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TOURNAMENTS AND UNFAIR TREATMENT

by

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Tournaments and unfair treatment[*]

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Abstract

This paper introduces the negative feelings associated with the perception of being unfairly treated into a tournament model and examines the impact of these perceptions on workers' efforts and their willingness to work overtime. The effect of unfair treatment on workers' behavior is ambiguous in the model in that two countervailing effects arise: a negative impulsive effect and a positive strategic effect. The impulsive effect implies that workers react to the perception of being unfairly treated by reducing their level of effort. The strategic effect implies that workers raise this level in order to improve their career opportunities and thereby avoid feeling even more unfairly treated in the future. An empirical test of the model using survey data from a Swedish municipal utility shows that the overall effect is negative. This suggests that employers should consider the negative impulsive effect of unfair treatment on effort and overtime in designing contracts and determining on promotions.

Key words: Unfair treatment, tournaments

JEL-codes: J3, M5

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1 Introduction

Workers' perceptions of organizational support and the effect of this on their behavior have been the focus of numerous studies in the fields of psychology, social psychology, sociology and management research. In this literature the employee-employer relationship is often characterized as a social exchange relationship (Blau, 1964), whereby workers feel an obligation to respond to employers' commitments such as promotion, a rise in pay or other benefits, by engaging in behavior that supports the goals of their common organization. The basis for this social exchange relationship is a psychological contract, defined as the employee's beliefs regarding the reciprocal obligations between him or her and the organization in question (see e.g. Levinson et al., 1962, or Rousseau, 1989). If the psychological contract is violated, negative feelings about unfair treatment on the part of the firm will arise, and any workers concerned will reduce their contribution to the organization. This may be done in various ways: by reducing their efforts (Rousseau, 1990) and doing less overtime, by giving notice (Robinson et al., 1994), or even by quitting (Rosseau, 1989; Robinson and Rosseau, 1994). The psychological contract is deemed to have been violated if workers' expectations about promotion or pay are not met by the firm. Negative feelings towards the employer also emerge if the worker feels relatively deprived[1] vis-à-vis his co-workers, in terms of such things as career development, wages or fringe benefits. Feldman and Turnley (2004), for example, find that relative deprivation is negatively related to career

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[1] The term "relative deprivation" was first introduced by Stouffer et al. (1949) in a study of performance and motivation in U.S. military personnel with a view to explaining how attitudes toward fairness are formed, and how group norms determine performance. Runciman (1966) suggested necessary and sufficient conditions for an individual's sense of relative deprivation: i) seeing that someone else possesses X, ii) wanting X, iii) feeling entitled to X, and iv) believing it is feasible to acquire X.

attitudes and to job behavior among adjunct faculty and Sweeny et al. (1990) found that workers whose pay fell short of the pay of similar others felt dissatisfaction with their incomes.

Feelings of being unfairly treated by the firm and related worker behavior have been considered in the economic literature by Akerlof (1982, 1984) and Akerlof and Yellen (1988, 1990). They have examined how workers' perceptions of fair treatment affect their effort level. According to Akerlof and Yellen's (1990) fair wage-effort hypothesis, workers reduce their efforts proportionately as their actual wage falls short of what they think would be a fair wage, i.e. the wage paid to a chosen reference group.

This paper introduces negative feelings associated with the perception of being unfairly treated into a tournament model. In a three-period model it is shown that these negative feelings affect the effort levels of relatively deprived workers. But, unlike the findings reported in the fair wage-effort literature, the effect of unfair treatment on effort in the tournament model appears ambiguous. In this model two countervailing effects arise: a negative impulsive effect and a positive strategic effect. The impulsive effect implies that workers reduce their effort level in response to the perception of being unfairly treated. The strategic effect implies that workers raise their effort level in order to improve their career opportunities in an attempt to avoid feeling even more unfairly treated in the future.

Stark (1987, 1990) and Kräkel (2000) have considered the effects of relative deprivation in career games and tournament models. Assuming that no (negative) feelings arise from relative deprivation, Stark argues that individuals are motivated by minimizing their relative deprivation, not by maximizing their income as standard tournament theory

suggests. His model shows that the intensity of effort to climb the ladder depends (positively) on how much relative deprivation there is to get rid of.

Starting from Stark's work, Kräkel (2000) models tournaments with different prize structures. In his model effort is a function of relative deprivation. As in Stark's work, there are no negative feelings involved in relative deprivation. Kräkel finds that the equilibrium effort choice on the part of workers who experience relative deprivation and attempt to minimize its effects, is higher than the equivalent choice of workers who only maximize their absolute net income under both prize structures.

In contrast to Stark and Kräkel, the tournament model presented in this paper shows that when one allows negative feelings to arise from situations of relative deprivation, the relative deprivation does not automatically induce a higher effort level among relatively deprived workers. These negative feelings increase the current marginal effort costs of workers, who consequently, make less effort to win the current round of the tournament. The presence of this negative impulsive effect which is absent from the tournament literature, recalls the fair wage-effort hypothesis.

These negative feelings also have a positive strategic effect on effort. Since workers are competing in a multi-period tournament, the higher the individual worker's expected future effort cost (relative to their current effort cost), the higher the level of effort they are prepared to produce today. So, even workers who have missed their first promotion and who feel unfairly treated realize that they will feel even worse if they miss the second round of promotions as well, and will consequently raise their effort level today in order to win the next round.

It is not possible to determine which of these two countervailing effects is the dominant one, without knowing more about workers' effort-cost functions. To this end, survey data from a Swedish municipal utility located in the Greater Stockholm area will be examined. The data indicates that the negative impulsive effect on the effort level dominates over the positive strategic effect. That is, unfairly treated workers adopt a lower level of effort than fairly treated workers. This implies that employers should consider the negative impulsive effect of unfair treatment on effort and overtime when they design contracts and decide on promotions.

In a recent paper, Kräkel (2005) introduces emotions as anger and pride stemming from comparing one's own performance with the performance of co-workers, into a tournament model. He models how the employer should compose teams optimally considering the impact of emotions on workers' effort and employer's profit. According to the model, the optimal team should consist of heterogenous rather than homogenous workers when emotions are taken into account. Feelings of envy and compassion are also taken into account when modeling a tournament by Grund and Slivka (2005). They find that individuals who are inequity averse exert higher efforts than purely selfish individuals for a given prize structure.

The rest of this paper is organized as follows. The model is presented in Section 2 and the predictions of the model concerning unfair treatment and effort are derived. In Section 3, an empirical analysis of the predictions of the model is performed. Section 4 offers some conclusions.

2 Modeling the effort decision

A firm hires 2^n risk-neutral workers of identical ability, where $n > 1$. The workers are employed by the firm for three periods, after which they retire. No one quits and there are no lay-offs. During the three periods there are two possibilities for promotion to higher positions in the hierarchy, based on the workers' effort levels. A wage w_s is attached to position s, where $s = 1, 2, 3$ and $w_3 - w_2 > w_2 - w_1$. All workers are initially employed in position $s = 1$ at wage w_1. The timing of events is presented in Figure 1.
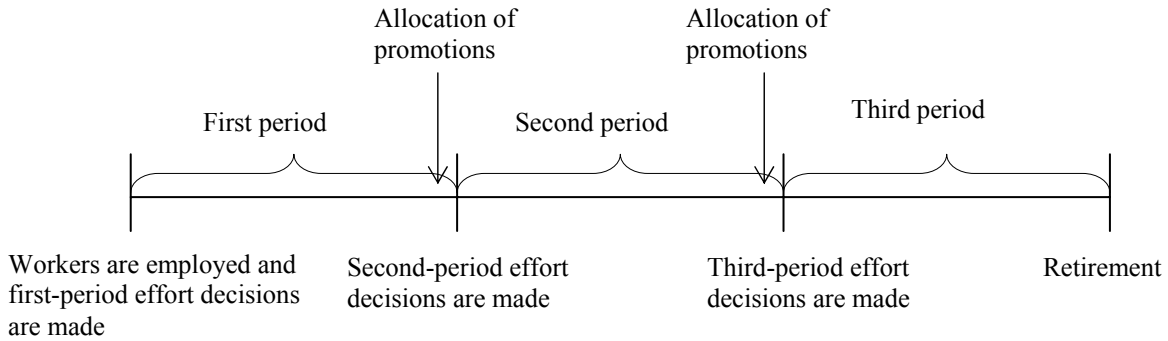

Figure 1. Timing of events

During the first two periods there are ongoing promotion contests. For the sake of simplicity and analytical tractability, homogenous workers (i.e. workers from the same cohort in the same position) compete pair-wise. At the beginning of each period a worker decides what amount of effort, e, to put in during that period in order to receive promotion at the end of it. It is assumed that the firm's monitoring of a worker's effort is imperfect. The firm observes worker i's effort level as $x_i = e_i + \varepsilon_i$ and promotes the worker in each pair that puts in the highest amount of observed effort, x_i. ε is drawn from a normal distribution with zero

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mean and variance σ^2 and i.i.d. across workers. Unpromoted workers remain in their current positions.

