Altruism and Tournament Incentives in the Workplace

Abstract

This paper studies the effects of tournament incentives with subjective performance measures and the existence of altruism. One of the conclusions of the model is related to a situation where the principal has no altruistic preferences. In such a situation both agents will always exert high effort and the principal will never shirk. However, if the principal has asymmetric altruistic feelings towards his agents, then the results of the model depend on the visibility of the altruism which can be either visible or invisible. Asymmetric altruistic feelings may trigger the principal to grant the bonus payment to the agent he likes most instead of the agent with the highest performance, as it contributes more to his utility. If altruism is invisible then the equilibria depend on the beliefs of the agents based on their priors. A tournament cannot be organized if the agents, based on their priors, believe that the principal will shirk. If those priors indicate the agents that the principal will not shirk, it is still possible that the principal does not keep his promise. A principal may decide to shirk in specific situations and then he will be punished by the agents in subsequent periods. If altruism is visible and the parameters are such that the principal will shirk, then both agents will ex-ante not respond to the bonus payment. Consequently, the principal will not organize a tournament. However, the principal will decide to keep his promise if the punishment of shirking is strong enough and then both agents will respond to the bonus payment by exerting high effort. So, although the agents know that the principal has asymmetric altruistic feelings, it is under specific circumstances still possible to have a tournament where the principal does not shirk and the agents exert high effort. A principal who is considering shirking is more likely to do it if he gives a low weight to the future.

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1. Introduction

Important decisions within firms regarding job promotions, dismissals and bonus payments of the employees often rely on subjective performance evaluations. Subjective measurements make it often impossible to determine what each agent contributed exactly to the production or profits of the firm. Of course, there are enough situations where a principal (manager) is able to measure the performance of his agents (workers) in an objective way. For example, in certain jobs it is possible to simply check the number of units produced by each individual worker. However, objective judgments about individual performance cannot be made if the units produced by the agents are not visible, the agents are working in teams or if the actions of the agents can have different effects on the firm in the short- and the long-term. When such objective measurements are unavailable or not enforceable in court, firms can use supervisor ratings to evaluate the performance of the agents (Frederiksen et al. 2012). Evaluations by the principal can be affected by the social relation between the agent and the principal: principals can be tempted to give a better evaluation to agents they like more instead of awarding the best-performing agent. In other words, the social preferences of the principal may affect the decisions he will make. The first aspect of this paper will focus on the principal's feelings of altruism or spite towards his agents.

The second aspect discussed in this paper is related to tournament theory, where a principal supervises at least two agents and promises to give a bonus or promotion to the best-performing agent. A paper by Malcomson (1984) shows that contracts with payments based on the results of a tournament can provide performance incentives, even if asymmetric information makes it impossible to have payments based on individual output. The model shows that, under specific circumstances, one- and two-period contracts with a fixed wage are inferior to two-period contracts which contain promotion. Moreover, Malcomson (1984) suggests that tournaments give the principal some incentives to honor the bonus payments, even if there are cases where performance can be observed but not verified. The reason is that the outcome and the total fixed payments to the agents are independent of each other.

The presence of asymmetric altruism can lead to other conclusions to this model, because the principal may decide to grant the promotion or bonus payment to the agent he likes most, instead of awarding the subordinate with the best performance. Consequently, the effects of such a tournament can be negative for a firm. A credibility problem can arise because of the use of subjective evaluations: will the principal always be fair and award the best-performing agent or will he grant the 'prize' to the agent he likes most? And are agents still willing to exert more effort if they know that principal's altruism plays a role in the decision made by the principal? This paper will focus on a tournament theory with subjective measurements, where asymmetric feelings of altruism and spite might play a significant role in granting the 'prize' of the tournament to an agent. The main goal of this paper is to study the influence of principal's asymmetric altruism on the behavior of the agents and himself when a firm uses subjective performance data in a tournament.

In the remainder of this first chapter there will be a short review of the related literature regarding subjective evaluations and social preferences on the one hand and the tournament theory on the other hand.

