paper 14272
http://www.nber.org/papers/w14272

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 2008

Complementarity of Shared Compensation and Decision-Making Systems: Evidence from the American Labor Market

Arindrajit Dube and Richard Freeman

NBER Working Paper No. 14272
August 2008
JEL No. J33,J54,L23,L25

ABSTRACT

This paper examines the relationship between shared capitalist modes of pay and shared modes of decision-making via employee involvement and related committees and between them and measures of productivity and worker well-being in two data sets: the employee based Worker Participation and Representation Survey and the California Establishment Survey. It finds in both data sets that the forms of shared compensation are complementary in the sense that they are more likely to be found together than if firms chose them separately; that shared compensation systems are positively associated with shared decision-making; and that combining shared compensation systems and employee involvement has greater impacts on outcomes than each system by itself.

Arindrajit Dube
UC Berkleley Institute of Industrial Relations
2521 Channing Way
Berkeley, CA 94720
adube@berkeley.edu

Richard Freeman
NBER
1050 Massachusetts Avenue
Cambridge, MA 02138
and NBER
freeman@nber.org

In the 1990s an increasing proportion of US firms moved toward compensation systems that made part of pay depend on the economic performance of work-groups or the firm. They gave profit-sharing bonuses, paid group incentive schemes (gain-sharing), developed employee stock ownership programs, awarded stock options, and funded pensions through defined contribution pension plans which put considerable assets in the stock of the firm. Over the same period, firms introduced teams, total quality management, quality circles, employee involvement committees, and other structures that gave employees a greater role in decision-making.

How significant are these new forms of compensation and modes of employee involvement? To what extent are the new forms of compensation linked to employee involvement programs? How have they affected employee behavior and attitude?

This paper examines these questions using the 1994-1995 Freeman-Rogers "Workplace Representation and Participation Survey" (WRPS) (Freeman and Rogers, 1999), and the 2003 California Establishment Survey (CES). The WRPS focuses on employee involvement and work organization but also asks about the mode of compensation so that we can link compensation systems and employee decision-making. The CES surveys businesses on compensation and decision making practices, and has productivity-related outcomes that allow us to examine the relation between firm performance and compensation and decision-making systems.

We find that: 1) New forms of compensation based on pay for group or company performance, or ownership of company shares have increased rapidly;2) Compensation systems that base part of pay on company or group performance are linked with employee participation in decision-making, suggesting that these institutions form a complementary package of

employee-management relations; 3) Together, employee involvement programs and shared compensation improve outcomes such as job satisfaction, attitude toward the firm, and a 0-1 measure of whether the worker was or was not likely to stay with the firm. In the worker survey, involvement programs have an independent effect on outcomes whereas the effect of shared compensation depends on the presence of involvement programs. 4) The highest outcomes occur when firms combine pay for company or group performance with an ownership stake in the firm and employee involvement committees. This supports the notion that these policies form a complementary package of employee-management relations.

The principal weakness in our study is the lack of exogenous variation in the presence of compensation and decision making systems, which firms choose, presumably for economic reasons. Still, the evidence fits more readily with the hypothesis that shared compensation and decision-making have real economic impact through altering *collective* employee incentives than with the null hypothesis that the results reflect sorting of firms or the impact of a single unobservable variable. We find similar associations in the two datasets and in specifications that control for unobserved factors. We also find complementarity in both the incidence of shared compensation and decision-making *and* in their relation to outcomes that suggests that the systems have real effects even though unobservable factors may bias estimated magnitudes.

The New Forms of Pay

Traditional economic analysis of labor contracts distinguish between: **employment contracts**, whereby a firm buys the time of a worker to do what management views as profitable and pays a time-based wage; and **sales contracts**, where the firms buys a product from the worker (Simon, 1947). In the employment contract model, the employer determines the activities that workers undertake at the workplace subject to principal/agent problems when the employer cannot fully monitor employee effort. By contrast, the sales contract is a model of

self-employment where the worker decides how much to work and how to produce the product. The classic sales contract in the job market is the piece rate. In cases where pieces can be readily measured, this solves principal agent problems but loses the advantages of coordinating work and of workers sharing knowledge of newly discovered ways to improve productivity.

The **shared compensation and decision-making** arrangements on which we focus fit between these polar cases. Under these arrangements workers share the financial benefits and risks of economic activity and/or decisions about production with the firm. Ideally, giving workers a financial incentive to behave in the interests of the firm and empowering them to make decisions increases the value of the firm and enhances worker well being.

There are diverse systems of shared compensation. We differentiate between systems that involve **financial ownership**, where the workers' reward depends on share prices, and group or company **profit-sharing or bonus systems** that reward workers on the basis of group or company performance irrespective of share prices. Employee stock ownership plans (ESOPs), majority employee ownership, defined contribution pension money invested in one's own firm, stock purchase plans and employee stock options all fit under the financial ownership rubric. Gain sharing, profit-sharing, bonuses linked to performance, Scanlon plans based on cost-saving, and so on, fit under the profit-sharing rubric.

There are also diverse institutions for **shared decision-making.** Employee involvement committees (EI), works councils as in the European Union, quality circles and team production give workers a say in what happens at their work site. At the corporate level, workers can serve on boards, which Germany legislatively requires but which is uncommon in the US, and worker-run pension funds can appoint directors.

Our classification arguably exaggerates differences among systems. Almost all employment arrangements have scope for sharing profits and decisions between owners and

workers. Most workers paid straight time wages have some control over decisions, and the better they perform, the more likely the firm will give them pay increases, promotions, and other benefits in the future. At the other end, even small partnerships will divide decision-making unevenly, while piece rate systems are more complicated than the simple sales contract model indicates, especially when the firm has to update the piece rates regularly due to technological change (Freeman and Kleiner, 1999). Still, the differences between traditional employment and sales contracts and modern shared compensation contracts are sufficiently large to make this a useful typology.

The incentive to free ride creates a problem for shared compensation structures. Rationalizing employee stock ownership or company-wide profit sharing is difficult because it is hard to see how these systems can motivate individual workers. It's one thing to pay the CEO of Starbucks or Bank of America stock options or profit-related bonuses, since their decisions can affect the share price and profits; but the clerks at a local store can hardly affect the share price or company-wide profits. Lazear (1999) offers a sorting explanation for variable pay among managers – that compensation linked to long term financial viability of the company elicits better information from managers about the true state of affairs. But, as he notes, such an explanation does not explain shared compensation for lower level workers. Oyer and Schafer (2002) argue that options may attract workers optimistic about the firm – which in conjunction with tax benefits from delayed exercise of options can provide an edge to this form of compensation. However, this seems to imply that options are useful mainly when they can fool employees, which is unlikely over a long period of time.

One possible explanation is that variable compensation affect employees by helping create a corporate culture that improves company performance. For instance, if employees share the gains when the company is doing well, they may feel more enthusiastic about putting forth

greater effort based on notions of fairness, even if rational calculations favor free riding on the efforts of others. They may self-monitor effort at the workplace, along the lines shown by Freeman, Blasi, and Kruse (2007).

In any case, if shared compensation schemes affect employees' willingness to engage in production issues, it makes sense to couple such schemes with programs that devolve workplace decisions to workers. Firms that give workers financial incentives but that do not empower them to make decisions are unlikely to benefit from the incentive system. Firms that give workers decision-making authority but no financial incentive risk workers making decisions that are not in the firms' interest. Thus, we expect financial sharing systems to be complementary with systems of shared decision-making, and for shared compensation and decision-making to produce higher outcomes together than they do separately.

Extent of Shared Compensation and Decision-Making Systems

How extensive are shared compensation and decision-making systems? How has their prevalence changed over time?

These basic questions are difficult to answer because until the General Social Survey asked about the systems in 2002 and 2006 there was no single nationally representative source of data on the extent of shared capitalism. Most administrative-based or establishment-based compensation surveys cover a single form of pay – such as defined contribution pension funds, 401k plans, or profit-sharing – without information on the overlap with other forms of financial sharing. Since workers receive several forms of pay related to performance, simply adding the numbers under each separate category will overstate the total number of workers having shared compensation pay systems. The employment cost index includes bonuses and profit-sharing but excludes stock options and related programs and provides no information on pension funds invested in the firm. The Bureau of Labor Statistics (BLS) conducted a national benefit survey

in 2000, but this focused primarily on retirement and health benefit plans. The BLS's 1999 survey of the incidence of stock option based compensation did not ask about other types of shared compensation plans.

Employee based surveys can resolve the overlap problem but suffer from measurement error, particularly of the size and nature of benefit programs. In their study of pensions held by older workers, Gustman and Steinmeier (1988, p 40) report that "discrepancies between firm provided and administrative records ... and respondent reports ... are large for many respondents". Opinion surveys typically find that 10 or so percent of workers report that their firm is employee-owned, which far exceeds any plausible estimate from administrative records (Freeman, Kruse, Blasi, Mackin, 2000). Many workers may interpret having a 401k plan that invests in their firm, or individual ownership of shares, as employee ownership when in fact the firm is owned by shareholders rather than workers. Still, by piecing together data from several sources, and comparing the results with the GSS, we can get a general picture of the extent and growth of new forms of compensation.

Table 1 estimates the proportion of the private sector work force that had a financial stake in the performance of their firm in the late 1990s from the sources described in Appendix Table A. Approximately 25 percent of the work force had a stake in their firm through some form of ownership. The main vehicle for employee ownership has been the Employee Stock Ownership Plan (ESOP). The National Center of Employee Ownership (NCEO) estimated that in 1998 some 8,500,000 workers were employed in over 11,400 ESOP and related stock bonus plans with combined assets of around 400 billion.[1] This is about 8% of the US private sector work force. In addition, the NCEO estimates that 7 to 10 million workers receive stock options as part of all employee stock option plans, for another 8% or so of the private sector work force.

