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Subjective Performance Appraisal and Inequality Aversion*

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Abstract

Making use of a subjective performance appraisal system, it is a well established fact that many supervisors tend to assess the employees too good (leniency bias) and that the appraisals hardly vary across employees of a certain supervisor (centrality bias). We explain these two biases in a simple theoretical model and discuss determinants of the size of the biases.

JEL Classification M5, D63

Keywords

Appraisals; Inequality aversion; Performance evaluation; Centrality bias; Leniency bias

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Subjective Performance Appraisal and Inequality Aversion

1. Introduction

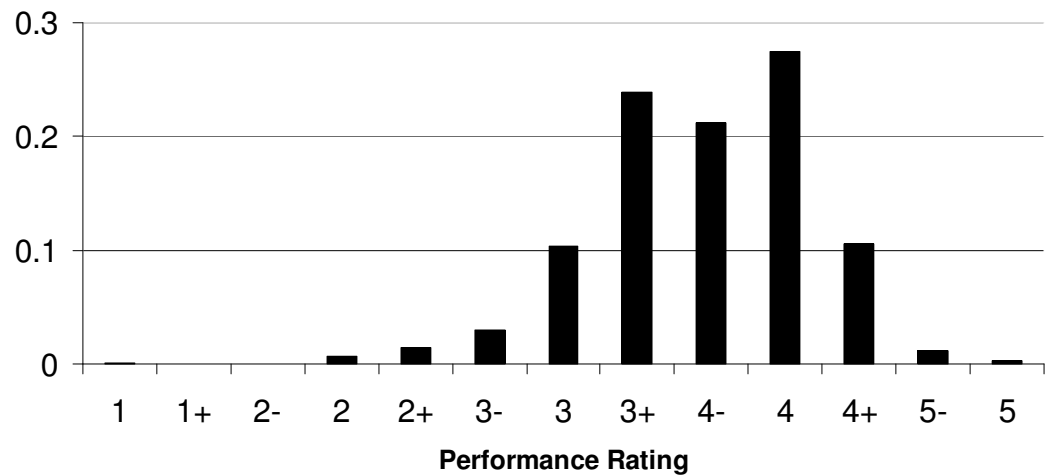
Performance appraisal is a comprehensively discussed topic of economics and management research. Bretz et al. (1992) as well as Levy & Williams (2004) provide extensive surveys of the literature. Systematic performance appraisal systems can be implemented for several purposes including promotion and training decisions, performance based variable pay and personnel planning (Cleveland et al. 1989). For some employees it might be possible to obtain objective performance indicators. Then, it is possible to analyze the advantageousness of certain measures (e.g. Reichelstein 1997). In many cases, however, it is not possible to obtain objective performance measures on an individual base. Besides, existing objective measures usually correspond only to part of employees' tasks, which may lead to distorted incentives (Milgrom & Roberts 1988, Holmstrom & Milgrom 1991). Therefore, many firms implement some kind of subjective performance evaluation.

Subjective performance evaluation, however, is also fraught with some problems. One issue is that the accuracy of ratings is not given automatically. If the rater is a residual claimant (i.e. the owner of a firm) and the appraisal affects some kind of variable pay, she may underreport the performance of her subordinates in order to save costs. However, many supervisors are no residual claimants but themselves employed workers in multi layered firms. Therefore, supervisors can also be interpreted as agents with own utility functions, which may deviate from the principal's objectives. In this situation possible rater biases include the centrality bias and the leniency bias.¹ In many firms the majority of employees get ratings above the average mark. Therefore, the appraisals are by definition skewed to the top end of the scale and supervisors rate some kind of lenient (e.g. Jawahar & Williams 1997). Besides, several studies find that only a small fraction of possible performance levels is used by the supervisors when evaluating subordinates. They tend to differentiate only slightly between employees (e.g. Murphy & Cleveland 1991). These biases may not only be inefficient for firms but also lead to

¹ Other biases that are discussed in the literature include the halo, primacy and recency effect (see e.g. Murphy & Cleveland 1995).

the problem that the performance appraisal system is not accepted by several employees as Murphy (1992) observes for the pharma company Merck & Co, Inc. More than 70 percent of employees are located in only three of 13 performance categories and only about 5 percent have got marks below the average one in this case (see Figure 1).