1.1 Subjective performance evaluation

Subjective performance evaluation is a broadly used way of evaluating the agents. A survey by consulting firm Altman Weil for example shows that more than 50 percent of the law firms use (partly) subjective performance measurements. (Altman Weil, 2000)

By using subjective evaluation methods it is possible to overcome limitations related to objective performance measurements which arise in principal-agent relations. The lack of objective performance data is one of the most logical reasons which make evaluations in a subjective way an attractive alternative. Holstrom and Milgrom (1991) named another reason, namely the multi-tasking concerns. In multi-tasking situations agents might change their actions in reaction to objective measurement in such a way that it is beneficial for themselves, but bad for the principal. An example of a typical multi-task casus is at a firm called Sears, which had several auto-repair shops. At Sears, the employees' payments were related to the repairs that were authorized by the customers. Consequently, the mechanics started to mislead the customers by trying to convince them to authorize unnecessary repairs. The actions increased the profits in short-term at the costs of a loss of reputation in the long-term (Patterson, 1992). Furthermore, the high measurements costs may result to be another important disadvantage of objective performance evaluation which can be overcome by the use of subjective performance evaluation.

To overcome such problems which arise with objective evaluations principals and agents are encouraged to rely more on relational contracts. Then, the performance of the agents will be measured in a subjective way (Prendergast 1999; Macneil 1974). However, because subjective performance evaluations cannot be enforced in court simply because a third independent person cannot judge about the fairness of the evaluations[1], the relational contract must be self-enforcing.

Most of the empirical papers regarding subjective performance measurements have focused mainly on the degree of biased subjective evaluations. These empirical papers have studied the relation between subjective evaluation on the one hand and objective performance on the other hand. Such studies suggest a relatively weak relationship between the subjective evaluation and the objective performance. This weak relationship may be influenced by several factors. One of the factors are demographic aspects of the principal and agent like age and gender (Varma and Stroh, 2001; Arvey and Murphy, 1998). An example of this last aspect is that agents by nature already expect higher subjective ratings if they are evaluated by a principal of the same gender (Maas and Torres-González, 2011). Other factors which can influence the evaluations are for example physical attractiveness (Commisso and Finkelstein, 2012).

The degree that players like each other can also be a significant factor of influence. Alexander and Wilkis (1982) studied a case with vocational rehabilitation counselors. They suggest that there is no relation between objective and subjective measures, but that

[1] With objective performance evaluations a third independent person or party can judge about the fairness of the evaluation. The existence of objective data make it for each party clear how much a worker has produced. Everybody can exactly see how much each worker has produced. This means that in a tournament theory with objective measures the decisions can always be taken into court. However, subjective performance evaluations are not based on verifiable data and therefore, it cannot be checked by a third independent party on correctness. Consequently, the principal may have an incentive not to keep his promises.

subjective evaluations tell more about the interpersonal relation than the (quality of the) performance. Thus, by using a subjective evaluation method in a tournament theory it seems to be relevant to take the feelings of altruism or spite of the principal towards the agents into account.

A study by Jacob and Lefgren (2008) shows that a principal can encounter differences in the effectiveness of distinctive agents by using subjective performance evaluation. They investigated a case where teachers are evaluated in a subjective way. Jacob and Lefgren conclude that principals are quite good in identifying the most and least effective teachers (about 10%-20% of the teachers), while they have more difficulties in identifying differences between teachers when they are ‘average’ effective. In the last group it is more likely that altruism will play a role.

The importance of subjective performance evaluation may not be underestimated as the evaluations of the principals have important short- and long-term effects from the firm’s-perspective. The existence of that kind of evaluations may enable for example that a principal will give higher ratings to the agent he likes more instead of taking the performance of the agents into account. Of course, it is possible that the best-performing agent is also the agent who the principal likes most, but it can also be that the principal has highly altruistic feelings towards an agent with lower performance. For that reason it is of added value to investigate how altruism affects the behavior of the principal and agents in a tournament game. In this study it is assumed for simplicity that the performance of the agent does not affect the feelings of altruism or spite of the principal towards the agents. In addition to previous studies, subjective evaluation will now be modelled related to a tournament game, whereas previous papers only look to cases where a tournament game is absent and where the firms use other ways of awarding the agents.