[1]More recent figures from NCEO indicate that in 2002, some 8.8 million workers were enrolled in ESOP plans, and around 15 million participated in stock purchase plans.

This estimate contrasts with the employee survey conducted by the BLS, which found that in 1999, 1.7% of all employees, or 5.3% of employees of publicly traded companies received options grants in 1999. Some of the divergence is likely due to differences in the timing covered by questions. Since companies may not give out broad based options each year, the number of employees who "regularly" receive options is greater than those who might receive it in one particular year. An additional 10% or so of the work force received special opportunities to buy company stock.

Profit sharing differs from employee ownership because it depends on accounting profits rather than share values. Employees at Amazon.com would receive nothing in profit shares when the firm has not turned a profit but would have gained from ownership of options, as the share price of the company increased rapidly. Most profit sharing is deferred, with the profit share put into an employee retirement account (PSCA, 1993; BLS, 1998). Gain-sharing plans typically tie employee compensation to a group-based operational measure -- such as physical output, productivity, quality, safety, customer satisfaction, or costs -- rather than to a financial measure such as profitability. We estimate that about 25% of American workers are paid in part with some form of group or company financial incentives.

The third major way in which firms pay workers based on firm performance is through non-ESOP defined contribution pension plans, such as 401k plans. In 1997 55% of full time employees had 401k plans (approximately the same proportion had any form of defined contribution pension). While we lack estimates on the proportion of *workers* with 401k or other defined contribution funds invested in their firm, estimates of the proportion of 401k *assets* in company stock hover around 20%. On the basis of these figures, roughly 11% (= .55 x 20) of retirement pay depends on company shares. Absent better information, we assume that this is the proportion of workers who depend substantially on company shares for retirement pay.

Because workers who receive one form of shared compensation may also receive another form, we cannot add these separate estimates together to obtain the proportion of the work force whose compensation depends on company performance. We must subtract the proportion with an overlap in coverage. Making such an adjustment, we estimate that about 45% of workers have a substantial portion of their pay varying with company or group performance. This proportion is almost identical to estimates of shared compensation programs from the 2002 and 2006 General Social Survey.[2]

Figure 1 shows that the forms of variable pay have increased rapidly. The proportion of private sector employees with ESOPs rose from 0% in 1975 to 4% in 1980 to 8% in the 1990 but then stabilized in the 1990s. By contrast, the proportion receiving stock options rose greatly in the 1990s. A William Mercer company study found that the proportion of firms granting options more than doubled between 1993 and 1998. Figures for large electronics firms show a fourfold increase between 1994 and 1997. In 1999 39% of the Inc magazine 500 fastest growing privately held firms offered options to workers; in 1999, the figure was 26%.[3] A Federal Reserve Board Survey of 125 large firms found that 23% had introduced stock option programs for regular employees between 1996 and 1998, while 37% had broadened the eligibility of their existing program.[4] Profit-sharing plan or gain-sharing plans increased over the period among large firms. The 45% of Fortune 1000 firms that reported profit/gain-sharing systems in 1995 was up from 26% in 1987. Finally, fixed contribution pension plans grew in the 1990 as well. Assuming that investment in company stock fell less rapidly or did not fall at all, more workers had part of their retirement income tied to company performance.

---

[2] http://www.nceo.org/library/gss_2006_tables.html

[3] See NCEO, Employee Ownership Report Jan/Feb 2000, p 10

[4] Lebow, et al , table 3.

In short, although measures of variable compensation are incomplete, there is no gainsaying that shared compensation mechanisms linking rewards to firm or group economic performance rose in the 1990s and to some extent in the 1980s as well.

Over roughly the same time period that compensation practices were changing, employee involvement committees, teamwork, and other forms of empowering workers became the cutting edge of labor relations in the US. Freeman, Kleiner and Ostroff's (2000) analysis of firms found a large increase in the number using various forms of employee involvement activity between 1983 and 1993. Osterman's 1994 survey of establishments found that 55 percent used work teams, 34 percent had Total Quality Management (TQM), and 41 percent had quality circles, with most introduced in the late 1980s/early 1990s. One-third of the workers in the 1995-1996 WRPS reported that they served on employee involvement committees, defined broadly to include TQM, QC, and related groups; and 55 percent reported that their firm had such committees (Freeman and Rogers, 1999).

Shared Compensation System and Employee Involvement

Does the data support the prediction that financial sharing and employment involvement are complementary ways of organizing work?

Table 2 presents data from the WRPS on modes of compensation and shared decision-making through employee involvement committees. With respect to compensation, we asked:

On your main job do you ... Participate in an employee stock ownership or ESOP plan? ; Work in an employee-owned company? ; Receive any bonuses based on profit sharing? ; Receive any bonuses based on meeting workplace goals?

Because the WRPS did not ask detailed questions about modes of financial sharing -- for instance distinguishing 401k plans or stock purchase plans -- nor differentiate between gain-

sharing and individual bonuses, the data is not ideal. Still, aggregated into broad categories, it gives evidence on the coverage among workers of group incentive pay or ownership plans.

The first column of Table 2 records the distribution of non-managerial workers according to their modes of compensation. It shows that 54% of the sample reported at least one of the variable forms of compensation, and that the incentive-based systems of pay were more common than the ownership-based systems. The figures for ESOPs and ownership and incentive bonuses are higher than those in Table 1 (in part perhaps because the WRPS covers larger firms) with the result that the proportion of workers covered by at least one form of shared compensation exceeds the estimate in Table 1.

The final line in Table 2 records the proportion of non-managerial employees who serve on employee involvement committees: 29.9%. Since the WRPS contained a full module on these committees, and asked workers details about how the committees operated and what they thought about them (see Freeman and Rogers, 1999, chapter 4), this is likely to be a reasonably accurate measure, at least for the sample covered.

The second column in Table 2 gives the percentage of workers on EI committees who are paid with different forms of variable pay while the third column gives the percentage of workers not on EI committees paid by the same forms. Overall, 66% of workers on EI committees have some form of shared compensation compared to 34% of workers who are not on those committees. A similar pattern is found for each of the individual forms of pay. The difference in the distribution of compensation between workers with EI and those without EI are statistically significant in this comparison, and remains so in analyses that control for diverse covariates. Thus, the WRPS confirms the prediction that employee involvement programs will be closely tied to financial sharing arrangements.

Figure 2 shows the complementarity among the forms of shared compensation and employee involvement from a different perspective. It contrasts the proportion of workers having various combinations of incentive pay, financial sharing, and shared decision-making with the proportion that we would expect if the probability of having the different forms was an independent draw from separate urns. Over twice as many workers report having all three forms than would occur if they were independent, and more workers have neither financial nor incentive systems nor EI committees than would be expected. The concentration of frequency at the extremes is consistent with the hypothesis that these forms of workplace organization and compensation are complementary.

Table 3 examines the characteristics of workers and firms with shared compensation systems and employee involvement activity. It reports the proportion of workers with specified demographic characteristics in the sample and in two polar cases: workers who have an ownership stake, profit/gain-sharing, and shared decision-making through EI committees; and workers with none of the systems. The pattern is clear. Workers at companies with shared decision making and compensation systems are better educated, more likely to be in the upper quartile of the wage distribution, more likely to be male, and more than twice as likely to be salaried than workers with none of the shared systems. In addition, the workers with all three forms of sharing are disproportionately professionals, sales workers, and skilled trades persons, and are disproportionately employed in manufacturing and finance, insurance, and real estate, and are twice as likely to be in firms with over 1000 employees than those without any of these programs. The bottom part of Table 3 shows that firms that share financial rewards with employees and who have EI committees also have other “good” labor practices: personnel policies, open door policies, town meetings and employee committees beyond EI committees.

Relation to outcomes

To see whether shared compensation practices and employee involvement activities affect worker attitudes and behavior, we examine seven measures of attitudes and behavior from the main body of the WRPS and two measures from the second wave of the survey[5] that fit broadly into four areas: productivity, satisfaction with workplace relations, attitudes toward the company, and worker retention.

The measures relating to productivity are the most problematic because the WRPS contains worker reports on productivity-enhancing activity but not on actual productivity. The survey asked workers how often they made productivity related suggestions and how often management heeded them, coded on a four point scale, from least (1) to most (4). Since for a suggestion to have an effect on productivity there workers have to make the suggestion and management has to act on it, we took the product of these two responses as the first measure of productivity-enhancing activity. This gives a variable that ranges from 1 to 16. The survey also asked workers how much influence they exercise over workplace practices. This is our second measure of productivity related activity. Our third measure, from the second wave of the survey, asked workers to rate fellow employees on their concern for the success of the company and willingness to take on new responsibilities and to work hard using a school grade scale from A to E, which we coded as a rating from 1 to 5. These three measures are broadly informative about the extent to which workers engage in productivity-enhancing activities at their workplace.

To determine how workers feel about their job, we selected four variables: whether workers looked forward to going to work in the morning versus wishing they didn't have to go; how they rated labor-management relations at their firm; their satisfaction with the influence they

[5]One-third of the WRPS respondents were asked a short follow-up set of questions, constituting a smaller second wave sample. See Freeman and Rogers (1999).

had at their workplace; and how they graded management's treatment of employees using the school grade scheme. We chose these variables to investigate whether shared compensation and decision-making create a work atmosphere where workers feel that their voice is heard and where management treats them fairly.