Figure 1: Distribution of subjective performance appraisals at Merck & Co., Inc.



Note: 1 = unacceptable performance, 5 = exceptional performance.

Source: Murphy (1992), p. 40.

Several reasons for these biases are discussed in the empirical management literature. If supervisors are not rewarded for accurate ratings, they may have insufficient motivation to invest time in gathering information (Fox et al. 1983). Furthermore, they may also face cognitive limitations and tend to focus on some performance dimensions (Ittner et al. 2003) or arbitrarily favor certain employees e.g. to encourage loyalty or to serve their self-interest (Ferris & Judge 1991). Besides, supervisors may have a preference for a pleasant relationship with their subordinates (Varma et al. 1996). Negative feedback may lead to undesirable discussions and is therefore avoided if possible.²

The aim of this paper is to explain both the leniency bias and the centrality bias in a simple model.

² See also Bol (2005) for a more detailed overview of the literature.

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5 The contributions of Prendergast and Topel (1996) as well as Prendergast (2002) are
6 two of the few theoretical studies which provide explanations for the leniency bias by
7 assuming that the well-being of subordinates is part of the supervisor's utility function.
8 In Prendergast and Topel (1996) a supervisor can distort her reports but is monitored by
9 the management. Since biased reports lead to inefficient job assignments, management
10 punishes the supervisor if her report deviates from the management's own observation.
11 Similarly, Prendergast (2002) assumes that the supervisor faces some cost when
12 deviating from the truth. Both contributions show that favoritism increases with the
13 worker's incentives. Assessments are distorted upwards the more the supervisor likes a
14 particular agent and downwards the more she dislikes a subordinate. Breuer, Nieken and
15 Sliwka (2008) provide a similar model and indeed find in a quantitative case study that
16 social ties between supervisor and appraised employee foster the leniency bias. Sliwka
17 (2007a) provides a model on performance appraisal with one loss averse agent and
18 shows in a two period model that the leniency bias becomes more relevant over time.
19 Giebe and Gürtler (2009) examine optimal contracts and show that the leniency bias
20 may hold if the supervisor cares for agents' well-being.
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34 In this paper we build on Prendergast's argument and additionally assume that
35 employees are inequality averse to each other. It is now more and more accepted that
36 inequality aversion is an important driving force of human behavior in many situations.
37 Recent applications of inequality aversion in principal-agent-models include individual
38 and team based incentive contracts, rank-order tournaments and adverse selection
39 problems (see Englmaier 2005 for an overview). However, inequality aversion has not
40 been applied to performance appraisal issues so far. Simultaneously and independently
41 from this paper Sliwka (2009) gives another explanation for the centrality bias by
42 incorporating two (not identical) signals of the agents' performances for a supervisor
43 *and* a principal. The centrality bias is due to the supervisor's inequity aversion and a
44 regression to the mean effect of the supervisor's report, because she wants to avoid own
45 disadvantages from deviating from the principal's signal.
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56 In the next section we proceed by providing a simple model. Section 3 concludes and
57 discusses the results.
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2. A simple model on performance appraisal with inequality averse agents

Suppose that a supervisor S has to assess the unverifiable performance of two agents i and j (i and $j = 1, 2; i \neq j$) to determine their wages. Her verifiable report for agent i is characterized by the term $r_i > 0$. We assume that the supervisor is not a residual claimant, but employed in a firm. She observes the true performance $p_i > 0$ of both agents and then has to state a report r_i for each agent. The situation of unverifiable performances of employees and the use of subjective performance appraisal systems may rather fit to the case of white-collar workers at lower and middle management levels than to blue-collar workers or executives. The wage W_i of agent i consists of two components. He receives a performance appraisal contingent bonus br_i ($b > 0$) in addition to his fixed wage $w > 0$, i.e. $W_i = w + br_i$. Linear incentive contracts are often used in practice and are also found to be optimal in many situations (Holmstrom & Milgrom 1987). We focus on a given wage scheme and do not model some kind of principal.