A worker decides what amount of effort to make in order to win a contest by maximizing the expected utility from receiving promotion or staying in the current position. Since the firm will promote the worker with the highest level of observed effort in each pair, the probability of receiving a promotion, p, increases with the effort made.

The probability that worker i wins over worker j is:

$$p = \text{prob } (x_i > x_j) = \text{prob } (e_i - e_j > \varepsilon_j - \varepsilon_i) = \text{prob } (e_i - e_j > \xi) = {}_{-\infty}\!\int^{ei-ej} g(\xi) d\xi = G(e_i - e_j), \text{ where}$$

$\xi \equiv \varepsilon_j - \varepsilon_i$, $\xi \sim g(\xi)$, $G(\xi)$ is the cdf of ξ, $E(\xi) = 0$ and $E(\xi^2) = 2\sigma^2$ (because ε_i and ε_j are i.i.d.).

The effort level chosen involves an effort cost $C(e, h)$, where e is the effort level and h is the time spent in the position, $h = 0, 1, 2$. It is assumed that a worker feels uncomfortable about being at work and not working at all, i.e. $C(0, h) > 0$, or working less than his perception of a fair day's work, $\tilde{e}_h$. It is further assumed that $C'(\tilde{e}_h, h) = 0$ where $\tilde{e}_h > 0$ and that $C'(e, h) < 0$ if $e < \tilde{e}_h$, $C'(e, h) > 0$ if $e > \tilde{e}_h$.

The effort cost also increases with the time spent in a position, h, since by assumption workers who are not promoted feel unfairly treated by the firm,[2]

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[2] When a worker does not receive a promotion, he feels deprived relative to his co-workers. As noted in Footnote 1, Runciman (1966) defined four conditions for an individual's sense of relative deprivation. Someone is relatively deprived if i) he does not have X, ii) he sees that someone else possesses X, iii) he wants X, and iv) that he believes it is feasible to acquire X. In our present context X is a promotion (Runciman also uses promotions to exemplify relative deprivation), and the worker will feel relatively deprived if he does not receive a promotion, if someone else does receive a promotion (remember that one in each pair in the contest receives a promotion), if he wants the promotion and if it is feasible to get it. Chapter 3 in the Handbook of Motivation and Cognition (Olson and Hafer, 1996) provides a survey of the psychological literature on the relation between relative deprivation and the emergence of negative feelings of unfair treatment.

i.e. $C(e, 0) < C(e, 1) < C(e, 2)$. It is further assumed that $C'(e, 0) < C'(e, 1) < C'(e, 2)$. The worker's perception of a fair day's work is assumed to diminish if he feels unfairly treated by the firm, i.e. $\tilde{e}_0 > \tilde{e}_1 > \tilde{e}_2$.[3]

In the third and last period workers do not compete for a promotion. They continue to work in their current position until retirement.

2.1 The maximization problem

All newly employed workers find themselves at the first node in the promotion tree in Figure 2. They are at the beginning of the first period, where they decide how much effort to put in. To make this decision, they evaluate all possible current and future outcomes in all contests.
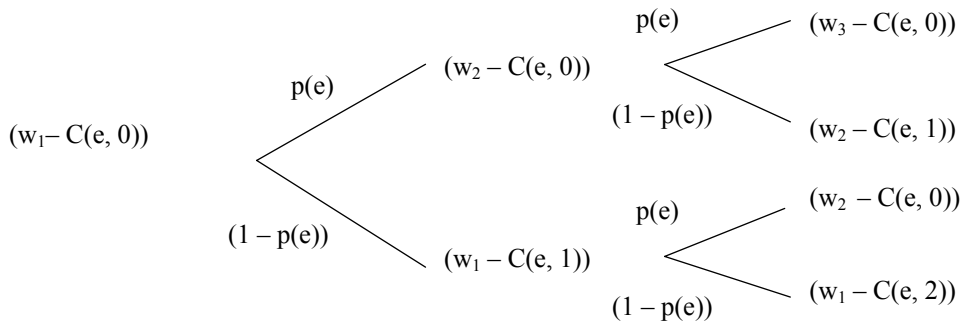
$p(e)$ $(w_3 - C(e, 0))$

$p(e)$ $(w_2 - C(e, 0))$

$(1 - p(e))$ $(w_2 - C(e, 1))$

$p(e)$

$(w_1 - C(e, 0))$

$(w_2 - C(e, 0))$

$p(e)$

$(1 - p(e))$ $(w_1 - C(e, 1))$

$(1 - p(e))$ $(w_1 - C(e, 2))$

Figure 2. Promotion tree

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[3] This last assumption is supported in the psychological, social psychological and sociological literature. Since the employee-employer relationship is regarded as a social exchange relationship, the fact that the firm gives the worker something (in this case a wage) implies that it wants something back from the worker. Balancing the equity in the relation, means that a worker gives the firm something back (in this case a fair day's work) in exchange for the wage (Blau, 1964). When psychological employment contracts are violated, i.e. when the firm does not give the worker what he thinks it owes him (in this case a promotion in return for his effort), he reduces his organizational support (for example what he thinks is a fair day's work, see e.g. Rosseau, 1989; Rosseau, 1990).

The newly hired workers choose their effort level in order to maximize their expected future utility,

Max$_e$ $U = [w_1 - C(e, 0) + p(e)W_1 + (1 - p(e))W_2]$ [1]

where

$W_1 = \max w_2 - C(e, 0) + p(e)W_3 + (1 - p(e))W_4$

and

$W_2 = \max w_1 - C(e, 1) + p(e)W_5 + (1 - p(e))W_6$

where

$W_3 = \max w_3 - C(e, 0)$,

$W_4 = \max w_2 - C(e, 1)$,

$W_5 = \max w_2 - C(e, 0)$ and

$W_6 = \max w_1 - C(e, 2)$.

Workers solve the maximization problem by starting with the third-period effort decision and working their way backwards to the first-period decision.

2.1.1 Third period

In the beginning of the third period workers decide how much effort to put in during their last period with the firm. There is no promotion possibility in the end of the period, just the date for their retirement. Depending on their career path up to now, workers are in positions 1, 2 or 3 where position 3 is the highest and position 1 is the lowest on the career ladder.

The maximization problems and first-order conditions for the workers in different positions are as follows. Workers in position 3 have received promotions in all contests. They maximize

$$\text{Max}_e \quad U = w_3 - C(e, 0), \tag{2}$$

where the first-order condition is

$$C'(e, 0) = 0 \tag{3}$$

that is fulfilled for $e = \tilde{e}_0$. The second-order condition is

$$C''(e, 0) > 0. \tag{4}$$

Workers in position 2 who received a promotion in the second contest but not in the first, maximize

$$\text{Max}_e \quad U = w_2 - C(e, 0), \tag{5}$$

where the first-order condition is

$$C'(e, 0) = 0 \tag{6}$$

that is fulfilled for $e = \tilde{e}_0$. The second-order condition is

$$C''(e, 0) > 0. \tag{7}$$

Workers in position 2 who did not receive a promotion in the second contest but did so in the first, maximize

$$\text{Max}_e \quad U = w_2 - C(e, 1), \tag{8}$$

where the first-order condition is

$$C'(e, 1) = 0 \tag{9}$$

that is fulfilled for $e = \tilde{e}_1$. The second-order condition is

$$C''(e, 1) > 0. \tag{10}$$

Workers in position 1 have never received a promotion. They maximize

$$\text{Max}_e \quad U = w_1 - C(e, 2), \tag{11}$$

where the first-order condition is

$$C'(e, 2) = 0 \tag{12}$$

that is fulfilled for $e = \tilde{e}_2$. The second-order condition is

$$C''(e, 2) > 0. \tag{13}$$

In the third period, wages do not affect the optimal effort level (see [3], [6], [9] and [12]). The workers base their effort decision solely on the way they perceive themselves to have been treated by the firm. Workers who received a promotion in the latest contest feel fairly treated by the firm and put in more effort than workers who did not receive promotions in the latest contest. Workers who have never received a promotion during their careers with the firm feel most strongly that they have been unfairly treated and they put in the lowest amount of effort, while workers who received promotions in the first but not in the second contest put in efforts somewhere between these two (i.e. $\tilde{e}_0 > \tilde{e}_1 > \tilde{e}_2$). The reason why workers do not shirk altogether, making absolutely no effort, is that, already noted, they feel uncomfortable about being at work and not working at all, i.e. it is assumed that $C(0, h) > 0$.