Dur and Tichem (2013) developed a simple dynamic principal-agent model. They conclude that altruism affects the credibility of a threat of dismissal in a negative way. However, feelings of altruism strengthen the credibility of a bonus. In other words, the existence of feelings of altruism of the principal towards his agent makes it more likely that he will give him a bonus and decreases the probability that the principal fires his agent. Dur and Tichem investigated the effects of altruism in a case with one agent and one principal. This study will use most of the factors as used in the study by Dur and Tichem. However, there are some important differences between both papers: for example, the bonus payment in my paper's model is contractible, as evidence in the model of Malcomson (1986) suggests. Another difference is that the agents in my paper are selfish.

1.2 Tournament theory

Lazear and Rosen (1981) developed the tournament theory in the discipline of labor economics. Their work is considered as the one building stones of the analysis of promotions and bonus payments in firms. The tournament theory is nowadays widely used in different disciplines like finance (Huifang and Zhang, 2013), psychology (Nicholas and Kidd, 2013) and sport (Sunde, 2003). Lazear and Rosen (1981) show that with risk-neutral agents the use of a tournament game provides an allocation of resources which is equal as used by efficient piece rate.

Another important paper regarding tournament theory is written by Nalebuff and Stiglitz (1983). They studied the importance of competitive compensation schemes on the performance and work incentives of the agents. Their paper showed that piece rate is inferior to schemes based on tournament theory simply because workers do not like to lose. They will work harder in order not to be the loser of the game instead of that they exert more effort to win the game. In Nalebuff and Stiglitz the performance data is objective and utility due to altruism are absent.

Rosen expanded in 1986 the literature regarding tournament theory by concluding that the prizes must be increasing in the ladder. If the top-ranking prizes are not high enough then the agents who already have succeeded in earlier tournaments will not be motivated to exert again more effort.

The study by Lazear and Rosen (1981) showed that an increase in the spread between the bonus of winning and losing leads to a higher level of effort of the agents. Several other studies show that a larger spread leads to an increase of the effort. (DeVaro, 2006 and Kepes et al., 2009)

Tournament games induce income inequality between the agents, even if those agents are identical. If social preferences are absent and agents only get utility from income, income inequality is not a problem. However, if agents are not only motivated by material self-interest but also by social preferences then the tournament game will be less effective (Loewenstein et al., 1989). Grund and Sliwka (2002) examined tournaments where agents dislike income inequality. They make a distinction between envy (where the loser of the game feel and dislike disadvantageous inequity) and compassion (where the winners of the game dislike advantageous inequity). Grund and Sliwka conclude that as a result of the existence of feelings of inequality the first-best efforts (in absence of envy and compassion) of the agents cannot be reached. Therefore, social preferences result in lower efficiency. In this paper feelings of income inequality among the agents is assumed to be absent.

This paper contributes to the existing literature by studying how a tournament game is affected by different feelings of altruism and spite of a principal towards multiple agents. Both symmetric and asymmetric altruism will be considered.

The structure of this paper is as follows. The next section contains a description of the model and the behavior of the players. Thereafter, the behavior of the principal and the agent will be analyzed in different settings. To conclude, section 4 contains a discussion of implications and addresses some avenues for further research.

2. Model

In this model, a principal (he) supervises N agents (she), where $N = 2$ and each individual agent is denoted by $i = (1,2)$. As existing evidence shows that gender-differences can cause differences in evaluation (Varma and Stroh, 2001) both agents are assumed to have the same gender. Possible differences in principal's altruism between both agents are therefore caused by other factors. Each period, for example every month or quarter, the principal organizes a tournament between both agents. The winner of the tournament will be awarded with an extra bonus payment. The feelings of altruism towards the agents of the principal will be noted by degrees of altruism and spite. The principal can have different levels of altruism towards the agents. Some of the theoretical literature focuses also on the horizontal social preferences, where agents have altruistic or spiteful feelings towards the other agents or co-workers (Grund and Sliwka, 2005). These horizontal social preferences are absent in this study: both agents have no feelings of altruism or spite towards each other or the principal. They are considered selfish. In my study, only hierarchical downwards preferences are examined. Furthermore, it is assumed that the principal and the agents are risk-neutral.

