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ABSTRACT

Boss Competence and Worker Well-being*

Nearly all workers have a supervisor or 'boss'. Yet there is almost no published research by economists into how bosses affect the quality of employees' lives. This study offers some of the first formal evidence. First, it is shown that a boss's technical competence is the single strongest predictor of a worker's well-being. Second, we examine equivalent instrumental-variable results. Third, we demonstrate longitudinally that even if a worker stays in the same job and workplace then a newly competent supervisor greatly improves the worker's well-being. Finally, we discuss analytical possibilities, and consider necessary future research.

JEL Classification: I31, J28, M54

Keywords: bosses, expert leaders, leadership, job satisfaction, happiness

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1. Introduction

This paper explores the role of 'bosses' and their influence upon the labor market. Although virtually every employee in industrialized society has a supervisor or boss, there has been little research by economists into how bosses affect the quality of the lives of the workers they oversee.[1] This paper documents formal evidence. The paper suggests that the technical competence of a boss may have powerful and currently un-appreciated consequences. We draw upon cross-sections and panels; we use data from the United States and Britain; we report 7 different forms of supporting evidence. The data and the findings, which appear to be the first of their kind, are summarized in Tables 1 to 8. Figure 1 provides an elementary non-technical glimpse of the possible importance of supervisor competence. The paper also probes issues of causality. This is done (i) by using a natural instrument and (ii) by investigating longitudinally a sample of workplaces in which the identity of the employee remains the same and the only change is in the quality of the supervisor. The paper's evidence is consistent with the view that boss competence is central to employee well-being and thus to the behavior of labor markets. We identify a significant role for variables little-studied by economists such as:

- *whether the supervisor worked his or her way up inside the company*
- *whether the supervisor could in an emergency do the employee's job*
- *the supervisor's assessed level of competence*.

Our work follows in the footsteps of Freeman (1978) and Lazear, Shaw and Stanton (2011). It also links to a recent literature that -- though it has not directly explored the influence of bosses on well-being -- seeks to understand the influence of bosses upon productivity. Prominent among this recent literature are writings such as Branch, Hanushek and Rivkin (2013), Goodall (2009, 2011), and Lazear, Shaw and Stanton (2011) itself. Our results are also consistent with interesting new evidence in Brown et al. (2014) on links between employee trust (in managers) and good workplace outcomes. More broadly, we fit within a growing well-being

[1] A search through the standard labor textbook Filer, Hamermesh and Rees (1996), for example, finds only one mention of the word 'boss' or 'supervisor' in its 600 pages; a text such as Ehrenberg and Smith (2012) has a larger number of mentions but does not provide an analytical model or discuss data. As another illustration, a search on the Web of Science shows that in the whole history of the Journal of Labor Economics there is only one article that mentions, in its Key Words or Abstract or Title, the word "supervisors" and one other article that mentions "bosses". The same is true of the Journal of Human Resources. In the Journal of Occupational and Organizational Psychology, the closest paper to ours appears to be Miles et al. (1996), but that paper does not make the same point as ours but is instead about supervisors' communication. There are large related literatures on procedural justice, by McFarlin and Sweeney (1992) and others, and on citizenship by authors such as Capelli and Rogovsky (1998), but these also do not cover the issue tackled here.

research literature written by economists and psychologists (including Benjamin et al. 2012, Booth and van Ours 2008; Clark and Oswald 1996, Diener et al. 1999, Di Tella et al. 2001, Easterlin 2003, Frey and Stutzer 2002, Graham 2011, Hamermesh 2001, Layard 2006, Powdthavee 2010, and Senik 2004).

Although the well-being of workers might be believed to matter strongly in itself, it is now known that it also does so indirectly. This is because there is growing evidence that 'happier' workers are more productive (see especially the work of Carol Graham, such as Graham et al. 2004; many papers by the late Alice Isen; and research by Bockerman and Ilmakunnas, 2012; Edmans 2012; De Neve and Oswald 2012, and Oswald, Proto and Sgroi 2014). The broader background is a more general research effort into the effects of leaders upon measures of organizational performance. One strand, to which this paper contributes, attempts to understand the role of so-called 'expert leaders'. Such research has largely been at a senior level: it has attempted to separate CEO effects from industry or firm effects in order to calculate the explanatory power of leaders and their characteristics (e.g. Thomas 1988; Finkelstein & Hambrick, 1996; Waldman & Yammarino 1999; Souder, Simsek & Johnson, 2012; Dezso & Ross, 2012; Bloom et al. 2012).

There is no standard theory of how a supervisor[2] affects a workplace. Our approach has been influenced by the innovative work of Lazear et al. (2011), which discusses the potential training, advising, and motivating functions of bosses. That channel is logical and almost certainly captures some of the activities of real-world bosses and supervisors (Becker and Wrisberg 2008 and Goodall et al. 2011 contain some discussion of this for an elite sports setting).

Nevertheless, our conception differs in one way. Bosses are, in principle, special workers because they are in charge. They make a range of important organizational decisions. Therefore, it may be desirable not to view a boss as just another factor of production, or as altering only the quality of an employee's input through greater marginal product in the production function. Instead, it may be appropriate to view a boss as being able to shape the nature of the organization itself. As an aid to possible thinking, in the Appendix we focus on a characterization of equilibria of different kinds of efficiency, and how supervisors might alter the

[2] This might sound paradoxical, as supervisors are all around us, but historically the implicit presumption in labor economics has perhaps been that it is possible to treat supervisors (where it has done so explicitly at all) as just another kind of input in the F(...) function.

outcome from one such equilibrium to another. We thus implicitly have in mind a somewhat wider set of supervisory functions than in Lazear et al (2011).

2. Cross-sectional data

This paper begins with the simplest kind of cross-sectional evidence. The next part of the paper turns to fixed-effects results and to instrumental-variable estimates. The data used[3] here are drawn from (i) the National Longitudinal Survey of Youth in year 1990, (ii) the Working in Britain Survey in year 2000, and (iii) panel data from the NLSY for a set of years between 1979 and 1988. Both data sets are statistically representative of their chosen populations. Table 1 describes their key features; it reports means and standard deviations.

Elementary evidence consistent with the possible importance of supervisors is visible in the regression equations of Table 2. Here the dependent variable is a measure of the job satisfaction[4] of approximately 6000 randomly sampled young US workers, where answers are on a 4-point scale and the wording is "Overall, how satisfied are you with your job? I like it very much, …., I dislike it very much." For ease of interpretation, we report this with a simple OLS estimator. However, the results are essentially unaffected by using instead an ordered estimator, and those equations are available upon request. The mean of the dependent variable in Table 2 is approximately 3.2 on a 4-point scale. It has a standard deviation (of course driven by the across-person variation, so this should be seen in perspective) of approximately 0.7.

We are interested in the consequences of highly competent, or 'expert', supervisors. There is no single or conventional way to define competence. Hence in this paper we try to show that the main ideas go through using different measures.

In Table 2, a dummy variable for the supervisor having worked his or her way up in the ranks is used, and another for the supervisor having started or owns the company. After adjusting for a conventional set of covariates, a combined-dummy variable for these two together enters, in column 1 of Table 2, with a positive coefficient of 0.047. This coefficient is significantly different from zero at the 95% level on a two-tailed test. It is substantial. Comparing it to famously large coefficients in the job-satisfaction literature, it is close to the size of the coefficient on marriage, and approximately one third of the size of the extra satisfaction

[3] Most surveys do not report information about the role of supervisors, so we use selected years for which data are available.