To measure the general attitude that workers have towards their firm, we took a question on the loyalty workers felt toward the firm and another on the degree of trust they had that the firm would carry out its promises to workers. For worker retention, we use a question that asks how likely an employee will remain at the same company.

Finally, as a broad summary statistic of worker attitudes and possible behavior, we constructed an average outcome measure that includes the productivity indicators, workplace satisfaction, and attitude toward the firm, and likelihood of staying with the company, with the variables given equal weight[6].

What does the data show about the relation between shared compensation and shared decision-making practices and these outcomes?

Row 1 of Table 4 reports the coefficients from a regression of our overall outcome measure on the forms of compensation and employee involvement, and on an extensive set of covariates that include the characteristics of workers (age, gender, etc) and of their firm (size, industry) as described in the table footnote. In addition, the covariates include measures of labor relations policies toward workers as groups and as individuals beyond shared capitalism and employee involvement. These measures are based on the presence of particular policies at the firm and on workers' assessment of their effectiveness, as reported on the WRPS.[7] We give the highest score when firms have many practices that workers view as effective and lower scores when

[6] Since all other variables here are in a 1-4 scale, we multiply the 0-1 likelihood of staying with the firm by 4 to ensure all variables get roughly an equal weight in the overall outcome measure.

[7] Questions on the labor relations policies can be found in Freeman and Rogers (1999).

firms have few practices or when workers view their practices as less effective. With these measures of human resource practices in the equation, our estimates attribute to the shared compensation and decision-making variables only the portion of the outcomes above and beyond those associated with these other attributes of firms.

Line 1 of the table shows that performance pay (PP), employee involvement (EI), and ownership stake (OS) variables have statistically significant effects on the average outcome. The table also shows that while shared decision making structures have an *independent* effect on outcomes, the impact of compensation practices appears to be *contingent* on such decision making structures. The firm has to empower workers to make decisions if it expects to gain from shared compensation and ownership structures, consistent with the hypothesis that such shared compensation schemes actually have incentive effects.

We tested for complementarities by including interaction terms in the regressions – i.e., a term for the presence both of an ownership stake and employee involvement committee, a term for ownership and profit/gain-sharing, etc. Statistical tests reject the null hypothesis that there is no added effect on outcome from complementarity between PP and EI at the 6% level and reject the null of no interaction effects between PP and OS and EI and OS at weaker levels (15-21%). Thus, the data support a complementary relation of the impact of the shared systems variables on the average outcome.

To examine the interactive effects of variables on outcomes more directly we replaced the measures of each separate policy with mutually exclusive variables representing each possible combination of practices, and regressed outcome variables on this new set of independent variables. Rows 2 –13 of table 4 gives the regression coefficients on dummy variables representing all the combinations of EI, Ownership, and Performance Pay. Here, EI means “EI only,” “P” means “Performance Pay only,” “P,EI” means “Performance Pay and EI” and so on.

Row 2 gives the coefficients on these variables on our overall outcome measure. Succeeding lines give coefficients on separate outcomes grouped into our three categories.

These calculations show that EI has a substantial and statistically significant link to all outcomes, whereas the compensation variables by themselves have limited importance. But the threefold combination of EI, ownership and performance pay is *always* statistically significant and represents the numerically largest value in the overall outcome regression and in all of the regressions for separate outcomes save one. To give a sense of the magnitudes of the effect, we note that the standard deviation in the average outcome (row 1) is around 0.64 (see Appendix B). The presence of EI by itself is associated with a 0.43 standard deviation gain, while the presence of EI, O and P are associated with a gain of 0.66 standard deviation compared to companies without any of the shared compensation and decision making schemes. The average productivity variable shows a gain of 0.59 standard deviations for EI only and a gain of 0.76 standard deviations the EI/P/O combination.

Looking at the underlying variables, the table shows that EI is critical for practices to affect productivity related measures. Complementary compensation variables boost the productivity indicators (productivity related suggestions, peer rating of effort, and the extent of influence in productivity decisions) only when coupled with EI decision-making structure. In contrast, attitudes toward companies are affected by shared compensation structures that include *both ownership and performance pay* separately from EI. Finally, for the measures of worker satisfaction EI always matters while compensation structures matter independently for some but not all variables. In all cases, the combination of EI, ownership, and performance pay is significant and quantitatively greater than individual effects and often than the sum thereof.

The human resource policy variables enter significantly in our regressions, so that our results on shared compensation and decision-making systems are an “add on” effect. The

regressions in table 5 show that the efficacy of the human resource policies themselves is related to the shared compensation and decision-making systems. The WRPS asked workers about the effectiveness of four group-based HR policies: town meetings, open door policies, employee committees independent of EI, and about HR policies toward individuals as a group. We regressed workers' assessment of the effectiveness of these programs on our shared compensation and decision-making variables and a full set of demographic and company controls. The regressions show that the efficacy of the human resource policies is higher in the presence of shared compensation and decision-making systems with a pattern quite similar to that found in Table 4. Since our measure of HR policies in those regressions included a weighting of the variables by their effectiveness, at least part of the effect credited to HR policies might be due compensation and decision making structures increasing their effectiveness.

Probing the results

Even in the presence of the proxies for human resource and personnel policies, the regression results could reflect an unobservable latent variable that is correlated with the EI and compensation policies, which would bias upwards the estimated impact of shared compensation and decision-making on outcomes. "Good" firms, in particular, are likely to have both worker friendly practices and policies and have workers who are reasonably satisfied with conditions, and may be more likely to attract and retain more productive workers as well.[8] Absent good exclusion restrictions (variables which impact the incidence of the policies without directly impacting outcome) we probe this possibility by exploiting the multiple outcomes that the WRPS obtained for each person. We focus on the productivity variables on the grounds that they are the most problematic measures and thus more likely to fail to stand up to probing than

[8] The term "good" is only being used as a shortcut for a firm having a set of practices that tend to produce a higher level of outcome in terms of worker satisfaction and participation.

some of the others. We use a two-equation model to estimate the effect of the policy variables on productivity *net of the composite worker satisfaction variable.* To the extent we expect the general or attitudinal outcomes (such as company loyalty, job satisfaction, and worker-management relations) to reflect an omitted "company effect," using those variables as controls better isolates the impact of EI and compensation structures on the productivity outcomes.

However, simply including the attitudinal outcomes as independent variables in regressions does not recover a lower bound on the effect of shared compensation and decision-making on productivity because the measures of attitudes will be correlated with the error term in the regression for productivity. To see this, let Y_{1i} measure productivity, and Y_{2i} be worker satisfaction, a_i is the latent company effect; X_i is the vector of controls. Consider two equations:

1) $Y_{1i} = b_1(X_i) + g_1 D_i + (c_1 a_i + e_{1i})$,

2) $Y_{2i} = b_2(X_i) + g_2 D_i + (c_2 a_i + e_{2i})$

Our model allows $F(a_i, X_i)$, $F(a_i, D_i)$, $F(e_{1i}, e_{2i})$ to be arbitrary. We assume that there is a single unobservable factor ai correlated with the treatment status, D_i, while the error e is uncorrelated with treatment status. Moreover, the joint distribution of the error *e* and the covariates X_i is independent of the treatment status.

Substituting the second equation into the first gives the following:

3) $Y_{1i} = (b_1 - (c_1/c_2)b_2)X_i + (c_1/c_2)Y_{2i} (g_1 - (c_1/c_2)g_2)D_i + (e_1 - (c_1/c_2)e_2)$

But if we regress Y_1 on X, Y_2 and D, we would not recover the desired lower bound $g_1 - (c_1/c_2)g_2$ because our regressor Y_2 is correlated with the error term $e_1 - (c_1/c_2)e_2$.

Netting the productivity measures of the overall job satisfaction involves a two-step procedure. The first step uses moment restrictions implicit in the single factor model to identify the relative importance of the latent factor on the various outcomes. The second step uses this to "net out" the latent factor. The formal derivation of this is in the Dube (2003). Here we

describe the method. First we note that if we knew c_1/c_2, the following regression would recover the lower bound on b_1, $g_1 - (c_1/c_2)g_2)$:

4) $Y_{1i} - (c_1/c_2)Y_{2i} = (b_1 - (c_1/c_2)b_2)X_i + (g_1 - (c_1/c_2)g_2)D_i + (e_1 - (c_1/c_2)e_2)$

However, since we do not know (c_1/c_2), we must estimate it in another step. Under the assumptions about the covariance structure invoked above, it can be shown that:

5) $(c_1/c_2) = \left([V(Y_{1i}|X,D=1) - V(Y_{1i}|X,D=0)] / [V(Y_{2i}|X,D=1) - V(Y_{2i}|X,D=0)] \right)^{1/2}$.

We estimate the equation above to recover (c_1/c_2) in step one, which is then used to estimate the primary regression to recover a lower bound on b_1, i.e., $(b_1 - (c_1/c_2)b_2)$. Because (c_1/c_2) is estimated, the OLS standard errors in the primary regression are not valid. Therefore, we use bootstrapped standard errors for this estimation.

Table 6 gives the coefficients from this exercise using the average of our productivity variables as the dependent variable and the average of our satisfaction variables as the control for the firm being 'good". The results show that even attributing all of the link between job satisfaction and shared compensation variables to a latent variable does not eliminate the effect of EI and the EI, P, O combination of policies on productivity outcomes. Moreover, the effects of the EI, P, O combination continue to be larger than those of EI in isolation, supporting the assertion that the compensation variables matter in conjunction with EI. While this single omitted factor model cannot provide the confidence of an experiment, it is the toughest hurdle that we could set up using unobservables and the main results pass it. At the minimum, it shows that the policies impact productivity beyond their impact on worker satisfaction.