We assume that agents may have social preferences and be inequality averse so that relative wages are important. This is in line with experimental evidence (see e.g. Fehr & Schmidt 2003) and findings of interviews with employees by Agell and Lundborg (1995). For simplicity we assume that both agents are equally inequality averse. To model their utilities we use the utility function proposed by Fehr and Schmidt (1999). If the performance appraisal of i is lower than the performance appraisal of j , agent i is jealous of j . The resulting disutility increases in the difference of the performance ratings ($r_j - r_i$), in the report dependent wage component b , and in the degree of disadvantageous inequality aversion α . If instead agent i is better assessed, he may feel some kind of compassion or guilt with agent j . The extent of such feelings is given by the parameter β . Thus, the utility function of an agent who is inequality averse is given by

$$\begin{aligned}
U_i(r_i, r_j) &= W_i - \alpha (\max \{W_j - W_i, 0\}) - \beta (\max \{W_i - W_j, 0\}) \\
&= w + b r_i - \alpha (\max \{w + b r_j - (w + b r_i), 0\}) - \beta (\max \{w + b r_i - (w + b r_j), 0\}) \\
&= w + b r_i - \alpha (\max \{b (r_j - r_i), 0\}) - \beta (\max \{b (r_i - r_j), 0\}) \\
&\quad , i \neq j \text{ and } 0 \leq \beta < 1, 0 \leq \alpha.^3
\end{aligned}$$

The special case of $\alpha = \beta = 0$ pictures the utility of two purely self-interested agents who are only interested in their own wage. We assume $\beta < 1$. This implies that agent i cares more for his own utility than for the other agent's utility. In their seminal paper Fehr and Schmidt assume that $\alpha \geq \beta$. We do not need this assumption for our model.

Furthermore, we assume that the supervisor is interested in the accuracy of her statement and in the utilities of the agents. On the one hand, the supervisor suffers from costs $v \cdot (r_i - p_i)^2$, if her report deviates from her observation. Hereby, $v > 0$ measures the intensity of these costs from distorting evaluations. These costs may picture the supervisor's shame or her compunction because of lying. This means that the supervisor shows some kind of ethical behavior and has truth-telling preferences. This interpretation is independent of the effect of distorted reports on the firm, i.e. of (ex ante) gains or losses accruing to the firm. If distorted reports unambiguously hurt the firm, these costs may also represent the potential cost of being fired if found out to have stated extensively distorted evaluations. We therefore suppose increasing marginal costs with increasing deviations and use a quadratic cost function. On the other hand, S cares for the utilities of the agents. For example, she may want to avoid arguments with the agents and a negative working atmosphere in general (Bernardin & Buckley 1981). The strength of this factor is represented by the parameter μ . The supervisor's utility function is therefore given by

$$\begin{aligned}
U_S(r_i, r_j | p_i, p_j) &= \mu (w + b r_i - \alpha (\max \{b (r_j - r_i), 0\}) - \beta (\max \{b (r_i - r_j), 0\}) \\
&\quad + w + b r_j - \alpha (\max \{b (r_i - r_j), 0\}) - \beta (\max \{b (r_j - r_i), 0\})) \\
&\quad - v (r_i - p_i)^2 - v (r_j - p_j)^2 \quad , \mu \geq 0.
\end{aligned}$$

³ Agents are assumed to be inequality averse with respect to outcomes and do not take inputs (e.g. efforts) into account. We think this is a reasonable assumption since there is evidence that the vast majority of employees consider themselves as top performers (Meyer 1975) so that differences in efforts will usually not be perceived equally across employees.