[4] Most of the results in the paper use job-satisfaction as the worker well-being variable. But we have replicated the spirit of these results with a range of alternative measures of well-being. Those are available on request.

associated with working in the public sector. Other variables enter in ways familiar from the literature. For example, after controlling for income, those with higher levels of education are less satisfied with their jobs (one of the early demonstrations was in Clark and Oswald 1996), the level of earnings enters positively, and, consistent with the existence of discrimination in the year 1990, black workers suffer a negative coefficient. The second column of Table 2 explores the effects of dividing the supervisor dummy variable into its two constituent parts. Here the two coefficients (0.044 and 0.059 respectively) are close in size, although, as might be expected after the reduction in statistical power, the individual t-statistics become weaker at approximately 1.8 and 1.6.

Table 3 is in the same spirit but uses a British data set, the WIB 2000. This allows a randomly selected sample of approximately 1600 individuals. Here the wording used to construct the dependent variable is similar to before but workers now answer on a 7-point scale from "I am completely satisfied,….I am completely dissatisfied." The mean of the dependent variable in Table 3 is approximately 5.3, with a standard deviation of approximately 1.1.

In Table 3, workers are asked "Could your supervisor do your job if you were away?" and also "Does the supervisor know their own job well?" Both of these allow the construction of a banded dummy variable for competence. This is because they are coded on a 4-point scale from "Yes, very true" to "No, not true at all". In the first case, the mean of workers' answers is 2.5 and in the second case it is 3.2 (apparently a large number of workers do not believe the supervisor could fill in for the worker if the worker were away, whereas supervisors are given higher grades for the ability to do their supervisory role).

The coefficient in Table 3 on the variable denoted 'supervisor could do the worker's job' is positive, large, and statistically well-determined. It is estimated at approximately 0.13 with a t-statistic in excess of 5. Employees enjoy their jobs far more where the supervisor is assessed as technically competent. To get a sense of the size of the coefficient, it is necessary to note that the variable here runs from a value of 1 to a value of 4. Hence a movement from Not True at All (that the supervisor could do the person's job) to Very True would be associated with a quadrupling of the level of job satisfaction from this source. The first column of Table 3 therefore points to a striking pattern in the data. Here the existence of a highly competent supervisor would imply 0.4 extra points (on a seven-point scale) on the worker's job satisfaction. This is almost double the combined coefficients of marriage and working-in-the-public-sector. We return later to what might account for this strength.

Columns 2 and 3 of Table 3 report coefficients on a variable that codes answers to "How true is it that your supervisor or manager knows their own job well?" In column 2, the coefficient on this variable has a coefficient of 0.305 with a t-statistic greater than 8. The variable values run from 1 to 4. Thus a statistically representative worker whose supervisor knows his or her own job very well is markedly more contented than other workers. The difference in job satisfaction is approximately 1 full point on a seven point scale. Column 3 of Table 3 shows that both of these independent variables, for 'supervisor could do my job' and 'supervisor knows own job well', are strong when entered together in the specification. As would be expected, the individual coefficients in column 3 are slightly lower, at 0.055 and 0.279 respectively, than in the previous two columns.

3. Pooled equations, longitudinal evidence, and causal identification

Table 4 contains evidence on a larger data set. It gives pooled cross-sectional estimates from the NLSY for the years 1979, 1980, 1981, 1982, and 1988. Here we have used all of the years in which a particular supervisor question was included in the survey, namely, "Is your supervisor competent in doing the job?" where people may answer on a 4-point scale "Not true at all, …., Very true". The sample size in these regression equations is approximately 27,000 employees.

The coefficients on the supervisor variable are now very substantial. In the first column of the job satisfaction equations of Table 4, for example, the estimated coefficient is 0.303 with a t-statistic of approximately 35. This implies that a movement from having the least-competent category of supervisor to the most-competent category of supervisor would be associated with a difference in job satisfaction of nearly 1 full point on a 4-point scale.

In column 1 of Table 4, we exclude a large number of the potentially relevant influences on the job satisfaction of the workers who are being supervised. Later columns gradually introduce more and more of those. Only minor changes are observed in the estimated coefficient on the supervisor-competence variable. By the fourth column of Table 4, the coefficient is still approximately 0.29.

A coherent objection to Table's 4 estimates is that they are biased because of the fact that the personality of the worker is here an omitted variable. Hence it might be that inherently 'cheerful' people tend both to report high levels of job satisfaction and to give favorable assessments of their supervisor (they simply have a sunny outlook about everything). In that

case, the association between the worker's well-being and the assessment of the supervisor might be spurious. One way to probe this possibility is to include another variable for the inherent cheerfulness of the employee, and to see whether that largely eliminates the significance of the supervisor variable. The final column of Table 4 does so. It includes a variable for whether the individual reports that his or her co-workers are friendly. The friendliness variable is strongly positive in column 5 of Table 4. Once this inclusion is done, the coefficient on the supervisor-competence variable is barely affected. It falls by only approximately 0.05 points to 0.238. This result is consistent with the existence of a genuine role for supervisor competence.

Table 5 reports another form of evidence. In these fixed-effects regression equations, we are able to confirm that the positive correlation between job satisfaction and a supervisor-competence variable is not spuriously due merely to factors such as omitted personality factors. Table 5 continues to give similar results to those earlier tables, which establishes that such an interpretation cannot explain the patterns in the data.

Once again, consecutive columns of Table 5 build up to fuller specifications. The supervisor coefficient remains highly stable, at approximately 0.23, across the first four columns of the table. That is not far from the estimate size from cross-sectional estimates. This fact itself suggests there is comparatively little bias from omitted person fixed effects in cross-sectional equations. Once again, the addition of the 'co-workers are friendly' variable has only a minor effect on the supervisor coefficient, and itself is positive and well-determined (which is arguably suggestive, because this is in a fixed-effects equation, of the idea that the friendliness of co-workers genuinely matters). In column 5 of Table 5, the variable for supervisor competence remains at approximately 0.2 with a t-statistic of approximately 27.

The other variables in these fixed-effects specifications of Table 5 are of interest. Even in the fullest specification, there is evidence that job satisfaction depends upon education, whether the person works in the public sector, weekly earnings, and tenure. These variables' coefficients are necessarily estimated from the 'switchers' in the data set.

An illustration of effect-sizes is provided in the histogram of Figure 1. Here it is necessary to standardize the data in some way, so that the quantitative role of different explanatory variables can be compared appropriately. We do so here by using 90^{th} percentile – 10^{th} percentile movements in the main independent variables (except, necessarily, in the case of the zero-one public-sector dummy variable). The size of the estimated supervisor effect, in the

first column of Figure 1, is strikingly large. It dominates any of the more conventional influences upon people's job satisfaction, including the role of worker remuneration. Here the 10^{th} percentile for the supervision variable is the second-lowest rating of supervisor competence; the 90^{th} percentile is the highest of the four possible ratings; thus this change corresponds to a 2-point movement in the independent variable that measures supervisor competence.

Table 6 shows that the paper's principal finding is robust to an important form of correction. A potential objection to the previous table, Table 5, is that in the whole sample used there, the switchers might be moving disproportionately to different workplaces with (unobservably) better characteristics, and that this, it might be argued, could lead to an upward bias on the coefficient on the supervisor-competence variable. We show that is not what is driving the paper's key finding. Columns 1 to 3 of Table 6 reveal that even in the final column, where we study only those who remain in the same job and same workplace, we again find a strong role for the supervision variable. As would be expected, the coefficient is slightly lower, at 0.121. It remains well-determined, with a t-statistic of approximately 5.