Propensity score test

We also probe our results using propensity scores that relate the presence of the shared capitalism pay and decision-making policies to covariates and then comparing outcome variables within groups with similar propensity scores. Estimation involves collapsing the

covariates into a single function – the propensity score, which is the probability of treatment given the covariates. As demonstrated in Rubinstein and Rubin, the outcome conditional on the propensity score is stochastically independent of the covariates.[9]If within the groups that have similar probabilities of EI and shared compensation chance determines which workers have EI and shared compensation and which do not, the propensity score technique identifies the effect of the policies on the outcomes.

Propensity score analysis can illuminate the patterns in the data in another way. Propensity score techniques enable us to see whether there is enough overlap in observations with respect to propensity scores (and hence the covariates) to make this analysis credible. Since the estimator is a weighted average of within-propensity-score differences in mean outcomes, it compares "similar companies" in coming up with the treatment effect estimate. Say that the covariates X_i that predict whether or not a worker has EI or receives shared compensation pay are completely non-overlapping between workers with those policies and those without the policies. Then identification of the treatment effect relies on extrapolation of the data to cover the range of the covariates, and should be viewed with suspicion.

We use a probit to estimate the propensity score for each of the following "treatment" variables – EI only, P, O only, and EI,P,O. For each of these cases, propensity score strata are created, and we check to see if the covariates are balanced (which they are). We then use propensity-score matching to pick with replacement the closest untreated company for each treated one. Table 6 reports the propensity score estimates of three of the policy categories – EI only and EI,P,O. We find that the propensity score based coefficients are quite similar to the coefficients using OLS, and are statistically significant at the 10% level for EI and EI,P,O

[9] Formally, let D measure the presence of the policies of interest, X be the covariates and Y be the outcome variable and p(X) be the probability that an observation has the policies, then $\Sigma_{p(X)} (E(Y_{1i} \mid p(X), D=1) - E(Y_{1i} \mid p(X), D=0))w(p(X)) =$

$\Sigma_{p(X)} (b_1(X_i,D_{i=1}) - b_1(X_i,D_{i=0}) + g_1)w(p(X)) = g_1 + E_X(b_1(X_i,D_{i=1}) - b_1(X_i,D_{i=0}))$

combinations. The results continue to hold when we look at differences between similar groups of companies – all of which increases our confidence that shared compensation and decision-making policies have real impacts on worker contributions to company performance.

Establishment data

As noted, the measures of productivity in the WRPS are based on worker responses about activity rather than on measured productivity for their establishment or workplace. To obtain an alternative view of the link between shared compensation and decision-making on outcomes at the establishment level, we examine data from the 2003 California Establishment Survey (CES). This survey provides information on 1,080 establishments in 2003.[10] It asked about the use of shared stock ownership (ESOP and stock options) and profit sharing and about organizational, including the use of "employee involvement" programs such as quality circles and quality management programs. The CES asks about stock options besides ESOP's but not whether the companies are employee owned; and about profit sharing but not about gain sharing or bonuses. With respect to output measures, the CES includes managements' assessments of the extent of employee decision-making, product/service quality, and financial performance, given on a 1 to 4 scale and employee retention, defined as 1 minus the annual turnover rate.

Table 7 shows the distribution of profit-sharing and stock ownership in the CES, with the summary statistics weighted by firm size to give estimates of the proportion of overall

[10] This is a dataset of private sector businesses designed by the UC Berkeley Institute of Industrial Relations, and conducted by the UC Berkeley Survey Research Center between May and October of 2003. The sample included private and non-profit establishments with five or more employees in California and excluded government agencies, public schools or universities, and agriculture, forestry and fishing. The unit of observation was an establishment (ie a single physical location at which employees work and business is conducted). A total of 2,806 establishments were sampled, with 2,200 meeting the eligibility criteria. The response rate was 49.1 percent, giving the sample of 1,080 establishments.

workforce in these programs. The incidence of EI is somewhat larger in the CES than in the WRPS, while the shared compensation figures are somewhat lower—though they are similar to other establishment level sources. But the incidence of EI by profit-sharing and ownership (not shown in the table) has a pattern comparable to that in the WRPS. Appendix table B gives the means and standard deviations of the outcome measures for the CES.

The CES allows us to test whether shared compensation and shared decision-making are associated with better establishment outcomes. To assess the impact of compensation and decision-making on establishment-level outcomes, we regressed the management reported measures of outcome on the same set of disaggregated combinations of EI, ESOP or stock option ownership, and profit sharing variables used in the table 4 analysis of the WRPS. The regressions include controls on firm size, age of establishment, two-digit level industry dummies, four-part occupational distribution (share of workforce that is managerial, clerical, sales, or blue-collar), share of workforce with college degrees, and share with collective bargaining contracts. We also estimate the impact of the shared compensation and decision-making variables on a summary outcome, which is simply the average of the four variables.

Table 8 reports the results. Row 1 shows a pattern of regression coefficients for the impact of shared compensation and decision-making variable on the average of all outcomes in the CES data that resembles closely that found for their impacts on the average of all outcomes in the WRPS data. By itself, EI has a positive statistically significant effect; but the combination of EI, P and O has an impact two times that of EI by itself. This corresponds to a 0.58 standard deviation gain—similar to the findings in WRPS. Row 2 shows that a formal EI program is associated with managers reporting greater employee decision-making, but the combination of performance pay, ownership and formal EI program has the greatest impact on employee decision making, though its difference from EI by itself is numerically small. Row 3 of the table

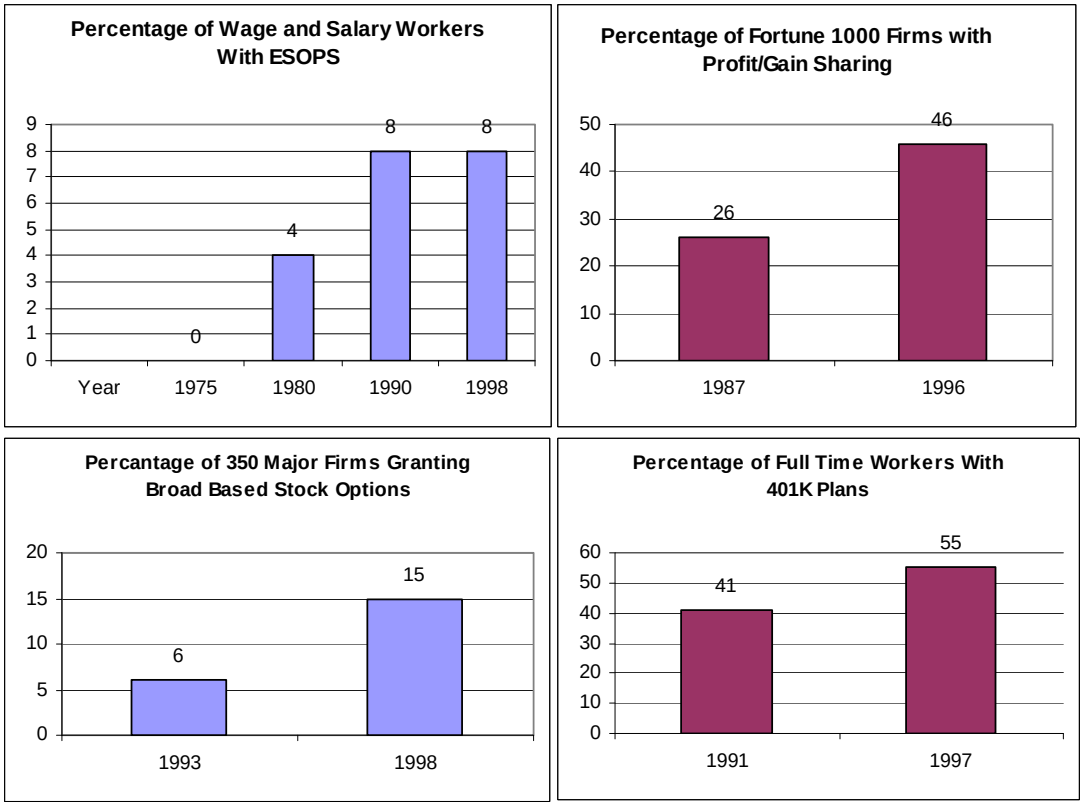
shows that the combination of EI and some type of shared compensation leads to the largest and statistically significant effects on quality and financial performance. Row 4 shows that EI increase employee retention; and that the combination of ownership, performance pay and EI is associated with greater retention than other configurations.

In sum, the results from the establishment survey support the finding from the WRPS that shared compensation and decision-making systems are complementary ways to increase participation and productivity at the workplace.