2.1 Utility of the principal

In this model the utilities of the three players are quite important. The utility of the principal can be described as follows:

(1) $$\Pi = \pi + \gamma_1 \mathrm{U}_1 + \gamma_2 \mathrm{U}_2$$

where $\pi = q(e_1) + q(e_2) - \omega_1 - \omega_2 + \theta_1 + \theta_2$ describes the profits of the principal during period T. The first parameter which affects the profits of the principal is the value of output of one of the agents $\left(q(e_1)\right)$, which is a function of the effort of agent 1 in that period. It is assumed that both agents have the same effort-function, thus the same input of effort leads to the same value of output. In order to make clear comparisons between this model and other tournament models without altruism, this paper will, like Lazear and Rosen (1981), introduce an extra factor which affects the output of the agents. This uncontrollable risk can be noted by θ_i and is observable to all players. This random factor arises after the agents have chosen their level of effort. All θ_i are independent and identically distributed with a mean of 0. The risk can be either positive or negative. In other words, the real output of a single agent is the sum of the output due to effort and the positive or negative effect of the risk. Finally, the profits of the principal also depend on the compensation ω_i he pays to his agents. The compensation consists of a fixed salary s_i and on a bonus payment β_1 to the agent who wins the tournament. The losing agent will only receive the fixed salary.

The effort of the agent depends also on the actions of the principal regarding the decision of the winner. Both agents will believe promises of the principal to award the prize to the best-performing agent as long as they expect that the best-performing agent (i.e. the agent with the highest production due to effort plus change caused by risk) indeed wins the tournament. If the agents expect that the principal will grant the prize of the tournament to the agent he likes most instead of the agent with the best performance, both agents will not believe future statements regarding the tournament games. As a result, the agent will punish the principal by exerting less effort. In other words, the value of output depends partly on whether the principal shirks or not: the effort and consequently the output will be lower if the principal shirks $\left(q\left(e_{i|L}\right)\right)$ compared to a situation where the principal keeps his promise $\left(q\left(e_{i|H}\right)\right)$, such that $q\left(e_{i|H}\right) > q\left(e_{i|L}\right)$. So, the effort of the agent depends partly on possible shirking by the principal.

The second part of equation 1 shows the feelings of altruism or spite of the principal towards each individual agent. Parameter γ_i shows the degree of altruism or spite of the principal towards his agent, while U_i gives the utility of agent i. A principal with feelings of altruism towards agent i will give a higher weight (γ_i) to the utility of that agent. Vice versa, a principal with feelings of spite will assign a negative weight (γ_i negative) to the utility of the agent (U_i). It is assumed that $\gamma_i \, \epsilon \, (-1, 1)$, which means nothing more than that the principal cares at the upmost as much as he cares for his own utility. The altruistic feelings if a principal shirks will be denoted by $\gamma_i U_{i|S}$. The altruism if the principal keeps his promise will be noted by $\gamma_i U_{i|KP}$.

The two altruism-parameters γ_i are unrelated to each other: an increase in the altruism-parameter of agent i does not mean that the principal will like agent $-i$ less. Therefore, it is possible that the principal has equal feelings of altruism or spite towards both agents. Another important assumption is that the effort level chosen by the agent will not affect the degree of altruism of the principal.

The altruism of the principal towards the agents can be either visible or invisible. When the agents are able to exactly determine the altruistic values then altruism is called visible. In situations where the agents are not able to exactly identify the altruism of the principal towards the agents, altruism is invisible. In such a situation both agents can only have beliefs based on their priors instead of on the exact value of altruism. The beliefs of the agents based on their priors do not necessarily have to match with the real altruism-parameters and decisions of the principal.