Are some kinds of employees more sensitive to bosses' actions? What of certain kinds of workplaces? A number of further robustness checks are reported in Table 7. Column 1 tests for an interaction between the age of the worker and a variable for supervisor competence. The level of supervisor competence continues to be highly significant. An interaction term, however, enters with a coefficient of 0.004 and a t-statistic of approximately 2.3. This implies that the marginal effect of supervisor competence on the job satisfaction of the worker is considerably larger for older employees. One possible interpretation of this is that young workers are highly mobile and thus less susceptible to good or bad supervisors; another is that the old hold more senior positions in the job hierarchy and that their bosses are therefore fewer and individually more influential. It is then shown, in columns 2 to 3, that in a fixed-effects job satisfaction equation a supervisor-competence variable works strongly both for the large establishments and the small establishments (where the cut-off chosen for the definition of smallness is having fewer than 50 employees). Its coefficient is slightly greater in column 2 for the group of small establishments. In each of the two columns its t-statistic exceeds 5. Columns 4 and 5 of Table 7 alter the dependent variable. They use not a job satisfaction variable but instead a variable for how the worker answers the question "You are given the chance to do the things you do best? Not true at all,….Very true". The aim is to probe whether supervisors might have effects through such a channel. The coefficients on the supervisor competence variable are then,

respectively, 0.207 and 0.183. Hence these findings are consistent with such a view. Competent supervisors may assign their workers particularly effectively. Further issues related to the gender of bosses are taken up in Artz and Taengnoi (2014); we do not pursue those here.

Instrumental-variable (IV) estimates are provided in Table 8. For this we need a variable that influences the competence of the supervisor but also satisfies the necessary exclusion restriction in the second-stage equation. We use two. The first is whether the supervisor has a college degree; we view this as a likely shifter in the competence equation and as a priori excludable from a worker satisfaction equation that includes industry and occupation dummies. The second is a simple and arguably clear form of instrument. It is whether the supervisor worked his or her way up in the organization (or owns or started the company), which offers us a proxy for individual knowledge of, and detailed experience within, the company. We view this as a persuasive further candidate for inclusion in a competence equation and one that is naturally excludable from the satisfaction equation once industry dummies are included. It is possible to estimate such a model on the 1988 data. Columns 1 and 4 of Table 8, which are for different sub-samples, report OLS estimates as a baseline. Column 2 is the first-stage equation, namely, the equation for whether the supervisor is assessed as competent. The variable for the instrument (coded 0, 1, or 2) works strongly positively with a coefficient of 0.171 and a t-statistic of approximately 8. In column 3 of Table 8, the instrumented job-satisfaction equation has a well-determined coefficient of 0.381 on the variable for supervisor competence. The same pattern is found in columns 5 and 6.

4. Possible objections and counter-arguments

There remain a number of possible concerns. We summarize them and describe the counter-arguments.

Objection 1: Although it is true that the results cannot be explained by omitted fixed-effects, they could be the spurious result of exogenous mood swings. Consider a worker who becomes 'happier' for some external reason. Then he or she might see the world as a rosier place, and thus both report higher levels of job satisfaction and also view the supervisor more favorably.

Such a criticism cannot account for all of the paper's findings. It cannot explain, for example, why the "supervisor worked his way up through the company" variable enters statistically significantly in Table 2. It would be difficult to argue that it could explain the statistical significance of the "the supervisor could do my job if I were away" variable in Table 3. It also

cannot explain, in a table such as Table 4, why the addition of a variable for perceived co-worker friendliness (which should absorb most of a temporary mood-swing effect) leaves the coefficient on the supervisor-competence variable almost unchanged. Nor would it predict that the IV estimation of Table 8 would work effectively.

Objection 2: Supervisors in these data sets are not randomly assigned, so causality is moot.

Little is known in this important research area, and the econometric work points to strong and persistent correlations, so these early patterns will eventually have to be studied. However, more fundamentally, a number of steps have been taken here to address endogeneity. Our instruments are strong rather than weak, and they seem naturally to satisfy an exclusion restriction. Perhaps most persuasively, Table 6 reveals that even when the worker stays put, so that the nature of the supervisor is the only thing that alters, the paper's key result continues to hold in longitudinal data. This finding is not plausibly viewed as unexplained reverse-causality.

Objection 3: The dependent variables in the empirical work use subjective data, so they are not reliable.

If this criticism is held as a matter of faith rather than science, then it cannot be refuted. But, as explained in the paper, there is now much evidence that subjective scores are correlated with, and predictive of, objective and observable phenomena. Examples include Oswald and Wu (2010), which also reviews the literature. It can also be pointed out that corporations around the world make extensive use of subjective satisfaction data, in market research and their human resources divisions, so such data have passed a key Chicago-esque 'market' test.

Objection 4: It is not possible to assess whether the data support the conceptual framework in the appendix of the paper.

In part, any such criticism would be fair. The analytical framework, however, could stand on its own. If explicit functional forms were assumed, then it might generate testable predictions for future research. More straightforwardly, the appendix framework has the feature that its broad idea -- that supervisors can matter in a way that goes beyond a simple training-like boost to workers' productivity -- is consistent with the data presented in the paper.

Objection 5: It is possible to raise objections to the two instruments used in Table 8.

The variable, in particular, for whether the supervisor worked his or her way up is a fundamentally plausible instrument. It is a natural shifter in a supervisor-competence equation; it is a natural candidate for the required exclusion restriction.

Objection 6: A central role in the analysis is played by subjective assessments of the level of supervisor competence, and these are used to define the key independent variable, so the evidence is unpersuasive.

Such a view, methodologically, is an extreme one. Nevertheless, even if it were to be taken on its own terms, the objection is not persuasive. Employees are in a good position to answer truthfully and objectively to, for example, an inherently factual question of the kind: "Did your supervisor work his or her way up in this company/start the company?" To answer this in the positive does not require the worker to like, or admire the behavior of, the supervisor. Such factual questions are routine in social-science surveys and are widely used in almost all econometric research. In so far as people's answers contain measurement error (perhaps because they are new to the office or factory and are thus not certain about the job history of their supervisor), then regression coefficients will be biased downwards, and that will typically make it harder, not easier, to find statistically significant results in the earlier equations.

5. Conclusion

Bosses are ubiquitous in working life. Their activities have provoked little academic scrutiny in applied economics. This paper offers evidence consistent with the belief that the qualities of bosses -- in particular their technical competence -- can have powerful and little-appreciated consequences for workers' well-being. To the best of our knowledge, these are, perhaps surprisingly, the first empirical results of their kind. [5]

We have documented seven forms of empirical support. Some are very simple. The seven have different (arguably complementary) strengths and weaknesses, but each seems consistent with the broad idea that the quality of workers' lives is higher if the supervisor is highly competent, in a technical sense, at his or her job[6]. The size of our estimates varies from

[5] This is despite the fact that some commentators on drafts of the paper suggested that these results are so intuitive that they are obvious and must surely have been discovered many times before.

[6] As mentioned above, we have obtained the same kinds of results with other well-being measures.

substantial to strikingly large. In some equations, such as those in Table 5, the assessed competence of the boss is the single strongest predictor of employee well-being[7].

Boss competence is, admittedly, a subtle concept. There is no conventional method in economics for assessing it. For this reason, we have explored a variety of empirical proxies for technical competence and expertise. First, in a cross-section of 6000 young U.S. workers, we find that the job satisfaction of employees is positively correlated with whether the supervisor worked his or her way up within the company (or literally started the company). Second, in a cross-section of 1600 British workers, we establish that satisfaction levels are higher among individuals whose supervisor could if necessary step in competently to do that job, and where the supervisor knows his or her own job extremely well. Third, in pooled cross-sections totaling 27,000 workers, we show that a variable for assessed supervisor-competence enters with a huge positive coefficient in a job satisfaction equation. Fourth, we demonstrate that the key conclusion continues to hold -- with an only marginally reduced coefficient -- in fixed-effects estimation. Fifth, it is also unaffected, in fixed-effects equations, by the inclusion of an extra control variable that is a proxy for fluctuations in the underlying cheerfulness of individuals. Sixth, and perhaps most notably, it is robust, with an only fractionally reduced effect-size, in estimates that restrict the sample solely to workers who remain in the same job in the same workplace, who are thus the employees who experience only a change in the quality of their supervisor. Seventh, we offer a range of instrumental-variable estimates.