Conclusion

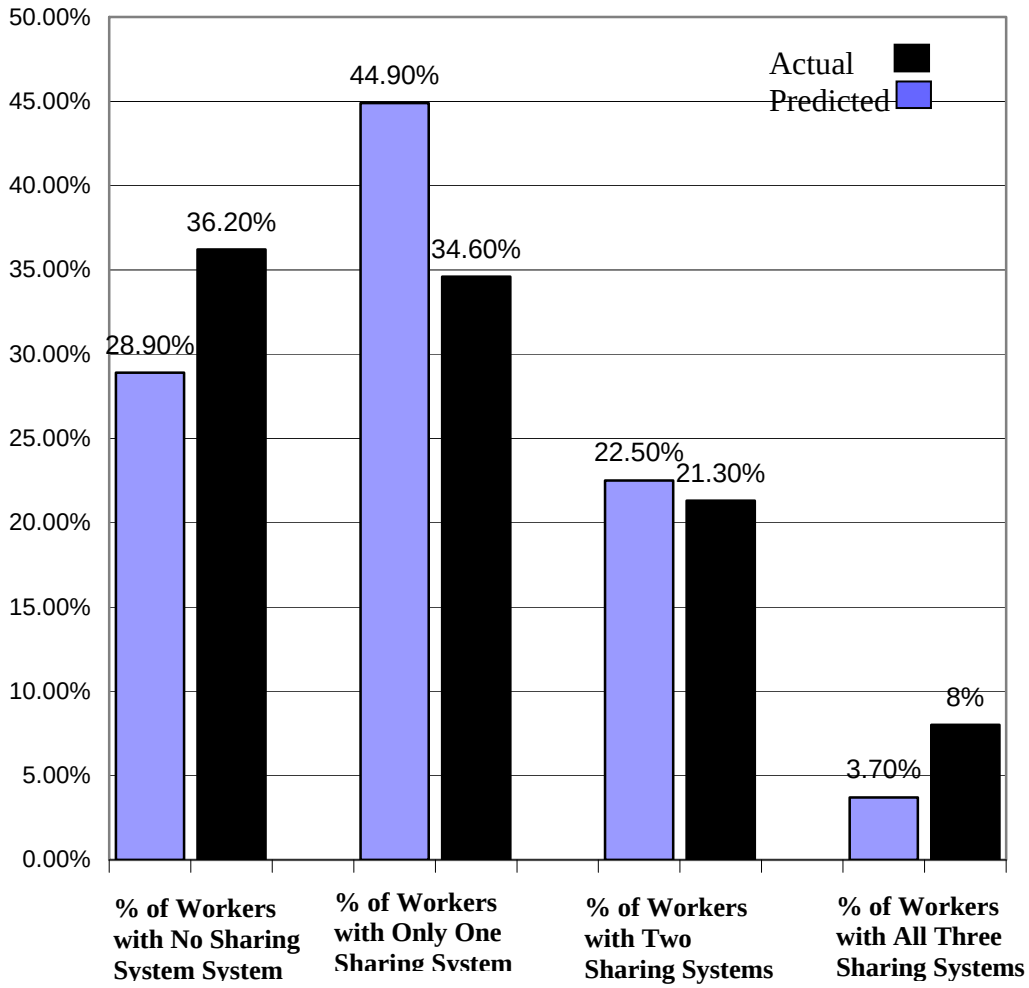
This paper has found in two separate data sets, the worker-based WRPS and the establishment based CES that: shared capitalist modes of compensation are complementary in the sense that they more likely to be found together than if firms chose them independently; that shared capitalist modes of pay are positively associated with shared modes of decision-making; and that shared compensation and decision-making are complementary in the sense that they have larger impacts on outcomes than they have separately. Although our results are based on correlations rather than experimental variation, they are robust to some statistical tests for unobserved "firm effects". Since it is hard to square the effects of shared compensation systems with theories of behavior in which free-riding is important, our findings point to possible importance of corporate culture and related behavioral economic factors in determining employee activity.

Figure 1: Growth of Shared Compensation Systems



SOURCE: ESOP Employees from NCEO Employee Ownership Report, Jan-Feb.'00, p.9; Broad Based Stock Options: from Mercer&Co. Executive Compensation Research Topics RT#10 - May26, 1998, p.5; Fortune 1000 Firms with Gain/Profit-Sharing from Employment Policy Foundation "US Wage and Productivity Growth," 1998; Workers with 401K plans from US Statistical Abstract, 1999, Table 622

Figure 2: The Distribution of Shared Compensation and Decision-Making Systems



SOURCE: Calculated from WRPS (Workers Representation and Participation Survey). The predicted values treat the proportion of workers with each of the shared systems as independent events. Thus, if 1/2 of the workers had an EI system and 1/10th had some ownership, the predicted proportion with both systems would be 1/20th, the predicted proportion with neither system would be 9/20ths and the predicted proportion with only one of the two would be 1/2. The actual proportions are taken directly from the data.

Table 1: Percentage of Employees/Firms With Pay Related to Company/Group Performance

Stock Ownership Programs	25% of nonagricultural work force
Profit or Gain Sharing	25% of US work force
Defined Contribution Pension Funds Invested heavily in Company Stock	11% of US work force
Total With Any Form of Shared Compensation adjusted for overlap	**45% of US work force**

SOURCE: For details, see Appendix Table A.

NOTE: If workers were covered by only one form of variable pay, our estimate would be the sum of the estimates for the bold categories in the table: 61%, of which 50 percentage points consists of ownership and incentive pay. But there is considerable overlap in coverage. On the basis of the the WRPS figures in table 2, we estimate that the proportion of workers with any form of performance pay and ownership exceeds the sum of the proportions covered by each form separately by 33% = (41.9+29.6)/53.8. Thus, we reduce the 50% to 38%. We do not have data on the overlap with the estimated 11% of workers with 401k or other plans with sizable amounts of company shares, but anticipate that this will be modest, giving us the 45% in the text.

Table 2: Proportion of Workers with Shared Compensation Systems, full sample, and by presence of Employee Involvement

	Full Sample (%)	*With EI (%)*	*Without EI (%)*
Any Compensation Structure	53.8	66.1	33.9
Performance Pay	41.9	53	37
Profit Sharing	28.9	39.9	24.1
Gainsharing	26.2	32.8	23.3
Ownership	29.6	40.2	25
ESOP	23	34.5	18
Employee Owned	11.2	13.1	10.4
Employee Involvement	29.9	100	0

SOURCE: WRPS Survey, in What Workers Want. For exact wording of relevant WRPS questions, see Appendix B1.

Table 3: Demographic, Occupational, Industrial and Firm Level Characteristics by Extent of Shared Compensation Schemes

A. Demographic, Occupational and Industrial Characteristics

	Full Sample	*Nothing*	*Everything P,O,EI)*
College Educ.	0.26	0.21	0.35
High Wage	0.24	0.19	0.38
Male	0.54	0.50	0.64
Salaried	0.31	0.22	0.46
Age	37.81	36.27	38.39
Occupations:			
Professional	0.24	0.20	0.27
Clerical	0.19	0.20	0.14
Sales	0.10	0.07	0.16
Manuf. Representative	0.03	0.01	0.04
Service Worker	0.10	0.14	0.04
Skilled Tradesman	0.15	0.15	0.17
Semi-skilled Worker	0.10	0.11	0.10
Laborer	0.09	0.11	0.08
Other	0.01	0.01	0.01
Industries:			
Agriculture./Forestry/Fishing	0.02	0.02	0.02
Mining	0.01	0.01	0
Construction	0.05	0.06	0.04
Manufacturing	0.27	0.23	0.39
Transport/Public Utilities/Communications	0.09	0.06	0.08
Wholesale Trade	0.05	0.04	0.05
Retail Trade	0.16	0.18	0.12
FIRE	0.08	0.06	0.16
Health Services	0.11	0.13	0.06
Business Services/Law	0.07	0.07	0.05
Educational, social services/membership orgs	0.05	0.09	0.01
Hotels	0.01	0.02	0.01
Amusement/Recreation Services	0.00	0.01	0.00
Personal Services	0.01	0.01	0.00
Misc.	0.00	0.00	0.00
Other	0.01	0.01	0.01
No Answer	0.02	0.02	0.01

Table 3: Demographic, Occupational, Industrial and Firm Level Characteristics by Extent of Shared Compensation Schemes (Continued)

B. Firm characteristics

	Full Sample	*Nothing*	*Everything P,O,EI)*
Firm Size:			
<25	0.00	0.00	0.00
25-99	0.21	0.27	0.09
100-499	0.25	0.27	0.21
500-999	0.11	0.10	0.09
>1000	0.44	0.36	0.60
Personnel Dept	0.71	0.61	0.87
Open Door Policy (Individual)	0.87	0.81	0.92
Grievance Procedure	0.36	0.34	0.44
Town Meeting	0.49	0.34	0.76
Open Door Policy (Groups)	0.66	0.56	0.83
Employee Committee	0.40	0.28	0.61

SOURCE: a) SOURCE: WRPS, What Workers Want. For full distribution, see Appendix Tables A1 and A2; b) WRPS, What Workers Want. For full distribution, see Table 3.9.