2.1.2 Second period

In the second contest workers who won the first contest compete against each other pair wise for position 3, and workers who lost the first contest compete pair wise for position 2. The idea behind modeling a multi-period contest is that it makes it possible to examine the difference in equilibrium effort level between worker types (i.e. promoted versus unpromoted workers), and to examine the change in the optimal effort level for a specific worker type (i.e. a promoted or unpromoted worker) over time. In this section the difference in the effort level

between workers is examined. In Section 2.2, the change in the effort level over time for a specific worker type is discussed.

To choose their effort level in the second-period contest, workers who received promotions in the first contest maximize their utility function, given the effort decision in the third position

$$\text{Max}_e \quad U = [w_2 - C(e, 0) + p(e)W_3 + (1 - p(e))W_4]. \tag{14}$$

Substituting for W_3 and W_4 we have

$$\text{Max}_e \quad U = [w_2 - C(e, 0) + p(e)(w_3 - C(\tilde{e}_0, 0) + (1 - p(e))(w_2 - C(\tilde{e}_1, 1)]. \tag{14$'$}$$

The first-order condition is

$$g(e_i - e_j)[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_1, 1)] = C'(e, 0), \tag{15}$$

where

$$g(e_i - e_j) = \partial G(e_i - e_j)/\partial e_i = \partial p(e)/\partial e. \tag{16}$$

The second-order conditions is

$$g_{ei}'(e_i - e_j)[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_1, 1)] - C''(e, 0) < 0. \tag{17}$$

As in Lazear and Rosen's (1981) tournament model, the Nash-Cournot assumption that each player optimizes against the optimum investment of his opponent has been adopted here. Worker i takes e_j as given in determining his effort level, while the converse applies to worker j. Equation [15] is worker i's reaction function. Worker j's reaction function is symmetrical. Symmetry implies that $e_i = e_j$ and $G(0) = \frac{1}{2}$, i.e. the outcome is random in

equilibrium.[4,5] Ex ante, a worker affects his probability of winning by the amount of effort he puts in. Substituting for $e_i = e_j$ at the Nash equilibrium, equation [15] can be reduced to

$$g(0)[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_1, 1)] = C'(e, 0) \qquad [15']$$

that is fulfilled for $e = e^*_0$.

It follows from [15'] that when ε is normally distributed with variance σ^2, then $g(0) = 1/\sqrt{2\sigma^2}\sqrt{2\Pi} = 1/2\sigma\sqrt{\Pi}$ and the comparative statics are:[6]

$$\partial e / \partial w_2 < 0 \qquad\qquad \partial e / \partial w_3 > 0 \qquad\qquad \partial e / \partial \sigma < 0. \qquad [18]$$

Workers who did not receive a promotion in the first contest maximize the utility function

$$\text{Max}_e \quad U = [w_1 - C(e, 1) + p(e)W_5 + (1 - p(e))W_6]. \qquad [19]$$

Substituting for W_5 and W_6 we have

$$\text{Max}_e \quad U = [w_1 - C(e, 1) + p(e)(w_2 - C(\tilde{e}_0, 0) + (1 - p(e))(w_1 - C(\tilde{e}_2, 2)]. \qquad [19']$$

The first-order condition is

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[4] In Lazear and Rosen (1981) there is not necessarily a pure strategy solution, since the authors do not specify a distribution of $g(e_i - e_j)$. However, they argue that if σ_ε^2 is sufficiently large, there will be a Nash equilibrium in pure strategies, even though $\partial^2 P/\partial e_i^2$ may be positive. Lazear and Rosen make no assumption regarding the sign of $\partial^2 P/\partial e_i^2$, but they do assume that the S.O.C. is negative and that an equilibrium does exist. In my model, I make the assumption that ε is normally distributed. Then $g(e_i - e_j) < 0$ and the S.O.C. is negative.

[5] The fact that the outcome is random in equilibrium supports the emergence of a feeling of relative deprivation. Crosby (1976) has extended the preconditions given in Runciman (1966) for an individual's feeling of relative deprivation to include a fifth condition. That is, to feel relatively deprived a person must lack any responsibility for not having X. In the model presented in this paper, the workers in each pair put in the same amount of effort and the promotion decision is random, i.e. the unpromoted worker lacks any responsibility for not being promoted.

[6] The signs of the comparative statics are not dependent on ε being normally distributed, e.g. if ε instead is exponentially distributed the signs of the statistics would remain the same. This is true for all comparative statics in this paper.

$$g(e_i - e_j)[w_2 - w_1 - C(\tilde{e}_0, 0) + C(\tilde{e}_2, 2)] = C'(e, 1) \qquad [20]$$

and the second-order condition is

$$g_{ei}'(e_i - e_j)[w_2 - w_1 - C(\tilde{e}_0, 0) + C(\tilde{e}_2, 2)] - C''(e, 1) < 0. \qquad [21]$$

Assuming a Nash solution and substituting for $e_i = e_j$, workers who lost the first contest have the following first-order condition

$$g(0)[w_2 - w_1 - C(\tilde{e}_0, 0) + C(\tilde{e}_2, 2)] = C'(e, 1) \qquad [20']$$

that is fulfilled for $e = e^*_1$.

The comparative statics that follow from [20′] are:

$$\partial e / \partial w_1 < 0 \qquad\qquad \partial e / \partial w_2 > 0 \qquad\qquad \partial e / \partial \sigma < 0. \qquad [22]$$

As in Lazear and Rosen's (1981) tournament model, the larger the wage spread between positions, the higher a worker's equilibrium effort level in a contest will be (see [18] and [22]). If the wage spread increases, the position a worker already holds becomes relatively less valuable, such that a promotion becomes more interesting.

Both today's feelings and expected future feelings of unfair treatment affect the effort level chosen in the contest (see [15′] and [20′]). The impulsive effect of unfair treatment implies that workers who feel unfairly treated by the firm today, will find it harder to put in effort than workers who feel fairly treated ($C(e, h)$ increases in h), and will consequently reduce the effort they put in.[7] However, expected future feelings of unfair treatment also affect the optimal effort level. If a worker loses the upcoming contest and remains in his present position, he knows that he will feel unfairly treated by the firm. His effort cost in the next period will increase compared to his effort cost in the present period. To avoid this, he

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[7] This negative impulsive effect on effort is similar to the effort reduction in the fair wage-effort hypothesis.

exerts more effort today in order to win the upcoming contest. This is defined as the strategic effect of unfair treatment on exerted effort.

$g(0)$ measures the importance of luck in the monitoring process (see σ in [18] and [22]). As the importance of luck increases, that is to say $g(0)$ decreases, the amount of effort exerted declines. The intuitive conclusion is that there is no use working hard if the probability is slight that the firm actually notices how hard a worker is working. Hence, the lower $g(0)$, the lower is the effort level in equilibrium.[8]

Comparing [15′] and [20′] we find, on the one hand, that unpromoted workers tend to set themselves a lower effort level than promoted workers, partly because the wage spread between positions is smaller ($w_3 - w_2 > w_2 - w_1$) and partly because the impulsive effect of unfair treatment reduces the effort made (in other words the current marginal effort cost is lower for promoted than unpromoted workers, due to fair treatment ($C'(e, 0) < C'(e, 1)$ for a given e)) for unfairly treated workers. On the other hand, there is also the strategic effect of unfair treatment. Workers who did not get promotion in the first contest know that if they do not win the second promotion contest either, they will feel even more unfairly treated. To avoid this they tend to raise their level of effort more than promoted workers do ($C(\tilde{e}_1, 1) < C(\tilde{e}_2, 2)$). Hence, the model produces two countervailing effects. Which of these is dominant depends on the specific form of the effort-cost function and the size of the wage spread, and the type of worker that makes the greatest effort level is ambiguous.[9, 10]

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[8] In other settings, an increase in monitoring might have the opposite effect on effort. Arai (1989) for example, shows that when workers are uncertain about the minimum level of effort required, an increase in monitoring may lead to a decline in average worker effort.

[9] Meyer (1992) presents a model of career profiles. In her model, two risk-averse workers of equal ability compete against each other in two contests. The firm's major promotion decision is made after the second period

2.1.3 First period

We now turn to the workers' effort decisions in the first period, given the effort decisions in the second and the third periods. As noted in Section 2.1, newly hired workers choose their effort in order to maximize

$$\text{Max}_e \quad U = [w_1 - C(e, 0) + p(e)W_1 + (1 - p(e))W_2] \tag{1}$$

where

$$W_1 = [w_2 - C(e^*_0, 0) + p(e^*_0)(w_3 - C(\tilde{e}_0, 0)) + (1 - p(e^*_0))(w_2 - C(\tilde{e}_1, 1))]$$

and

$$W_2 = [w_1 - C(e^*_1, 1) + p(e^*_1)(w_2 - C(\tilde{e}_0, 0)) + (1 - p(e^*_1))(w_1 - C(\tilde{e}_2, 2))]$$

The first-order condition is

$$g(e_i - e_j)[W_1 - W_2] = C'(e, 0) \tag{23}$$

and the second-order condition is

$$g'(e_i - e_j)[W_1 - W_2] - C''(e, 0) < 0. \tag{24}$$

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and an interim evaluation is made after the first. The firm designs jobs such that early success is rewarded by an increase in future promotion prospects (to minimize monitoring costs) as well as by higher current wages. Despite the different conditions after the first contest, the worker who was rewarded in the first contest and the worker who was not, will make the same amount of effort in the second contest. This is a function of the monitoring process and of the fact that the effort decision is independent of wages won in the first contest. In Kräkel's model, workers who are relatively deprived work harder than their co-workers do, in order to catch up with the others.