Lazear et al. (2011) argue, in an appealing way, that bosses act to raise workers' productivity. We agree with this. However, we have tried to consider a wider remit for a boss. They will indeed be trainers, and advisors; nevertheless, they also make organizational decisions. It is likely that future research will examine explicit models of a supervisor's behavior (we outline possible theoretical mechanisms in the Appendix). It may also be necessary to construct quasi-experimental inquiries into the effects that stem from poor, mediocre, and talented bosses. Ultimately, labor economics and the empirical literature that is emerging from business and management journals will in this area have to be fused into a coherent whole.

We believe these issues merit future attention.

[7] The earlier Figure 1 is one non-technical way to convey this.

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Appendix

Imagine a stylized world in which there are three kinds of agents to be understood – the worker, the supervisor, and the employer (ie. the firm or organization). Assume that the worker and the supervisor can be thought of as combining in their efforts to produce some kind of output. This can either be a blue-collar or white-collar activity; the issues in each are the same. For analytical simplicity, assume that the firm can be thought of as existing in the background rather than the foreground, but that this employing firm has, ultimately, to receive a share of whatever is produced jointly by the worker and the supervisor. The worker and the supervisor must then decide how to behave. Let the worker take some kind of action, denoted a. Let the supervisor's action be denoted s. These could be thought of as effort levels but can also be viewed much more broadly (s could be advice given to a worker by an experienced supervisor, for example). The variables a and s can easily be generalized to vectors of actions; but in the algebra below, for simplicity, they will not be. They will instead be viewed as single variables defined on the real line. Together, the two actions lead to output Q for the firm. Write this as a production function

$$Q = q(a, s). \quad (1)$$

where both a and s contribute to output and have positive first-derivatives. Something has also to be assumed about incomes. Assume that the worker gets a share psi, ψ, of the output while the supervisor gets share sigma, σ. The remainder goes to the employer.

Assume the worker's utility function can be written in the fairly general form

$$\mu = \mu(a, s, \psi Q) - c(a) \quad (2)$$

where part of utility thus depends directly on the actions a and s, another part depends on the share of the output that accrues to the worker, and a final part depends on the cost of action a, which is assumed to be captured by a convex increasing function $c(a)$. At this stage, no assumption needs to be made about the sign of the derivatives of the μ function in equation (2). For simplicity, the cost function is treated in the above formulation as separable, but that can straightforwardly be dropped. If desired, μ here might be thought of approximately as the 'overall job-satisfaction' of a worker. It is a measure of the total utility from the work environment.

Write the supervisor's utility function in a symmetric way. It is therefore

$v = v(a, s, \sigma Q) - k(s)$ (3)

where in this case the function $k(s)$ captures the supervisor's cost of action. For ease of notation, the form of equation (2) and (3) can be written in a more compressed way. Define identities

$\mu(a, s, \psi Q) = u(a, s)$ (4)

$v(a, s, \sigma Q) = v(a, s)$. (5)

Hence, from these, write the two parties' net utilities as:

Worker's utility = $u(a, s) - c(a)$ (6)

Supervisor's utility = $v(a, s) - k(s)$. (7)

This framework is a simple one, but it is allows us to think of three different types of outcomes that might be expected to occur.

The inexpert-supervisor case

Consider a supervisor who is inexperienced in the nature of the work and the type of workplace. He or she thus lacks deep knowledge about the worker and environment. How will such a supervisor act? Assume that the supervisor is able to observe the action of the worker, but beyond that understands little about the work-setting. In this case, because the supervisor is so inexpert, the two parties can be thought of as behaving in a non-cooperative rather than cooperative way. There is then potentially a Nash equilibrium where both the worker and the supervisor choose their actions (a, s) independently.

This outcome is characterized mathematically by the two usual kinds of first-order conditions

$u_a - c'(a) = 0$ (8)

and

$v_s - k'(s) = 0$ (9)

so the outcome, which can be thought of as the intersection of two reaction functions, is, for the usual reasons, either strictly or weakly sup-optimal for the worker-supervisor pair (intuitively, because each ignores the externalities imposed on the other party). Equations (8) and (9) define a self-reinforcing fixed point and thus one kind of equilibrium.

It might be thought that the supervisor in the above set-up is behaving foolishly. However, that reaction is not a fair one. This kind of non-cooperative outcome is a feasible and rational one for a supervisor who has limited knowledge. It requires only that (i) the supervisor knows his or her own preferences, and (ii) the supervisor be able to see the action chosen by the employee, even if the supervisor has little understanding of why the worker is choosing that action or how the workplace could be organized better.

The semi-expert supervisor

Now imagine one level up. Consider a supervisor who -- while not a true expert -- has slightly more knowledge and experience than the novice. This 'semi-expert' version of the framework points to an important variant on the first kind of outcome. In this case, consider the possibility that this kind of supervisor might be able to steer the workplace away from some of the excessively poor outcomes (for both sides, the supervisor and the worker, and thus potentially also the firm in the background). To conceptualize the problem more formally, consider exactly the previous framework but with one additional possibility, namely, that there are multiple Nash equilibria. Such multiplicity is to be expected. Sufficient conditions to rule that out would require strong assumptions about the structure (formally, that the model have the characteristics of a contraction mapping).

Thus, define a semi-expert supervisor as someone who is able, even with a rather hazy knowledge of the workplace and the preferences of the worker, to avoid the worst of the different Nash equilibria. Once again, both the worker and the supervisor will choose their actions *(a, s)* in a non-cooperative way, so the case is trivially also characterized mathematically by conditions

$u_a - c'(a) = 0$ (10)

and

$v_s - k'(s) = 0$ (11)

but there may now be, by assumption, multiple crossing-points of these two functions in *a,s* space. The location of the actual Nash outcome is then potentially influenced by the skill of the supervisor.

Formally, the outcome remains sup-optimal, and perhaps extremely so, in the sense of still being Pareto inefficient for the worker-supervisor pair. Nevertheless, a semi-expert leader here might be seen as navigating the pair away from particularly poor Nash equilibria.

The expert supervisor

Some supervisors, however, may be different. They may be individuals who have a deep and expert knowledge of both the core business and the nature of the worker. In such a case, an 'expert supervisor' could, in principle, help guide the pair to a jointly efficient outcome (for the pair, and, by implication, for the employing firm in the background). This is not a minor variant on the previous two kinds of outcomes. Instead the outcome here is not a Nash equilibrium but, rather, the expert supervisor helps to produce a cooperative equilibrium. The worker and the supervisor thereby choose actions *(a, s)* jointly to solve

Maximize $u(a, s) - c(a, s)$ s.t. $v(a, s) - k \geq V$

where V is an arbitrarily fixed level of net utility for the supervisor.

Thus this case is characterized by Pareto-efficiency and the following two first-order conditions have to hold:

$$u_a - c'(\mathrm{a}) - \lambda v_a = 0 \quad (12)$$

and

$$v_s - k'(\mathrm{s}) - \lambda k_s = 0 \quad (13)$$

where λ is the usual Lagrangean multiplier. The expert supervisor here leads the pair away from inefficient Nash equilibria. As can be seen, equations such as (10) and (11) do not satisfy the requirements for Pareto efficiency, whereas (12) and (13) do. The worker and the supervisor will thus have the highest utilities in this third case. Expert bosses can offer workers the best outcomes.

The defining aspect -- and a testable one -- of case 3 is that the 'expert supervisor' has to have an experienced understanding of the work setting and the character of the employees. The reason is simple. Such information is essential to achieve a cooperative equilibrium, whether by implicit negotiation or explicit negotiation. By contrast, to get to the Nash equilibria in each of case 1 and case 2, it is not necessary to know (almost) anything about the other side's preferences. An agent simply maximizes given what he or she sees the other side choose as the opposing side's action.