Table 4: Regression Estimates of the Impact of Ownership, Performance Pay and EI on Outcomes

	EI	*P*	*O*	*P,O*	*P,EI*	*O,EI*	*P,O,EI*
1.Average, All Outcomes:	0.09 **	0.11 ***	0.07 **				
	(0.04)	(0.03)	(0.04)				
2. Average, All Outcomes:	0.28 ***	0.11 **	0.01	0.18 ***	0.26 ***	0.26 ***	0.42 ***
	(0.06)	(0.05)	(0.07)	(0.06)	(0.07)	(0.07)	(0.06)
Productivity Related Outcomes:							
3. AVERAGE	0.44 ***	0.09	0.01	0.01	0.38 ***	0.42 ***	0.57 ***
	(0.07)	(0.06)	(0.08)	(0.07)	(0.08)	(0.08)	(0.07)
4. Productive Suggestions	0.55 ***	0.15 *	-0.02	-0.04	0.46 ***	0.53 ***	0.77 ***
	(0.09)	(0.08)	(0.09)	(0.09)	(0.10)	(0.11)	(0.10)
5. Overall Influence at Job	0.35 ***	0.03	0.04	0.09	0.32 ***	0.32 ***	0.39 ***
	(0.07)	(0.07)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)
5. Effort of Fellow Employees †	0.07	0.09	0.01	0.05	0.06	0.12	0.35 ***
	(0.10)	(0.09)	(0.10)	(0.15)	(0.12)	(0.17)	(0.11)
Worker Satisfaction Related Outcomes:							
6. AVERAGE	0.19 ***	0.06	0.06	0.09	0.17 ***	0.19 **	0.33 ***
	(0.06)	(0.05)	(0.07)	(0.06)	(0.06)	(0.08)	(0.06)
7. Overall Satisfaction with Workplace Influence	0.26 ***	0.07	0.04	0.11	0.26 ***	0.18	0.35 ***
	(0.07)	(0.07)	(0.09)	(0.08)	(0.08)	(0.11)	(0.08)
8. Overall Job Satisfaction	0.14 *	0.07	0.04	0.14 *	0.05	0.23 **	0.24 **
	(0.08)	(0.07)	(0.10)	(0.08)	(0.09)	(0.11)	(0.09)
9. Management-Employee Relations	0.17 *	0.02	0.09	0.02	0.19 *	0.13	0.38 ***
	(0.09)	(0.07)	(0.09)	(0.09)	(0.10)	(0.13)	(0.10)
10.Composite "Grade" for Management †	0.16	0.09	0.11	0.09	0.21	0.36 **	0.40 ***
	(0.12)	(0.11)	(0.14)	(0.15)	(0.13)	(0.17)	(0.13)

Table 4: Regression Estimates of the Impact of Ownership, Performance Pay and EI on Outcomes Continued)

	EI	*P*	*O*	*P,O*	*P,EI*	*O,EI*	*P,O,EI*
Attitudes towards Company:							
11. Reported Loyalty Towards Company	0.17**	0.07	0.08	0.17**	0.24***	0.11	0.29***
	(0.08)	(0.06)	(0.09)	(0.08)	(0.08)	(0.11)	(0.08)
12. Reported Trust Towards Company	0.30**	0.11	0.24*	0.21*	0.23*	0.20	0.34**
	(0.11)	(0.10)	(0.13)	(0.12)	(0.12)	(0.16)	(0.13)
13. Likely to Keep Working in Company	0.10**	0.11***	-0.02	0.21***	0.14**	0.13**	0.18***
	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)	(0.06)	(0.05)

NOTES: (1) All regressions include controls for: age, education, sex, race, experience, union membership, tenure, firm size, occupation (9 categories), industry (15 categories), salaried/non salaried status, as well as individual and group-based human resource practices; "AVERAGE" Productivity is a composite based on " productive suggestions" and "overall influence at job," and "AVERAGE" Satisfaction is a composite based on "Overall satisfaction with workplace influence," "Overall Job Satisfaction" and "Management Employee Relations." (2) Robust standard errors are within parentheses. (3) Statistical significance at the 1%, 5% and 10% levels is indicated by ***, **, and *, respectively. (4) All regressions use WRPS sample weights (5) Other variables not used for the "AVERAGES" if they were from the smaller Wave 2 subsample as indicated by (†).

SOURCE: WRPS Waves 1 and 2.

Table 5: Regression Estimates of the Impact of Ownership, Performance Pay and EI on the Effectiveness of Human Resource Practices

	EI	*P*	*O*	*P,O*	*P,EI*	*O,EI*	*P,O,EI*
Effectiveness of Group based HR Policies							
"Town Meetings"	0.10	0.05	0.11	0.16	0.22 **	0.22	0.36 ***
	(0.10)	(0.10)	(0.13) ***	(0.10)	(0.10)	(0.14)	(0.10)
Open Door Policies for Groups	0.14 *	0.06	0.02	0.12	0.19 **	0.36 ***	0.41 ***
	(0.08)	(0.08)	(0.11)	(0.09)	(0.08)	(0.11)	(0.08)
Employee Committees	0.32 ***	0.17	0.17	0.20	0.15	0.27 **	0.42 ***
	(0.11)	(0.11)	(0.13)	(0.12)	(0.12)	(0.13)	(0.12)
Effectiveness of Individual based HR Policies	0.32 ***	0.17	0.17	0.20	0.15	0.27 **	0.42 ***
	(0.11)	(0.11)	(0.13)	(0.12)	(0.12)	(0.13)	(0.12)

NOTES: (1) All regressions include controls for: age, education, sex, race, experience, union membership, tenure, firm size, plant size, occupation (9 categories), industry (15 categories), and salaried/non salaried status. (2) Robust standard errors are within parentheses. (3) Statistical significance at the 1%, 5% and 10% levels is indicated by ***, **, and *, respectively. (4) All regressions use WRPS sample weights.

SOURCE: WRPS Wave 1

Table 6: Robustness Checks--Controlling for Company Effect in Regressions, and Estimates using Propensity Score Matching

	EI	*P*	*O*	*P,O*	*P,EI*	*O,EI*	*P,O,EI*	*Controls for "Company Effect"*
OLS estimates:								
1. Average Productivity	0.41***	0.08	0.02	0.03	0.4***	0.43***	0.56***	N
	(0.07)	(0.05)	(0.07)	(0.07)	(0.08)	(0.09)	(0.07)	
2. Average Productivity (after subtracting weighted "Average Satisfaction")	0.24***	0.02	0.06	-0.05	0.26***	0.26***	0.3***	Y
	(0.07)	(0.06)	(0.07)	(0.07)	(0.08)	(0.09)	(0.08)	
Propensity Score Matching Estimates:								
3. Average Productivity	0.38***	-	-	0.01	-	-	0.62***	N
	(0.08)	-	-	(0.08)	-	-	(0.12)	
4. Average Productivity (after subtracting weighted "Average Satisfaction")	0.26***	-	-	-0.05	-	-	0.35**	Y
	(0.06)	-	-	(0.08)	-	-	(0.14)	

NOTE: (1) All regressions use controls for: age, education, sex, race, experience, union membership, tenure, firm size, plant size, occupation (9 categories), industry (15 categories), and salaried/non salaried status. (2) Bootstrapped standard errors are within parentheses (100 replicates). (3) Statistical significance at the 1%, 5% and 10% levels is indicated by ***, **, and *, respectively. (4) "Average Productivity" is a composite variable based on " productive suggestions" and "overall influence at job"; "Average Satisfaction" is a composite variable based on "Overall satisfaction with workplace influence," "Overall Job Satisfaction" and "Management Employee Relations" (see Table 5).

SOURCE: WRPS Wave 1

Table 7: Extent of Participation in Employee Involvement and Shared Compensation in Establishment-Level Data, California Establishment Survey 2003

	Proportion of Workers Participation in …			
	EI	*Stock Ownership*	*Profit Sharing*	*Stock Options*
None	*64.15%*	*89.26%*	*78.32%*	*88.97%*
Under 25%	6.79%	5.11%	4.68%	4.39%
25% to 49%	6.47%	1.36%	2.68%	1.29%
50% to 74%	2.20%	1.18%	1.71%	0.64%
75% to 99%	1.65%	0.92%	1.23%	0.46%
All	18.74%	2.17%	11.39%	4.25%
Some	*35.85%*	*10.74%*	*21.68%*	*11.03%*

SOURCE: California Establishment Survey 2004

Table 8: Regression Estimates of the Impact of Ownership, Performance Pay and EI on Outcomes in Establishment-Level Data

	EI	*P*	*O*	*P,O*	*P,EI*	*O,EI*	*P,O,EI*
1. *Average Outcome*	0.12**	0.01	0.09	-0.09	0.14**	0.22***	0.23***
	(0.05)	(0.07)	(0.06)	(0.08)	(0.06)	(0.06)	(0.07)
2. Extent of Participation in Decision-Making	0.28***	0.15*	0.13**	0.13	0.23***	0.24***	0.36***
	(0.05)	(0.08)	(0.07)	(0.09)	(0.07)	(0.08)	(0.08)
3. Quality Performance	0.12	0.03	0.08	-0.03	0.22**	0.35**	0.27*
	(0.09)	(0.12)	(0.11)	(0.17)	(0.11)	(0.13)	(0.14)
4. Financial Performance	0.13	-0.04	0.15	-0.31	0.21	0.33**	0.32*
	(0.11)	(0.25)	(0.13)	(0.19)	(0.13)	(0.14)	(0.17)
5. Employee Retention	0.06	0.05	0.10*	0.07	0.06	0.08	0.14**
	(0.04)	(0.07)	(0.05)	(0.07)	(0.05)	(0.07)	(0.06)

NOTE: (1) All regressions include controls for: firm-size (5 categories), 2-digit industries, percent of workforce with college degrees, percent of workforce managerial/clerical/sales/blue-collar, percent of workforce unionized, and age of establishment. (2) Robust standard errors are within parentheses. (3) Statistical significance at the 1%, 5% and 10% levels is indicated by ***, **, and *, respectively. (4) Average Outcome is constructed by averaging across the four specific outcomes.

SOURCE: California Establishment Survey, 2004.

References

Akerlof, George and Janet Yellen, 1990, "The Fair Wage-Effort Hypothesis and Unemployment," *Quarterly Journal of Economics,* 105(2): 255-283.

American Compensation Association, 2000, Compensation Survey: www.acaonline.org/resources/generic/html/aca-salarysurvey-99-2000.html.

Association for Quality and Participation Survey, "The rise of broadly granted employee stock options": cited by NCEO.org/library/option fact.html.

Black, Sandra E. and Lisa M. Lynch, 1997, "How to Compete: The Impact of Workplace Practices and Information Technology on Productivity," NBER Working Paper # 6120, August.