[10] If we eliminate feelings of unfair treatment, *h*, from the model we find, in line with Kräkel (2000), that workers in position 2 who experience fair and unfair treatment (*h* is included in the cost function) achive a higher effort level than workers in position 1 or those in position 2 who do not experience fair and unfair treatment (*h* is excluded from the cost function). The effort level of the workers in position 1 who experience fair and unfair treatment (*h* is included in the cost function) compared to the other workers' effort level, depends on the form of the cost function. This is shown in *Appendix 1*.

Assuming a Nash solution and substituting for $e_i = e_j$, workers in the first contest have the first-order condition

$$g(0)[W_1 - W_2] = C'(e, 0) \qquad\qquad [23']$$

that is fulfilled for $e = e^*$. ε is normally distributed with variance σ^2, $g(0) = 1/2\sigma\sqrt{\Pi}$ and the comparative statics that follows from [23'] are:

$$\partial e / \partial W_1 < 0 \qquad\qquad \partial e / \partial W_2 > 0 \qquad\qquad \partial e / \partial \sigma < 0. \qquad\qquad [25]$$

From [23'] we see that the effort level in equilibrium in the first contest depends on the expected future income and the importance of luck in the monitoring process, $g(\sigma)$. If a worker receives a promotion, his expected future utility is W_1. If a worker does not receive a promotion, his expected future utility is W_2. The greater the expected future utility from receiving a promotion relative to the expected future utility from not receiving a promotion, the greater the effort the workers will make in order to get promotion to position 2 (see [21]). If the future expected utility from not being promoted in the first contest, W_2, increases, workers will lower their equilibrium effort level, since the value of their current positions has increased.

2.2 Tenure and effort

According to the model, the effort profiles of all workers decline between the first and last period. Without specifying a cost function we cannot examine whether the effort profiles are hump-shaped over periods (with an increase in the effort level between the first and the second period and a decrease between the second and third) or whether they decline (linearly

or non-linearly) over all periods. But we can state that the effort levels of all types of workers are lower in the last period than in the first. This is shown in *Appendix 2*.

3 Examining the model using firm data

In the theoretical model, workers choose their effort level as a function of the probability of receiving promotion, the wage increase that comes with promotion, uncertainty in the monitoring process and effort costs including negative feelings of unfair treatment. Using data from a Swedish company the following factors are examined: the relationships between i) the wage spread between positions and the effort level, ii) unfair treatment and effort level, iii) effort cost (excluding feelings of unfair treatment) and the effort level, and iv) tenure and the effort level.

According to the model, an increase in the wage spread has a positive effect, unfair treatment has an ambiguous effect, and the remaining sources of effort costs and tenure have a negative effect on the effort level. The results of this examination are discussed in Section 3.2 after the data used has been presented in Section 3.1.

3.1 The data

This paper utilizes an original data set based on a survey of employees in a Swedish municipally owned company in the public utility industry. The data was collected in 1998 by distributing a questionnaire (see *Appendix 3*) in the company's mail system to a randomly

drawn sample of 383 of the total 831 employees. 331 employees filled in the questionnaire. The response rate of 86 percent is very high for a mail survey.[11]

In this section descriptive statistics are presented for the whole sample, and gender differences are commented up on only if they differ significantly. The descriptive statistics are given in Table 1. Fifty-seven percent of the employees in the sample are men. The overall average age is 43 and male workers are on average about 3 years older than female workers. Seventy-four percent of the workers are married or cohabiting, and 34 percent have children under ten living in their households. The average number of children per worker is 0.55. Only two men (1 percent) have taken leave for childcare for more than 6 months, compared to 38 percent of the female workers.[12]

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[11] Some information is available on the 52 workers who did not respond. Of the non-respondents, 32 are men and 20 are women. The mean wage for the non-respondents is SEK 21,150 and for the respondents SEK 21,538. The mean wage for non-responding men is SEK 20,943 and SEK 23,280 for responding men. The mean wage is SEK 21,495 for non-responding women and SEK 19,191 for responding women. The gender wage difference is not significant among non-respondents but significant among the workers who did respond. The median wage is SEK 17,200 for female non-respondents and SEK 18,100 for male non-respondents.

The sample includes a group of workers whose department had closed down. The firm had a policy of not laying off workers when they reorganized. Instead, the workers were transferred to vacancies in other parts of the firm. According to the personnel department, the supernumerary workers have jobs that are less qualified on average than those they had before the reorganization. The sample includes 51 workers who are supernumerary, i.e. 13 percent of the workers who received the questionnaire. Among the non-respondents 31 percent are supernumerary workers. The overrepresentation of supernumerary workers among the non-respondents might be a function of their having had a break in their career paths due to the reorganization and therefore feel uncomfortable answering questions about their careers.

[12] At that time parents in Sweden could divide 480 days of parental leave (paid by the social insurance system) between them. The only restriction in dividing parental leave was that each parent had to be on leave for at least 30 days, otherwise the paid parental leave was reduced by these 30 days.

The average length of schooling is 12.7 years. Men have on average one year of schooling more than women. Workers have had around 9 years of pre-company work experience on average. Male workers have been with the firm for 14 years on average, and have been there approximately 2.5 years longer than the female workers. The average employee has been working in their current position for 4.3 years.

Information on the number of promotions a worker has received under this employer has been elicited by asking the following question: "How many of the changes in your position with the company have been promotions (= a change to what you consider to be more qualified work)? (Do not count your first position in the company as a promotion)".[13] Workers report that on average they have had 1.61 promotions in the company. Male workers have on average had 0.5 more promotions than female workers. 39 percent of the workers report that they have never been promoted within the firm.[14]

On promotion possibilities the following question was asked: "Do you think there are any promotion opportunities for you within the company, given your current position?" Forty-five percent of the workers reported that there are promotion opportunities for them in their current positions.[15] Note that the workers who do not think they have any promotion opportunities within the firm may include workers whose competence is too low to warrant

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[13] To emphasize clearly the difference between promotions and lateral job changes, I follow Hersch and Viscusi (1996), in including the following question on positions: "How many positions other than your current position have you held with the company since you began working there?" This helps the respondent to separate job changes into lateral changes or promotions.

[14] If workers without any promotions are excluded, then on average workers have been promoted 2.65 times (the standard deviation is 1.95).

[15] The respondents could answer "yes", "no" or "I don't know". 25 percent reported no opportunities, while 30 percent were not sure about it.

promotion, workers in dead-end-jobs, and workers who are already in top positions in the firm.

To the question: "Are you interested in receiving promotion within the company?", 63 percent of the workers answered that they had preferences regarding possible promotion, 19 percent answered "no" and 18 percent answered that they were not sure whether they were interested in getting promotion within the company.

To the question: "Would you work 5 hours overtime per week if you knew this would improve your chances of receiving promotion within the company?", 51 percent of the male workers replied that they were willing to put in extra hours to increase their chances of getting a promotion, while only 33 percent of the female workers replied that they are willing to do so.[16] Of the workers who reported that they were interested in receiving promotion, 70 percent of the males and 48 percent of the females were willing to work extra hours in order to increase the probability of receiving a promotion. 12 percent of the men and 9 percent of the women who were not interested in receiving promotion also reported that they were willing to work longer hours to receive a promotion. These last two results are not reported in Table 1.

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[16] 33 percent of the men answered that they were not willing to work 5 hours overtime and 44 percent of the women reported that they were not willing to do so. 15 percent of the male workers and 23 percent of the female workers were unsure whether they would work extra time to improve their promotion probabilities. In the analysis in Section 3.3, workers who explicitly state that they are not willing to work 5 hours overtime to improve their promotion probabilities will be regarded as workers who are not prepared to make an effort to win promotion.