Before deriving the optimal reports of the supervisor for inequality averse agents, we determine the performance appraisals for situations usually analyzed in more traditional economic models. The results can be taken as benchmarks compared to the results of our model:

- 1.) If the supervisor is merely self-oriented and does not care for her agents' utilities ($\mu = 0$), it is easy to show that she will report the true performances

$$r_i = p_i \quad (i = 1, 2)$$

by differentiating her utility function with respect to the reports, because there would only costs but no benefits from deviating from the observations.

- 2.) If the supervisor cares for agents' utilities ($\mu > 0$) and the agents are not inequality averse but purely self-interested ($\alpha = \beta = 0$), the supervisor maximizes $\mu(w + br_i + w + br_j) - v(r_i - p_i)^2 - v(r_j - p_j)^2$. Solving the first order condition for r_i leads to the optimal appraisals

$$\tilde{r}_i = \frac{\mu b}{2v} + p_i \quad (i = 1, 2).$$

In this case the supervisor overstates the agents' performances ($r > p$). This result can be interpreted as the leniency bias. The size of this bias is increasing in the degree of the supervisor's preference for the agents' utilities and the monetary incentives of the agents. It is decreasing in the supervisor's costs of giving biased reports. Each employee is upgraded to the same degree so that there is no centrality bias in this case.

In our model the supervisor also has to choose r_i and r_j – given her observations p_i and p_j – to maximize her utility by taking the inequality aversion of the agents into account. Note that the supervisor's utility function depends on her reports. Thus, we have to distinguish three different cases, because uneven reports lead to inequality between the agents.

$$U_s = \begin{cases} \mu[2w + br_i - \beta b(r_i - r_j) + br_j - \alpha b(r_i - r_j)] - v(r_i - p_i)^2 - v(r_j - p_j)^2 & \text{if } r_i > r_j \\ \mu[2w + br_i + br_j] - v(r_i - p_i)^2 - v(r_j - p_j)^2 & \text{if } r_i = r_j \\ \mu[2w + br_i - \alpha b(r_j - r_i) + br_j - \beta b(r_j - r_i)] - v(r_i - p_i)^2 - v(r_j - p_j)^2 & \text{if } r_i < r_j. \end{cases}$$

The case of equal reports can also be integrated into the other lines of the supervisor's utility function so that we can write this as

$$U_S = \begin{cases} \mu[2w + br_i - \beta b(r_i - r_j) + br_j - \alpha b(r_i - r_j)] - v(r_i - p_i)^2 - v(r_j - p_j)^2 & \text{if } r_i \geq r_j \\ \mu[2w + br_i - \alpha b(r_j - r_i) + br_j - \beta b(r_j - r_i)] - v(r_i - p_i)^2 - v(r_j - p_j)^2 & \text{if } r_i \leq r_j. \end{cases}$$

Assume that S observes $p_i > p_j$. She wants to maximize her utility and has to decide whether it is optimal to choose different or equal reports for the agents. To determine the optimal reports r_i and r_j , we first look at the first line of her utility function. If S decides to choose a higher report for agent i or equal reports for both agents, she maximizes this line of her utility function subject to the constraint $r_i \geq r_j$. Possible solutions include both different and equal reports (Appendix A provides an examination of the corresponding Lagrangian in more detail).

The supervisor only provides different reports $r_i^{diff} = \mu b(1 - \alpha - \beta)/2v + p_i$ and $r_j^{diff} = \mu b(1 + \alpha + \beta)/2v + p_j$, if the performance difference across agents is sufficiently large so that the creation of inequality is compensated. This is the case for $p_i - p_j > \mu b(\alpha + \beta)/v$. Note that the right-hand side this inequality is increasing in the inequality aversion parameters α and β . This is intuitive since it captures an agent's higher disutility when obtaining a report different from the one of his colleague. Furthermore, the right-hand side is increasing in μ and in the report dependent wage component b while decreasing in the supervisor's costs v of deviating from the observed performances. The supervisor chooses equal reports $r_i^{even} = r_j^{even} = r^{even} = \mu b/2v + (p_i + p_j)/2$, if the performances do not differ that much.