Blasi, Joseph and Douglas Kruse, 1991, *The New Owners: The Mass Emergence of Employee Ownership in Public Companies and What it Means to American Business,* New York, NY: Harper Business.

Brickley, J.A., and Hevert, K.T, 1991, "Direct Employee Stock Ownership: An Empirical Investigation," *Financial Management*, Summer: 70-84.

Capelli, Peter and David Neumark, 1999, "Do 'High Performance' Work Practices Improve Establishment-Level Outcomes?" NBER Working Paper # 7374, October.

Chandler, Alfred, 1977, The Visible Hand. Cambridge, MA: Bellknap Press.

Collins, Dennis, 1998, *Gainsharing and Power: Lessons from Six Scanlon Plans*, Ithaca, NY and London: Cornell University Press, ILR Press.

Dube, Arindrajit, 2003, "Identifying a lower bound on the Treatment Effect with Multiple Outcomes" Working Paper.

Economic Benefit Research Institute, 2000, EBRI Issue Brief # 218, February.

Economic Policy Foundation, 1998, "US Wage and Productivity Growth" Washington, April 16.

Freeman, Richard and Joel Rogers, 1999, *What Workers Want*, New York, NY: Russell Sage and Cornell University Press.

Freeman, Richard and Morris Kleiner, 1998, "The Last American Shoe Manufacturers: Changing the Method of Pay to Survive Foreign Competition," NBER Working Paper # 6750, October.

Freeman, Richard, Morris Kleiner and Sherrie Ostroff, 2000, "The Anatomy and Growth of Employer Involvement Programs," NBER Working Paper # w8050, December.

Gustman, Alan L. and Thomas L. Steinmeier, "What People Don't Know About Their Pensions and Social Security: An Analysis Using Linked Data from the Health and Retirement Study," NBER Working Paper # 7368, September.

Hewitt Resources: The Hewitt 401k Index observations: www.hewitt.com/resc/resc055.htm

Ichniowski, Casey, Kathryn Shaw and Giovanna Prennushi, 1997,"The Effects of Human Resource Management Practices on Productivity: A Study of Steel Finishing Lines," *American Economic Review,* 87(3): 291-313.

Kardas, Peter, Adria L. Scharf and Jim Keogh, 1998, "Wealth and Income Consequences of Employee Ownership: A Comparative Study from Washington State," Draft, Washington State Department of Community, Trade, and Economic Development.

Kato, Takao, 1999, "Report on Changing Participatory Programs in Japan," NBER, Mimeo.

Kruse, Douglas, 1993, *Profit Sharing: Does It Make A Difference?* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Lawler, Edward E., Susan A. Mohrman, and Gerald E. Ledford, 1995, *Creating High Performance Organizations*, San Francisco: Jossey-Bass.

Lazear, Edward, 1999, "Output-based pay: Incentives or Sorting?" NBER Working Paper #7419, November.

Lebow, David, Louise Sheiner, Larry Slifman, Martha Star-McCluer, 1999, " Recent Trends in Compensation Practices" Federal Reserve Bank, July 15.

National Center for Employee Ownership, 2000, Employee Ownership Report, Jan/Feb.

Newsweek, 1999, Newsweek Poll, June 24-25: www.pollingreport.come/workplay.htm.

Osterman, Paul, 1994, "How Common Is Workplace Transformation and Who Adopts It?," *Industrial & Labor Relations Review,* 47(2):173-88.

Profit Sharing Council of America, 1993, *36th Annual Survey of Profit Sharing and 401(k) Plans*, Chicago, IL: PSCA.

Schaller, W.L., 2001, "Jumping Ship: Legal Issues Relating to Employee Mobility in High Technology Industries," *Labor Lawyer*, Summer.

Simon, H, 1957, "A Formal Theory of the Employment Relation," Chapter 11 in *Models of Man: Social and Rational*, New York, NY: John Wiley & Sons.

U.S. Chamber of Commerce, 1998, *Employee Benefits: 1997 Edition*, Washington, D.C.

U.S. Department of Commerce, Bureau of the Census, 1999, *Statistical Abstract 1999*, Table 622.

U.S. Bureau of Labor Statistics, 1999, "Employee Benefits in Medium and Large Establishments, 1997," Press Release USDL-99-02, January 7.

US Bureau of Labor Statistics, 1997, Employee Benefits in Medium and Large Establishments.

Watson, Wyatt, 2000, "Survey of Top Management Compensation," www.watsonwyatt.com/homepage/us/new/pres_rel/Jan00/execpay_2.htm.

Appendix Table A: Calculating the Percentage of Employees/Firms With Pay Related to Company/Group Performance

Stock Ownership Programs (about 25% of nonagricultural work force)

1. Employee Stock Ownership Plans (ESOPS)and Stock Bonus Plans (1998)
(8.5 million workers) — 8% of nonag empl

2 All Employee Stock Option Plans (1999) (7.0 - 10.0 million workers) — 8 % of nonag empl

3. Receive Stock Options or opportunity to buy company stock (1999) — 26% of work force

4. Workers Eligible for options from 1352 large firms, 1999 — 19% of covered

5. Firms Offering Stock-Based Compensation, ACA Compensation Survey 1999-2000

	Nonexempt		Exempt	
	Hourly nonunion	Salaried	Salaried	officers/execs
Stock Option	22	26	66	94
Co Stock Purchase	57	56	63	64
Stock Grant	6	6	22	48
Phantom Stock	1	1	5	16
Co Stock via 401k	68	72	73	72

6. Fortune 1000 companies offering options to 60% or more workers — 13%

Profit/Gain-Sharing (around 25% of US work force)

7 Workers in Medium and Large establishments with deferred profit-sharing, 1997 — 19% of work force

8 Profit/Gain Sharing in Fortune 1000 (1996) — 45% of firms

9 Firms with some profit-sharing, 1993-1998 — 33%-40% of firms

10 Receive bonus based on own performance or company performance — 43% of work force

Defined Contribution Pension Funds Invested in Company Stock (11% of work force)

11 Employees with 401k plans — 55% of full time workers in priv. nonfarm estab.

12 Estimated Proportion of 401k Assets in company stock
- a) EBRI estimate, 1998 — 17.7%
- b) Hewitt estimate, 1999 — 23.3%

13. Savings and thrift plans, % of workers in plans that allow for investment in company stock
- Firm contribution — 42%
- Worker contribution — 46%

Overall Variable Pay Practices, FRB Survey

	All Workers	Managers	Professionals
14. Percentage of 125 Major Corporations (1999)			
Any Type	88%	85%	69%
Stock Options	34%	33%	7%
Profit-Sharing	50%	48%	44%
Performance bonus	75%	69%	41%

SOURCE for Appendix A:
Line 1: National Center for Employee Ownership, Employee Ownership Report, Jan/Feb 2000, p 9
Line 2: National Center for Employee Ownership, private communication
Line 3: Newseek Poll, June 24-25, 1999 www.pollingreport.come/workplay.htm

Line 4: Watson Wyatt, Survey of Top Management Compensation, www.watsonwyatt.com/homepage/us/new/pres_rel/Jan00/execpay_2.htm
Line 5: ACA, Compensation Survey, of 2,683 US companies;208 Canadian Companies. See www.acaonline.org/resources/generic/html/aca-salarysurvey-99-2000.html. Number of responding firms ranged from 516 to 896
Line 6: Association for Quality and Participation Survey, cited by NCEO.org/library/option fact.html, "The rise of broadly granted employee stock options".
Line 7: US Bureau of Labor Statistics, Employee Benefits in Medium and Large Establishments, 1997, table 1; sum of percent reported deferred profit-sharing in various forms.
Line 8: Economic Policy Foundation "US Wage and Productivity Growth" Washington, April 16, 1998
Line 9: US Chamber of Commerce (1988); Doug Kruse, 1993, pp 8-10.
Line 10: Newsweek Poll, June 24-25, 1999 www.pollingreport.come/workplay.htm
Line 11: US Bureau of the Census, Statistical Abstract 1999, table 622
Line 12: Economic Benefit Research Institute, EBRI Issue Brief Number 218, February 2000
Hewitt Resources: The Hewitt 401k Index observations, page 2 www.hewitt.com/resc/resc055.htm
Line 13: US Bureau of Labor Statistics, Employee Benefits in Medium and Large Establishments, 1997, table 155
Line 14: Survey by FRB, Lebow, Sheiner, Slifman,Starr-McCluer, table 1.

Appendix B Means and Std Deviations of Outcome Measures in WRPS and CES

	Mean	Std. Dev
WRPS Outcomes		
Average Outcome	2.84	0.64
Productivity AVERAGE	2.65	0.74
Productive Suggestions	2.45	0.96
Overall Influence in Job	2.87	0.85
Effort of Fellow Employees	2.34	0.60
Satisfaction AVERAGE	2.74	0.63
Overall Satisfaction with Workplace Influence	2.92	0.85
Overall Job Satisfaction	2.42	0.86
Management-Employee Relations	2.87	0.94
Composite "Grade" for Management	1.88	0.79
Reported Loyalty towards Company	3.34	0.82
Reported Trust Towards Company	3.10	0.90
Likely to Keep Working in Company	0.58	0.49
Effectiveness of:		
"Town Meetings	3.01	0.77
Open Door Policies for Groups	3.18	0.72
Employee Committees	3.15	0.68
Individual based HR Policies	3.00	0.82
CES Outcomes		
Average Outcome	1.85	0.40
Extent of Participation in Decision-Making	0.53	0.40
Quality Performance	3.36	0.65
Financial Performance	2.79	0.89
Employee Retention	0.71	0.67

Appendix C

Table C1: Relevant WRPS Questions for Table 2

For compensation practices, the following question was asked:

D16. On your (main) job, do you ... **(READ ITEMS, IN ORDER) (answer yes/know/don't know)**

d16a. Receive any bonuses based on profit sharing?

d16b. Receive any bonuses based on meeting workplace goals?

d16c. Participate in an employee stock ownership or ESOP plan?

d16d. Work in an employee-owned (company/organization)?