2.2 Utility of the agent

The utility of the individual agent i can be expressed as:

(2) $$U_i = \omega_i - C(e_i)$$

The utility depends on the one hand on the compensation ω_i the agent gets. Recall that the compensation depends on two factors: firstly, the agents receive a fixed salary equal to s_i and secondly, the agents can receive an extra bonus payment of β_1. Secondly, as effort is costly, the utility is negatively affected by the cost-function of effort of the agents $C(e_i)$. Both agents have exactly the same production- and cost-function. It is assumed that the agents are selfish: they do not have feelings of altruism towards their principal, nor to each other.

2.3 Tournament theory model

The next step is to implement the tournament game in the model. In this model, the principal will announce that one of the two agents will get a bonus payment at the end of the period. He promises to grant the bonus payment to the agent who turns out to be the best-performing employee during this period. In case that the principal evaluates using an objective measurement, then the best agent should be the one with the best performance. Since the data is objective it is possible for an independent person to judge about the fairness of the decision made by the principal. However, in the presence of a subjective measurement and asymmetric altruism, the principal may have an incentive to grant the bonus to the agent whom he likes best. In making his decision, the principal will not only take the objective performance of agents into account, but he will also look to his altruism-parameters towards the agent. Therefore, at the moment of the decision the principal will not maximize his expected profits but his expected utility.

2.3.1 Infinite time horizon model

The model is an infinite time horizon model with repeated games. The game starts at $T = 0$ where the principal decides whether to organize or not a tournament. Subsequently, the principal decides whether to hire the agents. Both agents have the same fixed wage, thus $s_i = s_{-i}$. The salary is not affected by altruism. The agent's will get income from a fixed wage and a possible bonus payment if she wins the tournament. The agent will only enter the tournament if his expected utility is larger than her outside option. Thereafter, the agent will choose how much effort he will exert during the period. At the end of the period at $T = 1$ the principal will receive the revenues of the perceived output of the agents. The output is observable by the principal and the agents, but this information about the production is soft and therefore cannot be enforced in court. After observing the output and receiving the revenue the principal names the winner of the tournament and that agent gets an extra bonus payment equal to $\beta_1 > 0$. After the principal named the winner, a new period starts.

The decision of the principal is an important aspect of this model. This decision will depend on the payoffs of shirking versus the payoffs of keeping the promise. If the payoffs of shirking are larger than the payoffs of keeping the promise, then the worst-performing agent will get the highest evaluation rating. However, if the payoffs of keeping the promise are large enough then the best-performing agent receives the best evaluation rating. The agent with the highest evaluation rating will win the tournament and get the bonus payment of β_1.

As already mentioned, this paper is based on an infinite model. The reason for using such a timing is to overcome a credibility problem. This problem arises with a finite model, for example in a one-period model. In that case, at $T = 1$ the principal will grant the bonus to the agent he likes most without even taking the objective performance of the agents into account. Such a decision by the principal happens in that case for two reasons: firstly, the principal has no incentives to look to performance as it is measured in a subjective way and therefore, it cannot be enforced in court. Secondly, the agents cannot punish the principal if he only follows his feelings of altruism towards an agent, because after the decision of the principal the relation between principal and agent is over. Consequently, as the agents already know that performance is not that important, they will not believe the principal when he announces the tournament and promises that he will grant the promotion or bonus to the best-performing agent. At the end, the agents will not respond to the bonus and exert no extra effort.

So, in a finite model there exists an important credibility problem. For that reason an infinite model with repeated games is applied. In this model the agents can judge about the fairness of the decision by the principal. If the principal made an unfair decision, both agents will not believe the principal anymore and decide not to respond to the bonus payments offered by the principal. They will exert less effort in subsequent tournament games because they will choose an effort-level which corresponds to the fixed wage.