A similar reasoning can be applied to the maximization of the second line of the supervisor's utility function subject to the constraint $r_i \leq r_j$.⁴ It is never optimal for the supervisor to give agent j a better rating, while she observes that agent i is the top performer (see Appendix B). If S observes that agent i 's performance is better than the performance of agent j , the only solution to the maximization problem of the second

⁴ The relevant Lagrange function and the resulting Kuhn-Tucker-conditions can be found in Appendix B.

line of the utility function is to state equal reports $r_i^{even} = r_j^{even} = \mu b / 2v + (p_i + p_j) / 2$. Since the first line of the supervisor's utility function corresponds to the second line of the utility function if reports are equal, different reports are only optimal if $p_i - p_j > \mu b(\alpha + \beta) / v$. Otherwise S sets equal reports.

The derivation of the optimal reports when agent j 's performance is at least as good as the performance of agent i follows analogously. Our results are summarized in the following

Proposition:

Let $p_i > p_j$. If both agents are inequality averse and the performance difference between the better agent i and the worse agent j is sufficiently large, i.e. $p_i - p_j > \mu b(\alpha + \beta) / v$, the supervisor optimally reports $r_i^{diff} = \mu b(1 - \alpha - \beta) / 2v + p_i$ and $r_j^{diff} = \mu b(1 + \alpha + \beta) / 2v + p_j$. If the performance difference is rather small, i.e., $p_i - p_j \leq \mu b(\alpha + \beta) / v$, the supervisor announces equal reports $r_i^{even} = r_j^{even} = \mu b / 2v + (p_i + p_j) / 2$.

It is easy to see that the supervisor's reports picture both the centrality bias and the leniency bias. If there are large performance differences between the agents, the supervisor tries to diminish the wage gap between the agents. This effect represents the centrality bias. Note that the centrality bias occurs in our sense, if the difference between true performances exceeds the difference of performance ratings. The higher α and β , i.e. the more inequality averse the agents are, the larger is the range of equal reports and the larger the centrality bias.

The relevance of the leniency bias has to be illuminated separately for the cases of different and equal reports. First, we consider the case of different reports. As long as $\alpha + \beta < 1$ holds, both agents' performance ratings are higher than their observed performances, which represent the leniency bias. Otherwise, only the report for the agent with the lower observed performance is adjusted upwards. Also in this case the sum of the upward bias for the weaker employee and the downward bias for the top

performer is always positive, so that the leniency bias always exists in sum. This distortion increases in the preference of the supervisor for the agents' utilities (μ) and in the report dependent wage component (b). It is decreasing in her costs v of deviating from the observed performances.

Inspecting the case of equal reports r^{even} , it is also straightforward that the supervisor generally rates the agent with the lower observed performance with leniency. However, similar to the case of different reports this does not always hold for the report for the agent with the higher observed performance. Again, the size of the leniency bias depends on the inequality aversion parameters α and β . Assume that $p_i > p_j$, then $r_i^{even} > p_i$ if $p_i - p_j < \mu b / v$. Proposition 1 states that the supervisor announces r_i^{even} and r_j^{even} if $p_i - p_j \leq \mu b(\alpha + \beta) / v$. Consequently the report for agent i is always adjusted upwards if $\alpha + \beta < 1$. In contrast the report for agent i is lower than his observed performance, if $\alpha + \beta > 1$ and $\mu b / v < p_i - p_j \leq \mu b(\alpha + \beta) / v$. However, the upward bias for the weaker agent always outweighs the possible downward bias for the better one.