A taxonomy of bosses of the kind described might be said to have the advantage that it corresponds mathematically to an approach familiar to almost all economists (it is formally equivalent to the theory of duopoly in industrial organization, and standard parts of international-

trade theory, and core elements of environmental economics). Nevertheless, here it provides a way to conceptualize:

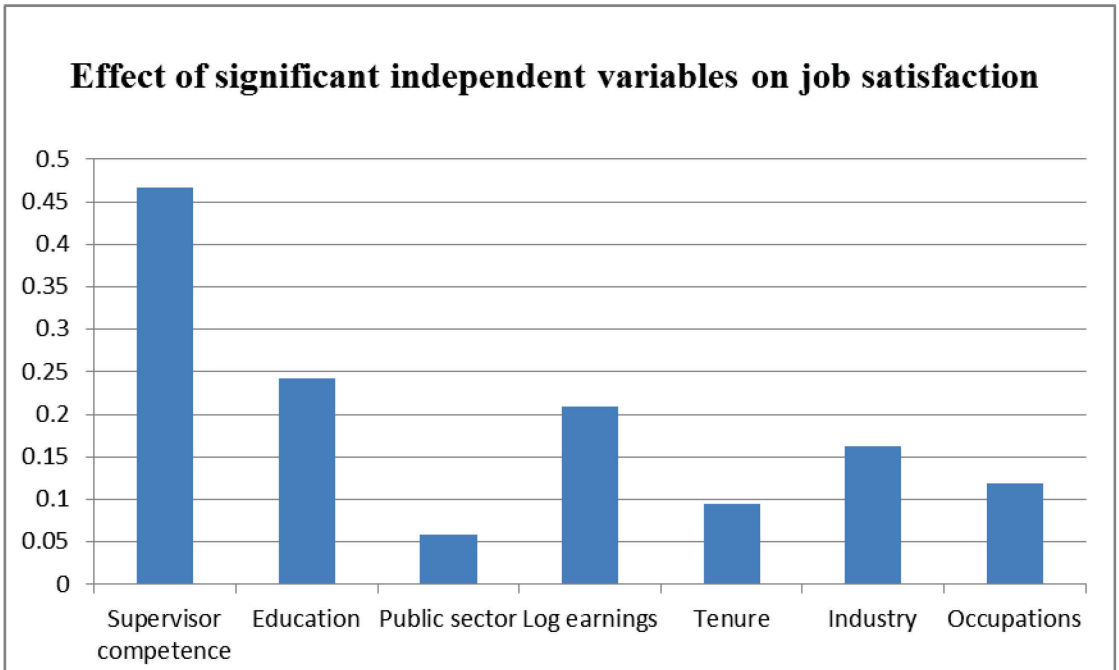
inexperienced supervisors who have very little technical or insider knowledge;

semi-informed supervisors who have some; and

expert supervisors who have a great deal.

In short, workers may benefit from having an expert supervisor, and not merely from any higher income that such a supervisor might make possible. Supervisors may help to improve equilibrium outcomes.

Figure 1: An Illustration of the Major Role of Supervisor Competence (with standardized effect-sizes, using the fixed-effects estimates of Table 5)



Note: values are computed by differencing the effects at the 10th percentile from the 90th percentile of each variable. The public sector value is the difference in effect between the public sector and private sector, the tenure value corresponds to differencing the 90th percentile from the 10th percentile, and the education value is the difference in effect between a college degree and a high school dropout. Values based on Table 5, column (4) estimates.

Table 1: Variable Definitions and Descriptive Statistics

Variable	Definition	Mean (Standard Deviation)		
		(1)	(2)	(3)
Job satisfaction (NLSY data)	Global job satisfaction: = 1 if "dislike very much" to 4 if "like very much" .	3.181 (0.749)	3.295 (0.728)	-----
Job satisfaction (WIB data)	Global job satisfaction: = 1 if "completely dissatisfied" to 7 if "completely satisfied".	-----	-----	5.305 (1.101)
Supervisor competence	Supervisor is competent in doing the job: = 1 if "not true at all" to 4 if "very true".	3.489 (0.748)	-----	-----
Supervisor expertise	= 1 if supervisor "worked way up through ranks" or "started or owns company" or 0 otherwise.	-----	0.683 (0.465)	-----
Supervisor knowledge	Supervisor "knows their own job well": = 1 if "not at all true" to 4 if "very true".	-----	-----	3.236 (0.904)
Supervisor replacement	Supervisor "could do [worker's] job if [worker] was away": =1 "not true at all" to 4 if "very true".	-----	-----	2.523 (1.216)
Friendly	Your co-workers are friendly: = 1 if "not true at all" to 4 if "very true".	3.630 (0.588)	-----	-----
Best	You are given a chance to do the things you do best: = 1 if "not true at all" to 4 if "very true".	3.085 (0.887)	-----	-----
Female	= 1 if worker is female and 0 if male.	0.466 (0.499)	0.444 (0.497)	0.529 (0.499)
Hispanic	= 1 if worker is Hispanic and 0 otherwise.	0.161 (0.368)	0.156 (0.363)	-----
Black	= 1 if worker is Black and 0 otherwise.	0.217 (0.413)	0.245 (0.431)	-----
High school	= 1 if worker has only a high school degree and 0 otherwise.	0.445 (0.497)	0.429 (0.495)	-----
Some college	= 1 if worker has more than a high school degree but not a 4-year degree and 0 otherwise.	0.196 (0.397)	0.223 (0.416)	-----
College	= 1 if worker has at least a 4-year degree and 0 otherwise.	0.090 (0.286)	0.208 (0.406)	-----
Degree or higher	= 1 if worker has a degree, equivalent or higher and 0 otherwise.	-----	-----	0.302 (0.459)
A / AS level	= 1 if worker has A-level or AS-level education and 0 otherwise.	-----	-----	0.112 (0.316)
O level	= 1 if worker has O-level education and 0 otherwise.	-----	-----	0.252 (0.435)
CSE	= 1 if worker has CSE education and 0 otherwise.	-----	-----	0.111 (0.314)
Married	= 1 if worker is married and 0 otherwise.	0.283 (0.451)	0.523 (0.500)	0.653 (0.476)
Union	= 1 if worker is a member of a labor union and 0 otherwise.	0.174 (0.379)	0.138 (0.345)	0.327 (0.469)
Public	= 1 if worker's employer is a government institution and 0 otherwise.	0.111 (0.315)	0.131 (0.338)	0.300 (0.458)
Age	Age in years	22.160 (3.842)	29.038 (2.254)	38.501 (10.584)
Age squared	Age in years x age in years	505.81	848.31	1594.29

		(178.14)	(131.60)	(840.39)
Tenure	Tenure at employer in weeks	78.21 (96.31)	177.15 (172.64)	386.71 (389.09)
Tenure squared	Tenure at employer x tenure at employer	15391 (41683)	61182 (101907)	300842 (567750)
Log hours	Natural log of weekly hours worked	3.555 (0.400)	3.731 (0.150)	3.454 (0.427)
Log earnings	Natural log of weekly earnings at job	5.141 (0.763)	5.918 (0.622)	5.553 (0.775)

Column (1): Observations = 27,537 across five NLSY waves (1979, 1980, 1981, 1982, 1988). 10 occupation categories and 13 industry categories are included.
Column (2): Observations = 6,298 in NLSY 1990 wave. 10 occupation categories, 13 industry categories, and 4 firm size categories are included.
Column (3): Observations = 1,604 in Working in Britain 2000. 9 occupation categories, 9 industry categories and 3 firm size categories are included.