Table 1. Summary Statistics

Variables	All	Men	Women
Women	42.60 %		
Age	43.07	44.36 ***	41.34
	10.10	10.15	9.79
Married/cohabiting	74.32 %	76.84 %	70.92 %
Workers with children under ten	33.83 %	30.53 %	38.30 %
Average number of children under ten	0.55	0.48	0.65
	0.88	0.84	0.92
More than 6 month absence for child care	16.61 %	1.05 %***	37.58 %
Years of schooling	12.72	13.16 ***	12.13
	2.79	2.89	2.55
Pre-company work experience	9.26	9.16	9.40
	9.21	9.12	9.36
Tenure	13.02	14.19 ***	11.44
	9.66	9.74	9.35
Years in current position	4.31	4.56	3.98
	6.09	6.56	5.39
Previously promoted	60.72 %	61.58 %	59.57 %
Number of promotions	1.61	1.83 **	1.30
	1.99	2.22	1.59
Workers having opportunities within the firm	44.71 %	44.74 %	44.68 %
Workers with preferences regarding promotion	63.14 %	66.32 %	58.87 %
Workers willing to work five hours overtime per week to get promotion	43.50 %	51.05 %***	33.33 %
Number of overtime hours worked last week	3.61	4.28 ***	2.70
	4.90	5.33	4.10
Working hours	38.54	39.16 ***	37.73
	3.27	2.08	4.25
Part-time	8.76 %	1.58 %***	18.44 %
Wage	21,538	23,280 ***	19,191
	7,031	7,353	5,818
Number of observations	331	190	141

Note: Standard deviations are in italics.
***/**/* indicate that the difference between means for men and women is statistically significant on the 1/5/10 percent level respectively.

Respondents were asked how many hours they had worked the week before the questionnaire was distributed,[17] to which 55 percent of the workers replied that they worked some overtime hours in the previous week. The average male worker had put in 4.3 hours overtime and the average female worker 2.7 hours. Overtime will be used as a proxy for effort in the following analysis.

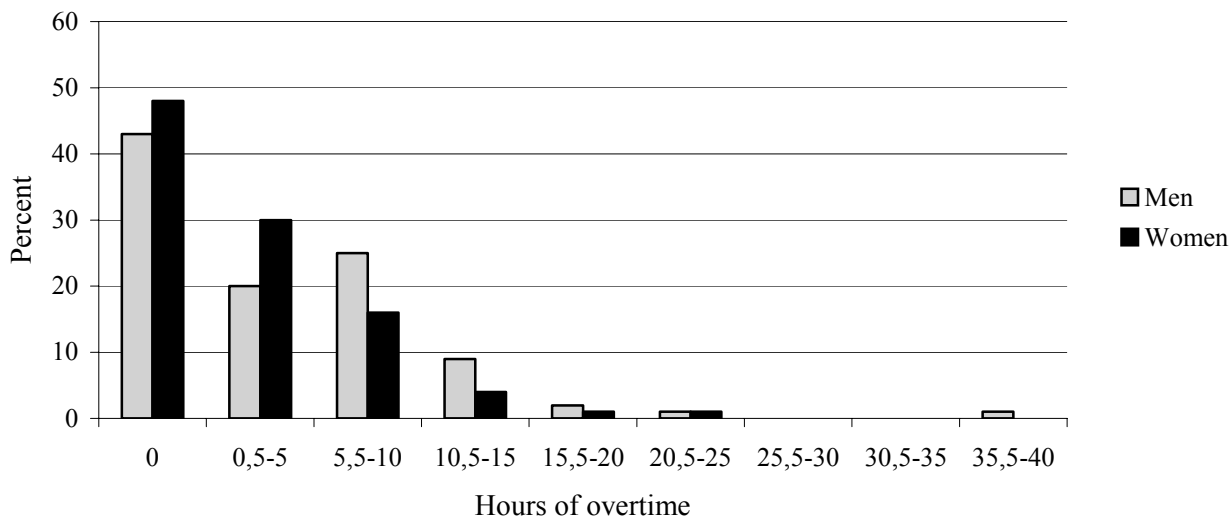Figure 3. Overtime hours worked

Figure 3 shows the distribution of reported overtime hours. Categories of overtime hours are presented on the x-axis. Forty-three percent of the male and 48 percent of the female workers worked no overtime at all. The difference is not significant. Twenty percent of the men and 30 percent of the women worked between 0.5 and 5 hours overtime. This difference

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[17] The question asked is: "Approximately how many hours did you work last week? (If you were absent, report the hours worked during the latest week when you were working)" Overtime hours are defined as the reported hours worked the previous week less the number of contracted hours. Whether or not the reported overtime hours for the latest week worked can be used as a proxy for overtime worked every week is open to discussion. Since I am looking at workers' overtime decisions at the present moment, no assumption that the hours worked the previous week represent standard overtime hours worked is necessary.

is significant. Thirty-seven percent of the male and 22 percent of the female workers (the gender difference is significant) worked more than 5 hours overtime during the week before the questionnaire was distributed. Nineteen percent of the male and 6 percent of the female workers worked 10 hours or more overtime in the week before the questionnaire was distributed. The difference is significant. Women's contracted work hours are on average about 38 hours a week, which on average is 1.5 hours shorter than the male working week.[18] Eighteen percent of the women and 1 percent of the men work part-time.[19]

The average monthly wage in the company is SEK 21,538.[20] The average wage for male workers is SEK 23,280. The average female worker earns SEK 19,191 a month, which is 82 percent of the average male wage.

3.2 The empirical model

According to the theoretical model presented in Section 2, the effort level increases in the wage spread between positions and decreases with years of tenure and effort costs. Feelings of unfair treatment have an ambiguous effect on effort. To examine the relation between effort and the variables discussed above,

$EFFORT_i = \beta_0 + \beta_1 WAGE\ SPREAD_i + \beta_2 YEARS\ BEFORE\ RETIREMENT_i + \beta_3 UNFAIR\ TREATMENT_i + \beta_4 EFFORT\ COST_i + \varepsilon_i$ [26]

is estimated by a tobit regression, where $EFFORT_i$ is the effort level chosen by a worker. Effort can be measured in different ways. One is to measure productivity and to evaluate

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[18] The question asked is: "How many hours do you work every week according to your contract?"

[19] Part-time is defined as working 35 hours a week or less.

[20] 1$ ≈ 7.7 SEK (29th of June, 2004)

workers' piece-rates or commission (measuring output). Another is to evaluate time spent at work (measuring input). I will use the number of overtime hours that a worker puts in as a measure of effort. Whether or not it is realistic to assume that firms promote workers on a basis of the number of overtime hours they work, and whether they expect promotion if they do work long hours, is open to discussion. Recent research on the relation between overtime hours and promotions has highlighted the importance of overtime hours in the promotion process.[21] It is therefore assumed here that firms and workers both consider overtime hours to

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[21] For example, Landers et al. (1996) present and test a model of the determinants of work hours in a law firm in which the partners take hours as an indicator when making promotion decisions. The authors also offer an empirical investigation of the model using data collected from two law firms. Associates and partners were asked to evaluate the importance of different factors that were likely to play a part in the promotion process in their law firms. Partners and associates regarded the quality of the work product and the willingness to work long hours when required, as the most important factors in the promotion process. Landers et al. also asked partners to evaluate hypothetical promotion cases. The results show that a partner's support for a promotion declines with a reduction in hours worked.

Using U.S. and German data, Bell and Freeman (2001) examine whether the chance of receiving promotion depends on the number of hours worked. In the German case they use panel data on working time and information on respondents' predictions as to whether or not they think they have good chances of receiving promotion in the near future. They find that German workers are more likely to expect promotion in their current job if they have worked long hours in the past. They interpret this result such that German workers expect more hours worked to bring them promotion. In the U.S. case they use panel data on working time and information about whether workers have actually received promotion over the last two years. They find that in the U.S. the impact of past hours worked on the chances of promotion is positive.

Booth et al. (2003) examine the way paid and unpaid overtime affects the promotion probabilities of British workers. They find that the amount of overtime worked has a positive effect on the probability of getting promotion, and that there is no difference between paid and unpaid overtime hours in this respect. Francesconi (2001) also finds that British workers who work overtime have a higher probability of getting promotion than other workers. However, if the workers are sorted into four occupational classes, the estimates reveal that the positive correlation between overtime hours and promotion probabilities observed in the sample as a whole is due mainly to the behavior of professionals and managers.

be of importance in the promotion process.[22] The tobit model is used since the dependent variable is left-censored and that there is a possibility that workers actually prefer to work a negative amount of overtime hours.

One of the assumptions made in the model presented in Section 2 is that the wage spread increases in positions. To examine this assumption, wages are arranged in ascending order of size and the following relation is plotted in Figure 4:

x_i = median wage – wage$_i$ (x-axis) versus y_i = wage$_{(N+1-i)}$ – median wage (y-axis),
where $i \in [1,331]$

Wages are expressed as the workers' monthly wages in SEK thousands. This represents the monthly contracted wage, i.e. excluding overtime pay.