If the agents' performances are exactly the same ($p_i = p_j = p$), the supervisor reports $r_i^{even} = \mu b / 2v + p$ (for $i = 1, 2$). This is the only case, in which the performance appraisals for inequality averse agents correspond to the reports for self-interested agents simply because there is no inequality. The leniency bias is also present in the case of purely self-interested agents, but the centrality bias cannot be explained.

In our model we assume that the supervisor favors all agents. However, it may well be the case that a supervisor has only preferences for one of two subordinates (her favorite). For example, the supervisor knows one agent well and/or wants to reciprocate previous loyalty. It is quite obvious then that the leniency bias is particularly relevant for the favorite so that she may even receive a better report although having performed worse.

3. Conclusion

Many empirical studies have shown that subjective performance ratings of supervisors are subject to the centrality and leniency bias: Supervisors tend to differentiate only slightly between their subordinates so that ratings are compressed. Moreover, ratings are often skewed towards the top end of the rating scale. Our analysis offers a simple explanation for both biases: If supervisors care for the utility of their inequality averse subordinates, ratings may be distorted in both ways. The extent of the biases is influenced by the size of agents' inequality aversion and the difference in observed performances, for instance.

Biased appraisals may also affect agents' effort choices. This issue is not part of this paper.⁵ Based on data of a financial service firm Bol (2008) empirically observes that biased performance appraisal outcomes influence future efforts. She differentiates between the leniency and centrality bias and shows that lenient ratings positively affect performance improvement. In contrast, the centrality bias has a negative effect on future performance. Further theoretical research may abstain from the typical ex ante perspective of principal agent models but also incorporate consequences for the future of employment relationships.

⁵ See an extended discussion paper version for this issue (Grund/Przemeck 2008).

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Appendix A

The supervisor will maximize the Lagrangian

$$L = \mu[2w + br_i - \beta b(r_i - r_j) + br_j - \alpha b(r_i - r_j)] - v(r_i - p_i)^2 - v(r_j - p_j)^2 + \lambda(r_i - r_j)$$

The resulting Kuhn-Tucker-conditions are

$$\mu b(1 - \beta - \alpha) - 2v(r_i - p_i) + \lambda = 0 \quad (\text{K1})$$

$$\mu b(1 + \beta + \alpha) - 2v(r_j - p_j) - \lambda = 0 \quad (\text{K2})$$

$$\lambda \geq 0, r_i \geq r_j, \lambda(r_i - r_j) = 0 \quad (\text{K3})$$

From adding (K1) and (K2) we obtain

$$\mu b / v + p_i + p_j = r_i + r_j. \quad (\text{K4})$$

Possible solutions include both different and equal reports. If S chooses $r_i > r_j$, it follows from (K3) that the Lagrangian multiplier λ has to be zero. From (K1) and (K2) we obtain the evaluations for agent i and j

$$r_i^{diff} = \mu b(1 - \alpha - \beta) / 2v + p_i \text{ and } r_j^{diff} = \mu b(1 + \alpha + \beta) / 2v + p_j.^6$$

However, the first line of the supervisor's utility function is only valid for the range

$r_i^{diff} > r_j^{diff}$ so that

$$p_i - p_j > \mu b(\alpha + \beta) / v \quad (1)$$

has to hold. Since the term on the right-hand side of inequality (1) is positive, the difference of the (observed) performances has to be sufficiently positive, too. Agent i

⁶ To capture the idea of different reports we will write r_i^{diff} and r_j^{diff} ($i, j = 1, 2$ and $i \neq j$).

has to outperform his colleague to a sufficient amount to compensate for the creation of inequality if S announces $r_i^{diff} > r_j^{diff}$.

S may choose $r_i = r_j$ in some cases, so that the agents cannot suffer from inequality. In this case we either have (I) $\lambda = 0$ or (II) $\lambda > 0$ (see K3).