For Employee Involvement, the following two questions were asked. Only those answering yes to q24 were coded as being in EI programs.

q23. Some companies are organizing workplace decision-making in new ways to get employees more involved — using things like self-directed work teams, total quality management, quality circles, or other employee involvement programs. Is anything like this now being done in your (company/organization)?

1 Yes **(GO TO Q24)**
2 No
9 Don't know/refused

q24 **(ASK ONLY IF RESPONSE TO Q23 = 1)** Are you personally involved in any of these programs at work?

1 Yes
2 No - **GO TO Q27**
9 Don't know/refused - **GO TO Q27**

Table C2: Relevant WRPS Questions for Tables 4, 5, 6

Questions asked to respondents, and definitions of various indices:

All the four point outcome variables were reordered (so that more is better) for the regressions. Below we report the actual questions used in the Survey, as well as different weighting schemes when appropriate. Unless otherwise reported, all "don't know" responses are coded as missing data.

OUTCOME VARIABLES:

1) "Loyalty to Company":

q9c. And, how much loyalty would you say you feel toward the (company/organization) you work for as a whole—a lot, some, only a little, or no loyalty at all?

1 A lot of loyalty
2 Some loyalty
3 Only a little loyalty
4 No loyalty at all

2)"Trust towards Company":

q10a. **(ASK OF FORM A ONLY)** In general, how much do you trust your (company/organization) to keep its promises to you and other employees? Would you say you trust your (company/organization)? **(READ)**

1 A lot
2 Somewhat
3 Only a little
4 Not at all
9 Don't know/refused **(DO NOT READ)**

3) "Index Rating of Management": This was constructed by taking the summated ratings (where A=5,...,F=0) on the following three questions, and then scaling by 4/15 to make the final outcome on a 1-4 scale.:

16A. If you were to rate the performance of management in your company on a scale similar to school grades (A for excellent, B for good, C for Fair, D for Poor and F for failure) what grade would you give MANAGEMENT in the following areas? (ROTATE ITEMS)

* Concern for employees
* Giving fair pay increases and benefits

* Willingness to share power and authority

4) “Management Employee Relations”
q11. Do you think relations between employees and management at your (company/ organization) are BETTER than average, WORSE than average, or about the SAME as in other places?
1 Better
2 Worse
3 About the same
9 Don’t know/Refused

5) “Job Satisfaction”: (This was coded as follows, “1" was coded as 4 “8" as 2.5, and “2" as 1.)
q8. On an average day, what best describes your feeling about going to work? Would you say you usually… **[READ AND ROTATE CATEGORIES 1 AND 2]**
1 Look forward to it
2 Wish you didn't have to go
8 Don’t care one way or the other/mixed feelings **(VOLUNTEERED)**
9 Don’t know/refused

6) “Overall Reported Satisfaction with Influence”
q14_1,2,3,4**.**Now I want to ask about your involvement in decisions on the job. Overall, how satisfied are you with the influence you have in company decisions that affect your job or work life? Would you say you are … **(READ)**
1 Very satisfied
2 Somewhat satisfied
3 Not too satisfied
4 Not satisfied at all
9 Don’t know/refused **(READ)**

7) “Effort of Fellow Employees” (Wave 2) : This was constructed by taking the summated ratings (where A=5,...,F=0) on the following questions and then scaling by 4/15 to make the final outcome on a 1-4 scale.:

16B. If you were to rate the performance of employees in your company on a scale similar to school grades (A for excellent, B for good, C for Fair, D for Poor and F for failure) what grade would you give EMPLOYEES in the following areas? (ROTATE ITEMS)
*Willingness to work hard; *Concern for the success of the company; *Willingness to take on new responsibilities

8) “Overall Influence at Job:” This is a summated rating of 3 questions. But there are two versions asked depending of the 1st of second random half of form A.
q12a. **(ASK OF FORM A ONLY)** (Now I want to ask about your involvement in different decisions on the job.) How much direct involvement and influence do YOU have in **(ITEM**)? (A lot, Some, Only a little, No) direct involvement and influence at all? **(ASK ITEMS a-d ONLY OF THE FIRST HALF OF THE FORM AND ITEMS e-h ONLY OF THE SECOND HALF OF THE FORM).** (Responses: 1 A lot of direct involvement and influence, 2 Some direct involvement and influence, 3 Only a little direct involvement and influence, 4 No direct involvement and influence, 5 Does not apply **(VOLUNTEERED),** 9 Don’t know/refused**)**
q12aa. Deciding HOW to do your job and organize the work
q12ab. Deciding what TRAINING is needed for people in your work group or department
q12ab. Deciding what TRAINING is needed for people in your work group or department
q12ae. Setting GOALS for your work group or department
q12ad. Deciding how much of a RAISE in pay the people in your work group should get
q12ae. Setting GOALS for your work group or department

9) “Suggestions” : This is a weighted summated rating index. The primary question is:

q17. **(IF S6=4)** How often, if ever, do YOU make suggestions to your supervisor or to management about how to improve quality or productivity? Would you say you make such suggestions ...**(READ)**
1 Often
2 Sometimes
3 Hardly ever
4 Never
9 Don't know/refused **(DO NOT READ)**

This was weighted by the perception of how often these suggestions are listened to. The question is:
q18. **(IF S6=4)** When you, or other employees like you, make suggestions about improving quality or productivity, how often does management take them seriously? Would you say management ... **(READ)**
1 Almost always
2 Sometimes
3 Hardly ever
4 Never… takes them seriously?
9 Don't know/refused **(DO NOT READ)**

9) "Worker Retention" is a variable that takes on 0 or 1 depending on whether the respondent says s/he is likely to remain with the company (i.e., responses 1 and 2) to the following question:

q7. Which ONE of the following four statements best describes how you think of your CURRENT job? Is it...
1 A LONG-TERM job you will stay in?
2 An opportunity for ADVANCEMENT in this SAME (company/organization)?
3 Part of a CAREER or profession that will probably take you to DIFFERENT companies?,
4 A job you will probably LEAVE that is NOT part of a career?
5 Other
9 Don't know/refused

10) "Overall Outcome" is an averaged rating of all the previous variables (scaled to a 1-4 scale) with the following caveats. (9) and (7) were asked of different people so we combined them to make a single question about influence. Also, (3) and (8) were asked of a subsample, so these were not included. (However, we did construct the same variable including (3) and (8) for the subsample: results were similar).

11) The Effectiveness of various HR programs came from the following questions:

<u>Individual:</u>
q29. On a different subject, I want to ask how problems involving INDIVIDUAL EMPLOYEES are solved at your workplace. Which of the following, if any, does your (company/organization) have? **(READ AND ROTATE) (Responses: 1 Yes, 2 No, 9 Don't know/refused)**
q29a. A PERSONNEL or human resources department
q29b. An OPEN DOOR policy so employees can tell upper management about problems with their immediate supervisors
q29c. A GRIEVANCE procedure that uses an outside referee or arbitrator to settle disputes

q32. OVERALL, how effective is your (company's/organization's) system for resolving the problems INDIVIDUAL employees have at work? Would you say it is… **(READ)**
1 Very effective
2 Somewhat effective
3 Not too effective
4 Not effective at all
9 Don't know/refused **(DO NOT READ)**

The HR_Individual control variable for the outcomes regression was constructed by summing over q29a through q29c, and multiplying the sum by q32.

Group:
q36. Now let's talk about company policies regarding wages, benefits, and other things affecting employees as a GROUP. Which of the following, if any, does your (company/organization) have to deal with issues that affect employees as a group? (First,) (is/are) there... **(READ) (Responses: 1 Yes, 2 No, 9 Don't Know/Refused to Answer)**
q36a. Regular "town" meetings with employees, called by management
q36b. An open door policy for GROUPS of employees to raise issues about policies with upper management
q36c. A committee of employees that discusses problems with management on a regular basis

q37. **(ASK FOR EACH ITEM WHERE Q36=1)** How effective (has/have) **(ITEM)** been in resolving group problems or concerns – very effective, somewhat effective, not too effective, not effective at all? (Responses: 1 Very effective, 2 Somewhat effective, 3 Not too effective, 4 Not effective at all, 9 Don't know/Refused to answer)
q37a. the "town" meetings
q37b. the open door policy
q27c. the employee committee

The HR_Grp control variable for the outcomes regression was created by summing up the (weighted) incidences of the various group based HR policies, i.e., q37a*q36a + ... + q37c*q36c.

Table C3: Questions from CES (for Table 8)
QL5a: What percentage of **NON-MANAGERIAL AND NON-SUPERVISORY** workers are involved in regularly scheduled meetings to discuss work-related problems:
* none of them,
* less than
* more than 75% but less than all of them
* all of them? %

QL2a: How about the quality of product or service? Would you assess this quality at your workplace as:

* A lot better than average
* Better than average
* Average
* Below average
* A lot below average

QL2b: How about financial performance? Would you assess this quality at your workplace as:
* A lot better than average
* Better than average
* Average
* Below average
* A lot below average

QD3:
How many employees at this location left the worksite in the past year? (We divided this by the number of employees to get the attrition rate, and took 1-attrition rate to be the "retention rate."