2.4. Expected Utility of the agents

Each agent maximizes her own expected utility when choosing an effort-level. The agents are risk-neutral. Before choosing an optimal level of effort, both agents will firstly decide if they want to enter the tournament or not. An agent will only accept the tournament if her expected utility of the tournament is higher than the present value of her outside option, such that:

$$(3) \qquad E(U_i) = \left(1/_r\right)^T \left(s_i + (P)\beta_1 - \mathrm{C}(\mathrm{e}_i)\right) > \bar{U}$$

The expected utility of the agents depends partly on the probability P that they win the tournament and receive a fixed salary and a bonus payment equal to β_1. An agent receives only a fixed wage if she does not win the tournament, which happens with probability $(1 - P)$. Together with the costs of effort the agent's expected utility per period as long as the principal keeps his promise can be denoted as:

$$(4) \qquad E(U_i) = (P)(s_i + \beta_1) + (1 - P)(s_i) - \mathrm{C}(\mathrm{e}_i)$$

$$(5) \qquad E(U_i) = s_i + (P)\beta_1 - \mathrm{C}(\mathrm{e}_i)$$

The agents will maximize their expected utility of equation 5 when choosing the optimal level of effort.

$$(6) \qquad {\partial U_i}/_{\partial e_i} = (\beta_1)\frac{\delta P}{\delta e_i} - C'(e_i) = 0$$

And where:

$$(7) \qquad {\partial U_i^2}\Big/_{\partial e_i^2} = (\beta_1)\frac{\delta^2 P}{\partial e_i^2} - C''(e_i) = 0$$

Since $\beta_1 > 0$, an increase of the probability of winning the tournament will have, ceteris paribus, a positive effect on the expected utility of the agent. The agents are facing more and more costs if they exert more effort. With increasing marginal costs of effort there is a point where the extra benefits of the increased chance of getting bonus payment β_1 are lower than the extra marginal costs of exerting effort.

The expected utility is, ceteris paribus, negatively (positively) affected by an increase (decrease) in the costs of effort.

The probability of winning the tournament, P, depends on the behavior of the principal. The next two subsections will show how the decision of the principal affects the probability P that agent i wins the tournament. The first subsection will show the effects of a fair decision of the principal, while the second subsection will focus on the probability of winning a tournament if the principal is planning to shirk.

If the principal does not keep his promise and grants the bonus payment to the agent he likes more, then both agents will not believe future statements regarding tournament theories anymore. Therefore, both agents will no longer respond to bonus payments in tournament games organized by the principal. The expected utility function of the agents after a shirking action of the principal will be:

(8) $$E(U_i) = s_i - C(e)$$

(9) $$\partial U_i / \partial e_i = -C'(e_i) = 0$$

(10) $$C'(e_i) = 0$$

Equation 10 shows that the agents will not exert effort after the principal shirked.

3. How do the agents respond to the decision of the principal?

The decision of the principal will affect the behavior of the agents. This subsection will show how both agents will respond to the decision of the principal regarding the winner of the tournament. The first subsection will focus on the effects of a principal who keeps his promise, while the second subsection describes how both agents react on a shirking principal in combination with the visibility of altruism.

3.1. How do the agents behave if the principal keeps his promise?

During this subsection it is assumed that the principal keeps his promise and decides to grant the bonus payment β_1 to the best-performing agent. Recall that the best-performing agent is the one with the highest output due to effort plus the effect of risk.

As seen earlier, both agents will maximize their expected utility:

(11) $$E(U_i) = (P)(s_i + \beta_1) + (1 - P)(s_i) - \mathrm{C(e)}$$

(12) $$E(U_i) = s_i + (P)\beta_1 - \mathrm{C(e)}$$

(13) $$\partial U_i / \partial e_i = (\beta_1)\frac{\delta P}{\delta e_i} - C'(e_i) = 0$$

As the principal makes a fair decision by granting the prize of the tournament to the agent with the highest output, the probability P of winning the tournament now depends on the production of both agents. In other words, both agents are aware that the probability P that agent i wins the tournament is equal to the probability that during that period his output is larger than the output of his opponent agent – i:

(14) $$P = prob\big((q(e_i) + \theta_i) > (q(e_{-i}) + \theta_{-i})\big)$$

As both agents have the same effort function it is possible to simplify equation 14 to:

(15) $$P = prob\left(\big((e_i) + \theta_i\big) > \big((e_{-i}) + \theta_{-i}\big)\right)$$

For convenience, the probability P that agent i wins the tournament will be set as follows:

(16) $$P = {}^1/_2 + \pi(e_i - e_{-i})$$

Where parameter $\pi > 0$ describes the noise of effort. If $\pi = 0$, then the probability P of winning the tournament depends completely on luck, such that $P = {}^1/_2$ and both agents will not exert any more effort.