(I) If $\lambda = 0$ and $p_i - p_j = \mu b(\alpha + \beta)/v$ the reports solving all Kuhn-Tucker-conditions (K1) to (K3) are $r_i^{even} = \mu b(1 - \alpha - \beta)/2v + p_i$ and $r_j^{even} = \mu b(1 + \alpha + \beta)/2v + p_j$, which are equivalent to

$$r_i^{even} = r_j^{even} = r^{even} = \mu b/2v + (p_i + p_j)/2.$$

(II) If S sets $r_i = r_j$ and we have $\lambda > 0$, we also obtain $r_i^{even} = r_j^{even} = r^{even} = \mu b/2v + (p_i + p_j)/2$ from (K4). Subtracting (K1) from (K2) leads to the relevant condition for stating these reports: $p_i - p_j < \mu b(\alpha + \beta)/v$. If this condition is satisfied, the reports r_i^{even} and r_j^{even} solve the Kuhn-Tucker-conditions (K1) to (K3).

Appendix B

If $p_i > p_j$ and S would decide to choose a lower report for agent i or equal reports for both agents, she maximizes the second part of her utility function subject to $r_i \leq r_j$. The relevant Lagrange function is

$$L = \mu[2w + br_i - \beta b(r_j - r_i) + br_j - \alpha b(r_j - r_i)] - v(r_i - p_i)^2 - v(r_j - p_j)^2 + \eta(r_j - r_i)$$

The resulting Kuhn-Tucker-conditions are

$$\mu b(1 + \beta + \alpha) - 2v(r_i - p_i) - \eta = 0 \quad (\text{K1}')$$

$$\mu b(1 - \beta - \alpha) - 2v(r_j - p_j) + \eta = 0 \quad (\text{K2}')$$

$$\eta \geq 0, r_j \geq r_i, \eta(r_j - r_i) = 0 \quad (\text{K3}')$$

From adding (K1') + (K2') we obtain

$$\mu b/v + p_i + p_j = r_i + r_j. \quad (\text{K4}')$$

We show by contradiction that $r_j > r_i$ cannot be a solution to this maximization problem. If $r_j > r_i$ holds, η has to be zero and we obtain $r_i = \mu b(1 + \beta + \alpha)/2v + p_i$ and $r_j = \mu b(1 - \beta - \alpha)/2v + p_j$ from (K1') and (K2'). However, $r_j > r_i$ only holds for $\mu b(1 - \beta - \alpha)/2v + p_j > \mu b(1 + \beta + \alpha)/2v + p_i$ or $p_i - p_j < -\mu b(\beta + \alpha)/v$. This leads to a contradiction since we assume $p_i > p_j$.

Similarly, $r_j = r_i$ and $\eta = 0$ cannot be a solution. For $\eta = 0$ we obtain $r_i = \mu b(1 + \beta + \alpha)/2v + p_i$ and $r_j = \mu b(1 - \beta - \alpha)/2v + p_j$ from (K1') and (K2'). But $r_j = r_i$ only holds for $p_i - p_j = -\mu b(\beta + \alpha)/v$ which again leads to a contradiction. The last possible solution is $r_j = r_i$ and $\eta > 0$. Subtracting (K2') from (K1') leads to $2\mu b(\alpha + \beta) - 2v(r_i - p_i) + 2v(r_j - p_j) = 2\eta > 0$. With $r_j = r_i$ we get $\eta = \mu b(\alpha + \beta) + v(p_i - p_j)$ and the relevant constraint is $p_i - p_j > -\mu b(\alpha + \beta)/v$. The resulting report for both agents is $r^{even} = \mu b/2v + (p_i + p_j)/2$. Since we assume

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4 $p_i > p_j$, the only solution to the maximization problem of the second part of the
5 supervisor's utility function which satisfies all Kuhn-Tucker-conditions is to state equal
6 reports r^{even} for $p_i - p_j > 0$.
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