In Figure 4 the plotted points lie above the reference line. This indicates that the distribution of wages is skewed to the right, i.e., on average, the wage spread between wages on the promotion ladder escalates over the wage range. If wages always increased by the same amount from one position to another, the points would lie on the reference line, and y_i would equal x_i. Hence, Figure 4 tells us that the wage spread between slots increases the higher the position is in the hierarchy, i.e. the assumption that $w_3 - w_2 > w_2 - w_1$ is supported by the data.

Anger (2005a) studies unpaid hours of overtime and its effect on promotion probabilities, wages and lay-off risks in Germany. She finds that male West German workers who put in paid over time hours or overtime hours compensated by leisure have a higher probability to receive a promotion than others.

[22] There may of course, also be other explanations as to why workers work overtime, besides a striving for promotion. For example, workers may have to work overtime just to get through with their work load or to earn extra money. According to the Peter Principle workers are promoted up to their level of incompetence, and therefore have to increase their hours worked just to cope with their ordinary workload (see e.g. Lazear, 2004). Anger (2005b) finds that workers in East Germany work overtime to reduce the risk of becoming unemployed.
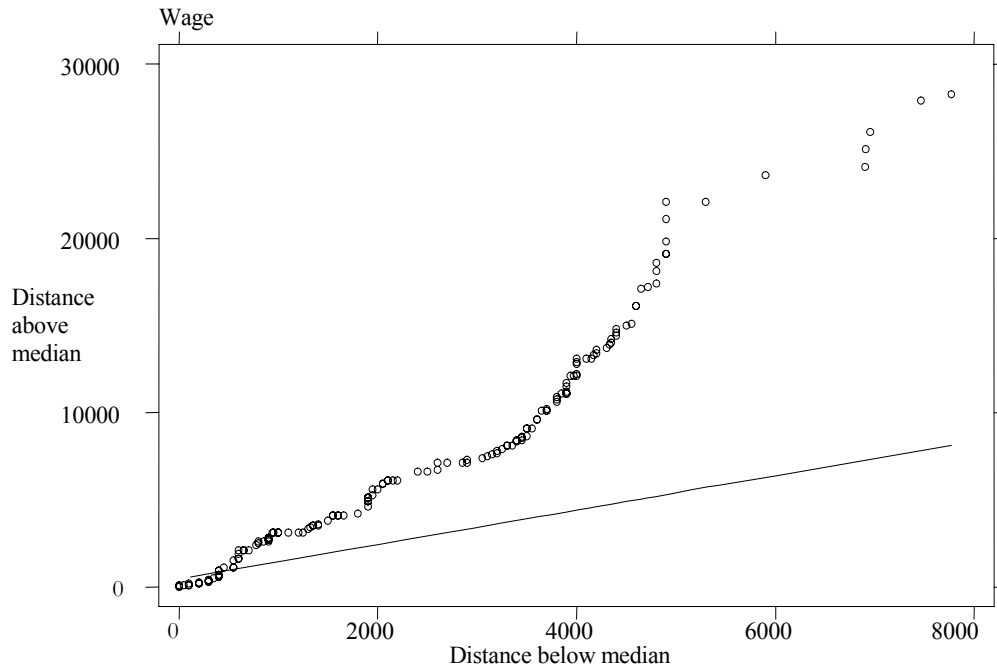
Figure 4. Wage spread between positions

The wage spread is defined as $WAGE\ SPREAD_i = WAGE_{i+1} - WAGE_i$ where $i \in$ [1,331] and wages are arranged in ascending order.[23] In determining effort, the empirical analysis will also be extended by using absolute wage instead of wage spread as an explanatory variable. The impact of the absolute wage is expected to have a positive effect on the level of effort, since on average - as Figure 4 shows - the higher the position in the hierarchy, the larger the wage spread between positions and, according to the model, the greater the level of effort.

Since the model presented in this paper is a tournament model, thus implying that the workers are in competition over promotions that will in turn increase their incomes, it is also

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[23] $WAGE_{321} = 53\,000$ which is the highest wage in the firm. The worker with this wage is not included in the sample. The worker with the highest wage in the sample earns SEK 47 000 per month. Hence, $WAGE$ $SPREAD_{331} = 6\,000$.

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of interest to extend the empirical analysis by excluding wage spread (or wage) from the regression and including instead the number of promotions, $PROMOTIONS_i$, that a worker has been granted in the company. Intuitively it would seem that the more promotions a worker has been granted, the higher his wage is and the larger the wage spread between his position and the next one will be. It is therefore expected that the relation between effort and promotions is positive.

$YEARS\ BEFORE\ RETIREMENT_i$ is the number of years left before a worker retires. The variable is constructed by subtracting the worker's age from 65, which in 1998 was the mandatory retirement age according to the collective agreement.[24] The model predicts that the youngest workers will work harder than the oldest workers, but predictions of the effort level of workers aged in the middle age group relative to the youngest and oldest groups are ambiguous.

$UNFAIR\ TREATMENT_i$ is measured by the time spent in the last position. Time is reported in incremental 6-month periods and is used to examine the effect of unfair treatment on the level of effort. According to the theoretical model, effort costs rise with the time spent

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[24] However, from the month when individuals turned 61 years old, they could choose to take early retirement but at the cost of a life-long reduction in the pension of 0.5 percentage points times the number of months left to their 65th birthday. No information is available on the number of workers who have left the company in question with an early old age pension. However, only a small fraction of all Swedes receive early old age pension. In 1998, when this survey was made, 6.5 percent of the Swedish population between 61 and 64 years old were receiving early old age pension benefits (source: Statistics Sweden). It was also possible (and still is) to postpone the old age pension until the age of 70. The retirement benefit is then raised by 0.7 percentage points times the number of months that have passed between the person's 65th birthday and the actual date of retirement. No-one in the sample is over 64, i.e. no-one has postponed their date of retirement beyond their 65th birthday. It is therefore reasonable to subtract the age of the worker from 65, to find the number of years left until retirement.

in the current position, due to negative feelings arising from a sense of unfair treatment.[25] But the implications of the theoretical model are ambiguous. The impulsive effect implies that workers reduce their effort level as a reaction to a perception of being unfairly treated. The strategic effect implies that workers raise their level of effort in order to improve their career opportunities in an attempt to avoid feeling even more unfairly treated in the future. The effect of *UNFAIR TREATMENT$_i$* on the effort level thus depends on which effect is the greatest.

The model implies that the greater the effort cost (excluding costs of unfair treatment) the fewer overtime hours a worker will put in. Since there is no specific variable available measuring how great a worker's effort cost is for working 1, 2, 3, ..., or H hours of overtime, a proxy variable defined as *EFFORT COST$_i$* has been used. The questionnaire includes a question about whether a worker is willing to work five hours overtime per week to increase the probability of his getting promotion. This variable is used as a proxy for effort cost on the

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[25] The suggestion that time spent in the current position imposes negative feelings associated with unfair treatment is based on findings reported in the literature on psychological contracts. Rosseau (1990) examines new hires and their perception of their obligations to the employer and the employers' obligations to them. The most frequently reported commitments to the employer were "doing one's best", working long hours and a certain minimum length of stay. The most frequently reported commitments from the employer to the employee (according to the employees' perception) were high pay, promotion and career development. That is, workers expect promotion and high pay in exchange for doing their best and working long hours. Two years later, Robinson and Rousseau (1994) followed up the new hires from Rousseau's study in 1990. This allowed for a longitudinal analysis of violations of psychological contracts. Robinson and Rousseau found that as many as 28 percent felt that the employer had failed to produce the "promised" promotions and advancement. Respondents gave examples of promises made, for example that on recruitment the employer had said that "there were good chances of promotions" or "chances for greater responsibility". If the respondents had not got promotions or more responsibility, they regarded the psychological contract as broken. Broken contracts in turn reduce workers contribution to the organization.

assumption that workers with high effort costs are less willing to put in overtime in order to get promotions. The dummy variable $EFFORT\ COST_i$ equals 1 for workers who answer "No" to the question above, i.e. whose effort costs are high, and 0 otherwise.

In completing the questionnaire, some workers may have underestimated the costs of staying at work for longer than their contracted hours. Consequently other variables assumed to reflect effort cost have also been included. These variables are motivated among other sources by Becker's (1985) model on efficient time allocation within the family between home production and market work. According to Becker's model, married women with children have higher labor market costs than other workers. Efficient time allocation implies that married women with children specialize in home production while their husbands specialize in market work. To measure effort costs, the following dummy variables are included: $FEMALE_i$ equals 1 if the worker is a woman and 0 otherwise, $CHILDREN_i$ equals 1 if the worker has at least one child under ten living in the household, and $MARRIED_i$ equals 1 if the worker is married or cohabiting. In order to examine also the effort levels of married or cohabiting women with children, an interaction variable $FEMALE_i*CHILDREN_I*MARRIED_i$ is included in the empirical model.