Table 2: Regression Equations for Job Satisfaction in the United States: OLS Cross-Section Estimates (NLSY 1990 data)

	Job satisfaction[a]	
	(1)	(2)
Supervisor "worked way up in the ranks" or	0.047**	-----
"started or owns company"[b]	(2.009)	-----
Supervisor "worked way up in the ranks"	-----	0.044*
	-----	(1.782)
Supervisor "started or owns company"	-----	0.059
	-----	(1.612)
Female	0.031	0.030
	(1.143)	(1.120)
Hispanic	0.075***	0.075***
	(2.663)	(2.668)
Black	-0.062**	-0.062**
	(-2.413)	(-2.382)
Age	0.064	0.064
	(0.479)	(0.478)
Age squared	-0.001	-0.001
	(-0.473)	(-0.473)
High school degree	-0.031	-0.031
	(-0.836)	(-0.837)
Some college education	-0.046	-0.046
	(-1.105)	(-1.099)
Four-year college degree	-0.084*	-0.083*
	(-1.789)	(-1.780)
Married	0.062***	0.062***
	(2.761)	(2.778)
Union	-0.049	-0.048
	(-1.498)	(-1.453)
Public sector	0.136***	0.137***
	(3.279)	(3.300)
Log weekly earnings	0.115***	0.115***
	(4.568)	(4.550)
Log weekly hours worked	0.230***	0.230***
	(2.893)	(2.892)
Tenure	-4.9×10^{-4}**	-4.9×10^{-4}**
	(-2.417)	(-2.412)
Tenure squared	2.80×10^{-7}	2.79×10^{-7}
	(0.846)	(0.844)
Firm sizes (4)	Yes	Yes
Industries (13)	Yes	Yes
Occupations (10)	Yes	Yes
Constant	0.973	0.972
	(0.498)	(0.497)
Observations	6298	6298
t-statistics are in parentheses: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively. Survey weights are used throughout.		

[a] " How do/did you feel about the job you have now / your most recent job?" 1 = "dislike very much", 2 = "dislike somewhat", 3 = "like fairly well", 4 = "like very much".
[b] "To the best of your knowledge, what reason on this card best explains how he/she came to occupy his/her position?" 1 = "worked way up through ranks" or "started or owns company" and 0 = otherwise.

Table 3: Regression Equations for Job Satisfaction in Great Britain: OLS Cross-Section Estimates
(WIB 2000 data)

	Job satisfaction[a]		
	(1)	(2)	(3)
Supervisor "could do [worker's] job"[b]	0.132***	-----	0.055**
	(5.321)	-----	(2.086)
Supervisor "knows own job"[c]	-----	0.305***	0.279***
	-----	(8.633)	(7.371)
Female	0.227***	0.212***	0.213***
	(3.193)	(3.065)	(3.074)
Age	-0.033	-0.047**	-0.044**
	(-1.526)	(-2.237)	(-2.125)
Age squared	$4.47x10^{-4}$*	0.001**	0.001**
	(1.657)	(2.382)	(2.284)
Degree or higher	-0.142	-0.182*	-0.178*
	(-1.349)	(-1.762)	(-1.727)
A-level or AS-level	-0.175	-0.210*	-0.206*
	(-1.506)	(-1.836)	(-1.802)
O-level	-0.212**	-0.222**	-0.223**
	(-2.243)	(-2.368)	(-2.385)
CSE	-0.052	-0.058	-0.065
	(-0.489)	(-0.552)	(-0.622)
Married	0.106	0.123*	0.118*
	(1.621)	(1.943)	(1.847)
Union	-0.183**	-0.146**	-0.147**
	(-2.484)	(-2.040)	(-2.058)
Public sector	0.117	0.149*	0.146*
	(1.413)	(1.842)	(1.815)
Log weekly hours worked	-0.237***	-0.207**	-0.204**
	(-2.693)	(-2.414)	(-2.383)
Log annual salary	0.211***	0.192***	0.201***
	(3.456)	(3.124)	(3.304)
Tenure	$1.84x10^{-4}$	$1.92x10^{-4}$	$2.30x10^{-4}$
	(0.816)	(0.834)	(1.003)
Tenure squared	$-1.41x10^{-7}$	$-1.38x10^{-7}$	$-1.59x10^{-7}$
	(-0.863)	(-0.796)	(-0.924)
Firm sizes (3)	Yes	Yes	Yes
Industries (9)	Yes	Yes	Yes
Occupations (9)	Yes	Yes	Yes
Constant	5.239***	4.814***	4.634***

	(9.746)	(9.197)	(8.867)
Observations	1604	1604	1604

t-statistics are in parentheses: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively. Survey weights are used throughout.
a "All in all, how satisfied would you say you are with your job?" Range from 1 = "completely dissatisfied" to 7 = "completely satisfied".
b "How true is it that your supervisor could do your job if you were away?" 1 = "not at all true", 2 = "somewhat true", 3 = "true", 4 = "very true".
c "How true is it that your supervisor or manager knows their own job well?" 1 = "not at all true", 2 = "somewhat true", 3 = "true", 4 = "very true".

Table 4: Regression Equations for Job Satisfaction in the United States: Pooled Cross-Section Estimates (NLSY 1979-1982, 1988)

	Job satisfaction[a]				
	(1)	(2)	(3)	(4)	(5)
Supervisor competence[b]	0.303***	0.303***	0.301***	0.293***	0.238***
	(35.187)	(35.155)	(34.890)	(34.057)	(26.616)
Co-workers are friendly[c]	-----	-----	-----	-----	0.225***
	-----	-----	-----	-----	(20.243)
Female	0.039***	0.037***	0.065***	0.057***	0.062***
	(3.026)	(2.814)	(4.896)	(3.837)	(4.274)
Hispanic	0.004	0.003	-0.004	0.002	0.010
	(0.277)	(0.200)	(-0.243)	(0.129)	(0.710)
Black	-0.110***	-0.102***	-0.097***	-0.081***	-0.054***
	(-7.600)	(-6.993)	(-6.551)	(-5.472)	(-3.704)
Age	0.033**	0.034**	-0.031*	-0.024	-0.023
	(2.274)	(2.121)	(-1.739)	(-1.360)	(-1.330)
Age squared	-3.83×10^{-4}	-4.59×10^{-4}	0.001*	0.001	4.89×10^{-4}
	(-1.232)	(-1.353)	(1.885)	(1.378)	(1.334)
High school degree	-----	-0.017	-0.039**	-0.060***	-0.055***
	-----	(-1.074)	(-2.384)	(-3.641)	(-3.456)
Some college education	-----	-0.014	-0.026	-0.084***	-0.081***
	-----	(-0.690)	(-1.265)	(-3.894)	(-3.861)
Four - year degree	-----	0.009	-0.057**	-0.196***	-0.201***
	-----	(0.361)	(-2.214)	(-7.017)	(-7.332)
Married	-----	0.049***	0.042***	0.043***	0.044***
	-----	(3.488)	(2.993)	(3.094)	(3.170)
Union	-----	-----	-0.066***	-0.039**	-0.031**
	-----	-----	(-4.001)	(-2.370)	(-1.964)
Public sector	-----	-----	0.137***	0.051**	0.052**
	-----	-----	(6.877)	(2.024)	(2.116)
Log weekly earnings	-----	-----	0.110***	0.093***	0.092***
	-----	-----	(8.065)	(6.719)	(6.834)
Log weekly hours worked	-----	-----	0.038*	0.052**	0.051**
	-----	-----	(1.862)	(2.502)	(2.472)
Tenure	-----	-----	-9.10×10^{-5}	-1.76×10^{-4}	-1.74×10^{-4}
	-----	-----	(-0.655)	(-1.265)	(-1.269)
Tenure squared	-----	-----	4.19×10^{-9}	1.41×10^{-7}	1.52×10^{-7}
	-----	-----	(0.015)	(0.501)	(0.547)
Industries (13)	No	No	No	Yes	Yes
Occupations (10)	No	No	No	Yes	Yes
Year dummies	No	No	No	Yes	Yes

Constant	1.592***	1.598***	1.771***	2.086***	1.441***
	(9.385)	(8.528)	(9.295)	(10.415)	(7.214)
Observations	27537	27537	27537	27537	27537

t-statistics are in parentheses: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively. Survey weights are used throughout. Standard errors are clustered by individual respondent.