3.3 Results

According to the theoretical model, firms promote workers on a basis of their efforts. The results of the empirical model reported in Table 2, Column 1, show that the level of effort increases significantly in the wage spread as implied by the model. A re-estimation of

equation [26], replacing wage spread first by absolute wages and secondly by promotions, shows that wage and number of promotions are both positively related to effort.[26]

The theoretical model predicted that the youngest workers achieved a higher level of effort than the oldest workers, but the effort level of the workers in between was ambiguous. The empirical results only show evidence for a relationship between years left to retirement and effort in the model using wage as a proxy for wage spread. If the estimated standard error of the regression is minimized when examining the form of the relation between the years left before retirement and effort – i.e. whether it is linear, quadratic, square root or log linear – it appears that a linear relationship produces the best fit.

According to the empirical analysis, the longer a worker has been in his current position, the less overtime hours he works. In the theoretical model, the effect of unfair treatment (i.e. time spent in the current position) is not clear. Workers who give greater weight to their feelings of unfair treatment today than to their feelings tomorrow (the impulsive effect dominates over the strategic effect), will work less hard today to get a promotion in the future. The converse also applies. The data indicates that on average the impulsive effect of unfair treatment dominates over the strategic effect: the longer a worker remains in a position, the less effort he will put into trying for promotion in the future. Different functional forms of the relation between $UNFAIR\ TREATMENT_i$ and $EFFORT_i$ have been examined. The square root functional form fits the relation best in the first and third model and the linear functional form fits the relation best in the second model. The square root of $UNFAIR\ TREATMENT_i$ is included in the regressions.

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[26] If $WAGE\ SPREAD_i$ and $WAGE_i$ are both included in the tobit regression, then $WAGE\ SPREAD_i$ becomes insignificant. The same holds for $PROMOTIONS_i$ when included together with $WAGE_i$.

Table 2. Effort level

Dependent Variable: *EFFORT* (Hours of overtime)			
	[1]	[2]	[3]
WAGE SPREAD/100	**0.342 *****		
	0.001		
WAGE/100		**0.041 *****	
		0.006	
NUMBER OF PROMOTIONS			**0.491 ****
			0.222
YEARS BEFORE RETIREMENT	**0.046**	**0.113 ****	**0.056**
	0.049	*0.475*	*0.051*
Sq.root of UNFAIR TREATMENT	**-1.766 *****	**-1.002 ****	**-1.609 *****
	0.464	*0.449*	*0.484*
EFFORT COST	**-2.523 *****	**-2.543 *****	**-2.576 *****
	0.927	*0.872*	*0.958*
WOMAN	**-1.145**	**-0.193**	**-1.298**
	1.052	*1.005*	*1.068*
CHILDREN	**-1.294**	**-1.811**	**-1.790**
	1.191	*1.115*	*1.207*
MARRIED	**1.254**	**0.385**	**1.026**
	1.045	*0.988*	*1.061*
WOMAN*CHILDREN*MARRIED	**-1.084**	**-.0158**	**-0.916**
	1.769	*1.659*	*1.798*
CONSTANT	**3.789**	**-7.172 *****	**3.299**
	1.829	*2.478*	*1.985*
LR chi2(8)	54.13	87.46	47.71
Estimated standard error of the regression	7.017	6.561	7.129
Number of observations	331	331	331
Number of left-censored observations at 0	148	148	148

Note: Standard errors are in italics.
***/**/* indicate significance at the 1/5/10 percent level respectively.

According to the data, if a worker is not willing to put in extra hours in order to get promotion, i.e. his effort cost is high, then he will put in less overtime than other workers do. There is no evidence that women put in significantly fewer overtime hours than men. There is either no evidence that married or cohabiting workers or workers with at least one child under 10 work less overtime than other workers do. Married mother status has no significant effect on a worker's level of effort.

3.4 Careerists or non-careerists?

In the preceding section we interpreted the empirical results in terms of the theoretical model for unfair treatment. The coefficient for time spent in a worker's current position was interpreted in terms of unfair treatment. Another possible interpretation of the result could be that there are two types of worker, careerists and non-careerists, whereby the careerists work overtime and get frequent promotion while non-careerists never work overtime and do nor get promotion. There is then a negative correlation between overtime hours and time spent in the current position: non-careerists stay longer in their current positions and work less overtime hours than careerists, not as a function of unfair treatment but as a function of their own preferences.

To examine whether the results are a function of the presence of the careerist- and non-careerist situations, equation [26] is re-estimated for the sub-sample of workers who had declared their interest in getting promotion. The assumption is that workers who are careerists do make such declaration. Hence, non-careerists who have a preference for staying in their current position and who do not thus work overtime, are excluded from the sample. The results are presented in Table 3.

An analysis concerned only with careerists yields results similar to the analysis of the whole sample in Section 3.3. That is to say, the careerists who have been in their current positions for a long time work less overtime than their co-careerists who have been in their latest position for less time. This is interpreted as meaning that unpromoted careerists feel unfairly treated by the firm when they do not get a promotion. This means in turn that their effort costs increase, and it will be harder for them to make efforts to get promotion in the future, i.e. they work less overtime.

Table 3. Effort level and promotion preferences

Dependent variable: *EFFORT* (Hours of overtime)			
	[1]	[2]	[3]
WAGE SPREAD/100	0.270 ***		
	0.097		
WAGE/100		0.037 ***	
		0.007	
NUMBER OF PROMOTIONS			0.408 *
			0.242
YEARS BEFORE RETIREMENT	0.172	0.093	0.021
	0.060	1.217	0.062
Sq.root of UNFAIR TREATMENT	-1.930 ***	-1.049 [a]	-1.813 ***
	0.648	0.638	0.672
EFFORT COST	-3.153 ***	-3.382 ***	-3.356 ***
	1.256	1.204	1.279
WOMAN	-1.748	-0.962	-1.829
	1.271	1.226	1.294
CHILDREN	-0.876	-1.618	-1.389
	1.294	1.227	1.312
MARRIED	0.916	0.122	0.559
	1.219	1.165	1.237
*WOMAN*CHILDREN*MARRIED*	-1.896	-0.559	-1.699
	2.038	1.946	2.072
CONSTANT	5.404	-5.071	5.253
	2.240	3.089	2.404
LR chi2(8)	39.41	58.27	34.66
Estimated standard error of the regression	6.581	6.239	6.686
Number of observations	209	209	209
Number of left-censored observations at 0	83	83	83

Note: The standard errors are heteroscedastic. Robust standard errors are in italics.
***/**/* indicate significance at the 1/5/10 percent level respectively.
[a] p-value=0.102

4 Conclusions

Stark (1987, 1990) and Kräkel (2000) introduce the concept of relative deprivation into tournaments in their models. They suggest that workers experiencing relative deprivation in relation to a specific reference group will raise their effort level to minimize the wage gap between themselves and their co-workers. According to these models, workers do not harbor

any feelings of envy vis-à-vis their colleagues or of unfair treatment on the part of the firm. In a series of papers Akerlof (1982, 1984) and Akerlof and Yellen (1988, 1990) discuss the importance of including workers' feelings of fair and unfair treatment when modeling a wage scheme.

This paper has presented a tournament model in which the concept of relative deprivation is combined with feelings of unfair treatment. The model suggests that relative deprivation does not always lead to an increase in the level of effort. Relative deprivation and a sense of unfair treatment generate two counteracting effects on the effort made. Workers who feel unfairly treated by the firm work less hard today because their effort cost has increased (due to unfair treatment). This effect on the level of effort has been defined here as the impulsive effect. But workers also evaluate the effort costs they expect in the future from not having worked hard today. They know that they will feel even more unfairly treated in the future if they lose the next tournament as well. To avoid this they work harder today. This effect has been defined as the strategic effect. Which of the effects is dominant, depends on the form of the effort cost function.

Data from a Swedish municipally owned company has indicated that when workers decide how much effort they are prepared to make, they pay more attention to the way they feel today about how they have been treated than to their possible future feelings of unfair treatment. Thus the impulsive effect is stronger than the strategic. That is, the longer a worker has been in his present position, the less effort he makes to get further promotion. Hence, the effect of unfair treatment on the level of effort in a tournament setting is similar to the effect of unfair wages on effort according to Akerlof and Yellen's fair-wage hypothesis.

The theoretical model in this paper is a partial equilibrium model in which wages are exogenous. An interesting task for future research would be to include the firm side in the model and build a "full" equilibrium model allowing for the effects of unfair treatment in designing an optimal reward structure.