[a] " How do/did you feel about the job you have now / your most recent job?" 1 = "dislike very much", 2 = "dislike somewhat", 3 = "like fairly well", 4 = "like very much".

[b] "Your supervisor is competent in doing the job." 1 = "not true at all", 2 = "not too true", 3 = "somewhat true", 4 = "very true".

[c] "Your co-workers are friendly." 1 = "not true at all", 2 = "not too true", 3 = "somewhat true", 4 = "very true".

Table 5: Regression Equations for Job Satisfaction in the United States: Fixed-Effects Estimates
(NLSY 1979-1982, 1988)

	Job satisfaction[a]				
	(1)	(2)	(3)	(4)	(5)
Supervisor competence[b]	0.243***	0.243***	0.239***	0.233***	0.198***
	(28.790)	(28.767)	(28.183)	(27.647)	(22.951)
Co-workers are friendly[c]	-----	-----	-----	-----	0.165***
	-----	-----	-----	-----	(14.993)
Age	0.039***	0.040**	-0.001	-0.028	-0.025
	(2.789)	(2.374)	(-0.064)	(-1.192)	(-1.078)
Age squared	-4.75×10^{-4}*	-0.001	2.55×10^{-4}	4.37×10^{-4}	3.74×10^{-4}
	(-1.618)	(-1.530)	(0.696)	(1.169)	(1.007)
High school degree	-----	-0.017	-0.065***	-0.074***	-0.066***
	-----	(-0.745)	(-2.800)	(-3.235)	(-2.911)
Some college education	-----	-0.011	-0.079**	-0.114***	-0.105***
	-----	(-0.339)	(-2.473)	(-3.594)	(-3.342)
Four - year degree	-----	0.035	-0.142***	-0.242***	-0.239***
	-----	(0.892)	(-3.398)	(-5.699)	(-5.688)
Married	-----	0.014	0.018	0.015	0.016
	-----	(0.883)	(1.147)	(0.975)	(1.059)
Union	-----	-----	-0.004	0.007	0.011
	-----	-----	(-0.264)	(0.459)	(0.742)
Public sector	-----	-----	0.149***	0.059**	0.061**
	-----	-----	(7.115)	(2.367)	(2.471)
Log weekly earnings	-----	-----	0.123***	0.118***	0.117***
	-----	-----	(7.709)	(7.325)	(7.366)
Log weekly hours worked	-----	-----	-0.004	-0.003	-0.004
	-----	-----	(-0.194)	(-0.148)	(-0.190)
Tenure	-----	-----	-0.001***	-0.001***	-0.001***
	-----	-----	(-4.879)	(-5.439)	(-5.243)
Tenure squared	-----	-----	4.60×10^{-7}*	6.13×10^{-7}**	5.93×10^{-7}**
			(1.715)	(2.276)	(2.212)
Industries (13)	No	No	No	Yes	Yes
Occupations (10)	No	No	No	Yes	Yes
Year dummies	No	No	No	Yes	Yes
Constant	1.718***	1.710***	1.708***	2.361***	1.853***
	(10.514)	(8.772)	(8.600)	(6.684)	(5.261)
Observations	27537	27537	27537	27537	27537
t-statistics are in parentheses: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively. Standard errors are clustered by individual respondent.					

[a] " How do/did you feel about the job you have now / your most recent job?" 1 = "dislike very much", 2 = "dislike somewhat", 3 = "like fairly well", 4 = "like very much".
[b] "Your supervisor is competent in doing the job." 1 = "not true at all", 2 = "not too true", 3 = "somewhat true", 4 = "very true".
[c] "Your co-workers are friendly." 1 = "not true at all", 2 = "not too true", 3 = "somewhat true", 4 = "very true".

Table 6: Regression Equations for Job Satisfaction in the United States: Alternative Groupings Fixed-Effects Estimates (NLSY 1979-1982)

(This table gradually restricts the sample to show, in the final column, that the FE results hold even when *the sample is only those workers who remain within the same job and workplace, namely, when only supervision alters*.)

	Job satisfaction[a]		
	Narrow sample 1	Narrower sample 2	Narrowest sample 3
Supervisor competence[b]	0.179***	0.149***	0.121***
	(16.420)	(10.375)	(4.926)
Co-workers are friendly[c]	0.160***	0.100***	0.064**
	(11.800)	(5.965)	(2.485)
Age	-0.138**	-0.129	-0.046
	(-1.979)	(-1.294)	(-0.223)
Age squared	0.004**	0.004*	0.001
	(2.534)	(1.653)	(0.185)
High school degree	-0.084***	-0.057	-0.051
	(-2.890)	(-1.364)	(-0.749)
Some college education	-0.162***	-0.118*	-0.102
	(-3.618)	(-1.755)	(-0.939)
Four - year degree	-0.446***	-0.432***	-0.839***
	(-6.040)	(-3.396)	(-4.288)
Married	0.002	-0.037	0.022
	(0.102)	(-1.185)	(0.382)
Union	-0.003	0.019	0.004
	(-0.144)	(0.722)	(0.095)
Public sector	0.093***	0.158***	0.171*
	(2.712)	(2.754)	(1.930)
Log weekly earnings	0.126***	0.042	0.048
	(5.564)	(1.490)	(1.011)
Log weekly hours worked	0.006	0.029	0.000
	(0.191)	(0.586)	(0.005)
Tenure	-0.002***	-0.004***	-0.006***
	(-5.062)	(-8.198)	(-4.238)
Tenure squared	7.11×10^{-7}	6.47×10^{-6}***	9.65×10^{-6}***
	(0.502)	(4.085)	(3.359)
Industries (13)	Yes	Yes	No
Occupations (10)	Yes	Yes	No
Year dummies	Yes	Yes	Yes
Constant	2.828***	3.484***	3.180
	(3.499)	(3.104)	(1.437)
Observations	19587	9361	3275

t-statistics are in parentheses: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively. Standard errors are clustered by each cluster type in the corresponding columns.
[a] " How do/did you feel about the job you have now / your most recent job?" 1 = "dislike very much", 2 = "dislike somewhat", 3 = "like fairly well", 4 = "like very much".
[b] "Your supervisor is competent in doing the job." 1 = "not true at all", 2 = "not too true", 3 = "somewhat true", 4 = "very true".
[c] "Your co-workers are friendly." 1 = "not true at all", 2 = "not too true", 3 = "somewhat true", 4 = "very true".
Sample 1: all observations from 1979 – 1982 are included.
Sample 2: only observations of workers in the same employer are included.
Sample 3: only observations of workers in same employer, occupation and industry are included.

Note
The number of third-column observations is reduced (i.e. groupings large) because we use 3-digit occupations and industries to generate the sample/groupings. This corresponds to very close job-matches across the waves.

Table 7: Regression Equations for Job Satisfaction and Am-Given-Chance-To-Do-My-Best in the United States: Robustness Checks

	Job satisfaction[a] – Fixed effects			Can do what does best[d]	
	Whole sample	NLSY 1979, 1980, 1988		Pooled cross-sect.	Fixed effects
		Small firm[e]	Big firm[e]		
	(1)	(2)	(3)	(4)	(5)
Supervisor competence[b]	0.110**	0.194***	0.125***	0.207***	0.183***
	(2.299)	(7.784)	(4.557)	(20.818)	(19.291)
Co-workers are friendly[c]	0.165***	0.150***	0.162***	0.160***	0.135***
	(15.011)	(4.868)	(4.830)	(13.315)	(11.215)
Female	-----	-----	-----	0.123	-----
	-----	-----	-----	(-7.030)	-----
Hispanic	-----	-----	-----	0.043	-----
	-----	-----	-----	(-2.347)	-----
Black	-----	-----	-----	-0.006	-----
	-----	-----	-----	(-0.352)	-----
Age x supervisor comp.	0.004*	-----	-----	-----	-----
	(1.846)	-----	-----	-----	-----
Age	-0.040	-0.007	0.042	0.076***	0.015
	(-1.604)	(-0.131)	(0.555)	(3.702)	(0.554)
Age squared	3.91×10^{-4}	0.001	-0.001	-0.001***	-0.001
	(1.055)	(0.606)	(-0.446)	(-3.185)	(-1.258)
High school degree	-0.067***	0.019	-0.181**	-0.081***	-0.051*
	(-2.941)	(0.317)	(-2.478)	(-4.019)	(-1.868)
Some college education	-0.106***	0.045	-0.190*	-0.179***	-0.073*
	(-3.372)	(0.521)	(-1.878)	(-6.890)	(-1.934)
Four - year degree	-0.242***	-0.065	-0.345**	-0.224***	0.032
	(-5.742)	(-0.594)	(-2.478)	(-7.077)	(0.637)
Married	0.016	-0.011	-0.018	0.021	0.019
	(1.053)	(-0.270)	(-0.369)	(1.365)	(1.097)
Union	0.012	0.035	-0.077	-0.096***	-0.027
	(0.796)	(0.713)	(-1.577)	(-4.943)	(-1.474)
Public sector	0.062**	0.207**	0.354***	-0.016	-0.036
	(2.508)	(2.152)	(2.634)	(-0.535)	(-1.181)
Log weekly earnings	0.117***	0.042	0.061	0.105***	0.116***
	(7.346)	(0.979)	(1.370)	(7.087)	(6.661)
Log weekly hours worked	-0.004	0.113**	0.073	0.160***	0.071***
	(-0.162)	(2.093)	(0.978)	(6.557)	(2.756)
Tenure	-0.001***	-0.001	-0.001	0.001***	0.001***
	(-5.192)	(-1.397)	(-1.505)	(6.912)	(3.209)

Tenure squared	5.92×10^{-7}**	4.50×10^{-7}	8.09×10^{-7}	-1.76×10^{-6}***	-1.21×10^{-6}***
	(2.205)	(0.698)	(0.968)	(-5.364)	(-3.925)
Industries (13)	Yes	Yes	Yes	Yes	Yes
Occupations (10)	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Constant	2.163***	1.431*	1.504	-0.072	1.177***
	(5.520)	(1.740)	(1.286)	(-0.301)	(2.943)
Observations	27537	8009	6339	27537	27537

t-statistics are in parentheses: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively. Survey weights are used throughout. Standard errors are clustered by individual respondent.

[a] " How do/did you feel about the job you have now / your most recent job?" 1 = "dislike very much", 2 = "dislike somewhat", 3 = "like fairly well", 4 = "like very much".

[b] "Your supervisor is competent in doing the job." 1 = "not true at all", 2 = "not too true", 3 = "somewhat true", 4 = "very true".

[c] "Your co-workers are friendly." 1 = "not true at all", 2 = "not too true", 3 = "somewhat true", 4 = "very true".

[d] "You are given the chance to do the things you do best." 1 = "not at all true", 2 = "not too true", 3 = "somewhat true", 4 = "very true".

[e] Big firms have more than 49 employees and small firms have less than 50 employees.

Table 8: Regression Equations for Job Satisfaction in the United States: Instrumental Variable Estimates (NLSY 1988)

	Inclusive sample			Exclusive sample		
	OLS	IV OLS		OLS	IV OLS	
	Job sat.[a]	First-stage equation	Second-stage equation	Job sat.[a]	First-stage equation	Second-stage equation
	(1)	(2)	(3)	(4)	(5)	(6)
Supervisor competence[b]	0.286***	-----	0.381***	0.336***	-----	0.493**
	(16.053)	-----	(3.009)	(13.048)	-----	(2.235)
Instrument[c]	0.016	0.171***	-----	0.022	0.142***	-----
	(0.742)	(6.922)	-----	(0.709)	(3.966)	-----
Female	0.014	-0.005	0.014	0.022	0.031	0.018
	(0.451)	(-0.152)	(0.468)	(0.503)	(0.605)	(0.388)
Hispanic	0.075**	-0.053	0.080**	0.086*	0.026	0.082
	(2.017)	(-1.250)	(2.124)	(1.650)	(0.428)	(1.572)
Black	-0.054*	-0.049	-0.049	-0.172***	0.004	-0.172***
	(-1.660)	(-1.322)	(-1.483)	(-3.808)	(0.071)	(-3.825)
Age	0.154	-0.154	0.169	0.235	0.107	0.218
	(1.092)	(-0.959)	(1.189)	(1.196)	(0.477)	(1.102)
Age squared	-0.003	0.003	-0.003	-0.004	-0.002	-0.004
	(-1.135)	(0.931)	(-1.230)	(-1.221)	(-0.493)	(-1.122)
High school degree	-0.010	-0.077	-0.003	0.030	-0.033	0.035
	(-0.232)	(-1.501)	(-0.069)	(0.467)	(-0.452)	(0.546)
Some college education	-0.079	-0.035	-0.075	-0.042	0.011	-0.044
	(-1.561)	(-0.615)	(-1.500)	(-0.573)	(0.136)	(-0.596)
Four - year degree	-0.053	-0.062	-0.048	-0.007	-0.042	-0.001
	(-0.943)	(-0.955)	(-0.852)	(-0.089)	(-0.450)	(-0.008)
Married	0.057**	0.010	0.056**	0.062*	0.038	0.056
	(2.198)	(0.327)	(2.167)	(1.679)	(0.895)	(1.484)
Union	-0.016	-0.164***	-1.4×10^{-4}	-0.053	-0.133**	-0.032
	(-0.467)	(-4.292)	(-0.004)	(-1.131)	(-2.486)	(-0.574)
Public sector	0.066	-0.087	0.075	0.161**	-0.073	0.172**
	(1.346)	(-1.561)	(1.493)	(2.418)	(-0.959)	(2.529)
Log weekly earnings	0.020	-0.035	0.023	0.027	0.015	0.024
	(0.694)	(-1.062)	(0.804)	(0.634)	(0.321)	(0.572)
Log weekly hours worked	0.101	-0.092	0.109	0.054	-0.027	0.059
	(1.289)	(-1.042)	(1.387)	(0.507)	(-0.219)	(0.546)
Tenure	-0.001**	-0.001***	-0.001*	-0.001	-0.001***	-3.2×10^{-4}
	(-2.471)	(-3.783)	(-1.813)	(-1.336)	(-3.123)	(-0.604)

Tenure squared	$8.35x10^{-7}$	$1.6x10^{-6}$***	$6.8x10^{-7}$	$2.8x10^{-7}$	$2.0x10^{-6}$**	$-3.8x10^{-8}$
	(1.621)	(2.796)	(1.223)	(0.381)	(2.404)	(-0.043)
Industries (13)	Yes	Yes	Yes	Yes	Yes	Yes
Occupations (10)	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.023	6.190***	-0.566	-1.109	2.093	-1.439
	(0.012)	(2.814)	(-0.272)	(-0.412)	(0.681)	(-0.528)
Observations	2469	2469	2469	1197	1197	1197

t-statistics are in parentheses: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

[a] " How do/did you feel about the job you have now / your most recent job?" 1 = "dislike very much", 2 = "dislike somewhat", 3 = "like fairly well", 4 = "like very much".

[b] "Your supervisor is competent in doing the job." 1 = "not true at all", 2 = "not too true", 3 = "somewhat true", 4 = "very true".

[c] Count variable = 0 if worker's supervisor does not have at least a college degree and did not work his/her way up through the ranks or owns / started the company; = 1 if one of these is true; = 2 if both of these are true.