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Appendix 1

h is excluded from the effort cost function to eliminate workers feelings from the model (i.e. h = 0). Workers in position 2 without h in the effort cost function maximize:

$\text{Max}_e \quad U = [w_2 - C(e) + p(e)(w_3 - C(\tilde{e})) + (1 - p(e))(w_2 - C(\tilde{e}))]$.   [A1]

The first-order condition is

$\qquad g(e_i - e_j)[w_3 - w_2] = C'(e)$ [A2]

that is fulfilled for $\breve{e}$, and the second order condition is

$\qquad g'_{ei}(e_i - e_j)[w_3 - w_2] - C''(e) < 0$.   [A3]

Workers in position 1 without h in the effort cost function maximize:

$\text{Max}_e \quad U = [w_1 - C(e) + p(e)(w_2 - C(\tilde{e})) + (1 - p(e))(w_1 - C(\tilde{e}))]$.   [A4]

The first-order condition is

$\qquad g(e_i - e_j)[w_2 - w_1] = C'(e)$ [A5]

that is fulfilled for $\underline{e}$. The second-order condition is

$\qquad g'_{ei}(e_i - e_j)[w_2 - w_1] - C''(e) < 0$.   [A6]

From equations [A2] and [A5] we have that $\breve{e} > \underline{e}$ (since $w_3 - w_2 > w_2 - w_1$), i.e. workers in position 2 work harder than workers in position 1.

From equation [15$'$] in Section 2.1.2 we have that when h is included in the effort cost function, workers in position 2 have the following first-order condition:

$\qquad g(e_i - e_j)[w_3 - w_2 - C(e, 0) + C(e, 1)] = C'(e, 0)$

that is fulfilled for $e_0{}^*$.

From equation [20$'$] we have that when h is included in the effort cost function workers in position 1 have the following first-order condition:

$\qquad g(e_i - e_j)[w_2 - w_1 - C(e, 0) + C(e, 2)] = C'(e, 1)$

that is fulfilled for $e_1{}^*$.

Comparing equations [A2], [A5], [15$'$] and [20$'$] we see that the effort level chosen in equation [12$'$] > the effort level chosen in equation [A2] > the effort level chosen in equation

[A5] since $-C(e, 0) + C(e, 1) > 0$ and $w_3 - w_2 > w_2 - w_1$, i.e. $e*_1 > \breve{e} > \underline{e}$. The effort level chosen in [20′] compared to the other effort levels depends on the relative size of $C'(e, 1)$ to $C'(e, 0)$ and $C(e, 2)$ to $C(e, 1)$.

Appendix 2

From section 2.1.1 – 2.1.3 we see that workers who have received promotions in both contests have the following first-order conditions:

Period 3: $0 = C'(e, 0)$ that is fulfilled for $\tilde{e}_0$ [A7]

Period 2: $g(0)[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_1, 1)] = C'(e, 0)$ that is fulfilled for $e*_0$ [A8]

Period 1: $g(0)[W_1 - W_2] = C'(e, 0)$ that is fulfilled for $e*$. [A9]

Since $[w_3 - w_2 - C(e, 0) + C(e, 1)] > 0$ and $[W_1 - W_2] > 0$ we have that $\tilde{e}_0 < e*_0$ and $\tilde{e}_0 < e*$, i.e. the effort level in the last period is less than the effort level in the other periods. Since we do not know if $[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_1, 1)]$ is larger or smaller than $[W_1 - W_2]$ we cannot say whether the shape of the relation between tenure and effort is hump-shaped or decreasing over all periods for workers who have received promotions in all contests.

Workers who received a promotion in the first but not the second contest have the following first-order conditions:

Period 3: $0 = C'(e, 1)$ that is fulfilled for $\tilde{e}_1$ [A10]

Period 2: $g(0)[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_1, 1)] = C'(e, 0)$ that is fulfilled for $e*_0$ [A11]

Period 1: $g(0)[W_1 - W_2] = C'(e, 0)$ that is fulfilled for $e*$. [A12]

Since $C'(e, 1) > C'(e, 0)$, $[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_1, 1)] > 0$ and $[W_1 - W_2] > 0$ we have that $\tilde{e}_1 < e*_0$ and $\tilde{e}_1 < e*$. Since we do not know whether $[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_1, 1)]$ is larger or smaller than $[W_1 - W_2]$ we cannot say whether the shape of the relation between tenure and effort is hump-shaped or decreasing over all periods for workers who have received promotions in all contests.

Workers who did not receive a promotion in the first contest but did so in the second, have the following first-order conditions:

Period 3: $0 = C'(e, 0)$ that is fulfilled for $\tilde{e}_0$ [A13]

Period 2: $g(0)[w_2 - w_1 - C(\tilde{e}_0, 0) + C(\tilde{e}_2, 2)] = C'(e, 1)$ that is fulfilled for $e*_1$ [A14]

Period 1: $g(0)[W_1 - W_2] = C'(e, 0)$ that is fulfilled for $e*$. [A15]

$[W_1 - W_2] > 0$. Hence the optimal effort level in equation [A15] is larger than the effort level in [A13], i.e. the optimal effort level is larger in the first than in the third period.

We know that $[w_2 - w_1 - C(\tilde{e}_0, 0) + C(\tilde{e}_2, 2)] > 0$. But since the effort needed to fulfill $C'(e, 1) = 0$ is lower than the effort needed to fulfill $C'(e, 0) = 0$ this does not imply that the effort needed to fulfill $[w_2 - w_1 - C(\tilde{e}_0, 0) + C(\tilde{e}_2, 2)] > 0$ is greater than the effort needed to fulfill $C'(e, 0) = 0$. Hence, we cannot say anything about the relation between [A14] and [A13]. Equations [A15] and [A14] do not enable us to say whether the optimal effort level in period 1 is higher than in period 2.

Workers who are in the lowest position in all periods have the following first-order conditions:

Period 3: $0 = C'(e, 2)$ that is fulfilled for $\tilde{e}_2$ [A16]

Period 2: $g(0)[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_2, 2)] = C'(e, 1)$ that is fulfilled for $e*_1$ [A17]

Period 1: $g(0)[W_1 - W_2] = C'(e, 0)$ that is fulfilled for $e*$ [A18]

The optimal effort level needed to fulfill $0 = C'(e, 2)$ is higher than the optimal effort level needed to fulfill $0 = C'(e, 1)$, which is higher than the optimal effort level needed to fulfill $0 = C'(e, 0)$. Since $W_1 > W_2$, we get $e* > \tilde{e}_2$. Since $[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_2, 2)] > 0$ we get $e*_1 > \tilde{e}_2$. However, we do not know the size of $[w_3 - w_2 - C(\tilde{e}_0, 0) + C(\tilde{e}_2, 2)]$ relative to $[W_1 - W_2]$, and cannot say anything about the relative size of the effort between the first and the second periods.

Appendix 3

Questionnaire

1. Gender

□ Male

□ Female

2. Year of birth   19____

3. Civil status

□ Married/cohabiting

□ Single

4. How many children under 10 live in your household? _____

5. How many years have you spent altogether at school? _____

6. What is the highest level of education you have attained?

□ Elementary school/Compulsory school

□ Junior secondary school/Upper secondary school/Folk high school

□ Some university education (no degree)

□ University degree

□ Vocational training

7. How many years altogether have you spent in gainful employment? _____

8. How many years have you spent with this company? _____

9. Have you ever been on leave from the company for more than 6 months?

□ Yes

□ No

10. If your answer to question 9 was "Yes", please state why, and for approximately how many months.

More than one alternative can be given.

□ Studying _____ months

□ Child care _____ months

□ Sick leave _____ months

□ Worked for other employer _____ months

□ Other _____ months

11. How many hours do you work every week according to your contract? _____

12. Approximately how many hours did you work last week? (If you were absent, report hours worked during the last week when you were working.) _____

13. How large is your pre-tax monthly salary? _____ kronor

14. How many years have you held your position with the company? _____ years

15. How many positions other than your current position have you held with the company since you began working there? _____

16. How many of the changes in your position with the company have been a promotion (=a change to what you consider to be more qualified work)**?** (Do not count your first position as a promotion). _____

17. Do you think there are any promotion opportunities for you within the company, given your current position?

□ Yes

□ No

□ Don't know

18. Are you interested in receiving promotion within the company?

□ Yes

□ No

□ Don't know

19. Would you work 5 hours overtime per week if you knew this would improve your chances of receiving promotion within the company?

□ Yes

□ No

□ Don't know

20. Have you received any kind of education or training during paid working time in the last 12 months?

□ Yes

□ No

21. If you have received such education or training, how many whole working days did it involve? _____

22. Have you ever moved house to get a better job?

□ Yes

□ No

23. Have you ever moved house because your spouse got a better job?

□ Yes

□ No

24. If your answer to question 23 was "Yes", did you

□ get a better job?

□ get a worse job?

□ get no job?