Agent i will maximize her expected utility of equation 12. By substituting equation 16 into 13:

(17) $$\partial U_i / \partial e_i = \frac{\delta\left({}^1/_2 + \pi(e_i - e_{-i})\right)}{\delta e_i}(\beta_1) - C'(e_i) = 0$$

(18) $$C'(e_i) = \pi\beta_1$$

Agent i's optimal effort increases with the bonus payment, but decreases with the costs of effort. More noise (decrease of π) also decreases the effort of the agent. Agent $-i$ will have the same effort-function. Symmetry implies that both agents will exert the same level of effort during the period: $e_i = e_{-i}$. Consequently, as both agents have the same effort-function it is possible to set $q(e_i) = q(e_{-i})$. Both agents will therefore have the same output due to effort. It also means that the agent with the highest risk-outcome θ_i will win the tournament as long as the principal keeps his promise. Given that both agents exert the same amount of effort, equation 16 shows that the probability P of winning the tournament will be for both agents $P = {}^{1}/_{2}$ in equilibrium. The probability is equal to the probability that the risk-outcome θ_i is larger than the risk-effect θ_{-i} of agent $-i$.

These results are the same for situations where altruism is visible and invisible with small asymmetric differences based on the priors of the agents. If altruism is visible both agents know that the principal will keep his promise and therefore, they will exert high effort. If altruism is invisible in combination with priors of the agents that the difference between γ_i and γ_{-i} will not affect the decision of the principal, then the agents expect a fair decision. For that reason they will exert high effort as long as the principal keeps his promise.

If altruism is invisible and the agents expect that based on their priors the principal will shirk (because they think that the difference between γ_i and γ_{-i} is large enough), then both agents will not respond to the tournament bonuses offered by the principal. In other words, even if the principal keeps his promise both agents can, based on their priors, decide not to exert extra effort.

In a world with invisible altruism, the decision of the agents to exert either high or low effort depends completely on their priors. If the priors indicate that the principal will shirk, then both agents will never respond to the bonus payment as they expect that effort (which is costly) will not play a role in the decision of the principal regarding the winner. Vice versa, the agents will respond to the bonus payments by exerting more effort if they expect that the principal will keep his promise. Recall that the priors do not necessarily have to match with the real altruism. Of course, another risk-attitude (instead of risk-neutral) can change the behavior of the agents.

3.2 How do the agents respond to a shirking principal?

The principal may also decide to shirk. A shirking action of the principal arises if he grants the bonus payment to the worst-performing agent. Both agents are aware that the principal will shirk if his payoffs of shirking exceed the payoffs of keeping the promise. The principal will not even take a look to the output, as the benefits of shirking are larger than the costs related to shirking. The next step is to look what the agent's behavior will be when they are aware that the principal will shirk. The behavior of the agent when a principal is planning to shirk will be studied in situations where altruism is visible and where altruism is invisible.

3.2.1. Agent's response when altruism is visible

In this subsection it is assumed that altruism is visible to both agents and that the principal is planning to shirk. Once again, in order to choose the optimal level of effort both agents will maximize their expected utility. The expected utility of individual agent i is:

$$E(U_i) = (P)(s_i + \beta_1) + (1 - P)(s_i) - \mathrm{C}(\mathrm{e}_i) \tag{19}$$

$$E(U_i) = s_i + (P)\beta_1 - \mathrm{C}(\mathrm{e}_i) \tag{20}$$

The probability P of winning a tournament will play again an important role. In the previous situation where the principal kept his promise it was quite clear that the probability of winning the tournament was based on the probability that one of the agents had the highest output. However, when the principal is planning to shirk then the probability of winning completely depends on the altruism-parameters. The agent with the highest altruism will win for sure, as shirking gives the principal a higher expected utility than keeping the promise. The probability that agent i wins the tournament will be:

$$P = Prob(\gamma_i > \gamma_{-i}) \tag{21}$$

As the probability is not affected by effort and there is no marginal benefit of effort then the optimal level of effort of agent i will be:

$$(22) \qquad {}^{\partial U_i}\!/_{\partial e_i} = \frac{\delta Prob(\gamma_i > \gamma_{-i})}{\delta e_i}(\beta_1) - C'(e_i) = 0$$

$$(23) \qquad C'(e_i) = 0$$

Equation 23 shows that as effort is not important in the decision of the principal, both agents will not respond to the bonus payment offered by the principal. The visibility of altruism in combination with a shirking decision of the principal leads to a situation where both agents will ex-ante decide not to exert effort, as they know that the principal will shirk. The agent with the lowest altruism knows that she will never win the tournament, while principal's favorite agent knows that she will win the tournament for sure and that the amount of effort is not interesting factor. Consequently, the principal will not organize a tournament game as both agents do not believe his promise that he will award the best-performing agent. More evidence for this last statement will be shown later in this paper. As the principal does not organize a tournament, there will not be named a winner.

In this situation not only the principal has a credibility problem, but also the agent he likes most. Of course, the agent with the highest altruism-parameter can say to the principal that she will respond to the bonus payment. But, as effort is costly and the agent already knows that she will win the tournament, then she is always triggered to shirk and not keep her promise of responding to the bonus payment by exerting more effort. So, also the agent has to deal with a credibility problem which arises if the principal shirks.

3.2.2. Agent's response when altruism is invisible

In this subsection it is assumed that altruism is invisible and the principal is planning to shirk. If altruism is invisible, both agents have beliefs only based on their priors whether the asymmetric altruism is big enough to affect the decision of the principal or not. If the asymmetric difference is low enough from agent's point of view, both will exert high effort as they expect a fair decision of the principal. Although the altruism is invisible, they are still able to judge about the fairness of the decision of the principal. If the principal grants the bonus payment to the worst-performing agent, both agents know that the principal has not kept his promise. As already shown, both agents will exert the same amount of effort. Differences in output of the agents are therefore caused by the risk-outcomes. So, if the agent with the lowest risk-outcome wins the tournament then both agents are aware that the principal shirked. Consequently, they will not believe future statements regarding bonus payments in subsequent tournament games anymore.

In a case where the agents expect that the asymmetric difference in altruism is low enough, both agents exert in equilibrium ex-ante high effort even if the principal shirks. In such a case, both agents expect based on their priors that the principal will keep his promise and they will exert effort equal to equation 18. After the shirking action of the principal, both agents will punish the principal by not responding anymore to the bonus payment and not exert effort anymore.

It is also possible that both agents expect based on their priors that the difference in altruism is large enough to affect the decision of the principal in such a way that he will shirk. In this case both agents will not respond to the bonus offered by the principal.

To conclude, the previous subsection showed that if the principal is planning to shirk then the agents will punish him ex-ante if altruism is visible by not exerting extra effort. The same effect arises when altruism is invisible and the agents expect that the difference in altruism will affect his decision. If those priors are such that both agents expect that the principal will keep his promise then both agents will exert high effort even if the principal shirks. Only after an unfair decision of the principal both agents are able to punish a shirking principal.

	Altruism visible	Altruism invisible Prior: $\gamma_i > \gamma_{-i}$ small enough to not affect decision	Altruism invisible Prior: $\gamma_i > \gamma_{-i}$ large enough to affect decision
Principal plans to keep his promise	Agents respond always to bonus by exerting more effort	Agents respond always to bonus by exerting more effort	Agents do ex-ante and ex-post not respond to bonus payment
Principal plans to shirk	Agents do ex-ante and ex-post not respond to bonus payment	Agents respond ex-ante to bonus by exerting more effort, ex-post they do not respond	Agents do ex-ante and ex-post not respond to bonus payment

Table 1: Responses of agents

3.3. Expected Utility of the principal

The principal will, before announcing the tournament, start with investigating if a tournament will lead to a higher utility. The principal will organize a tournament if the payoffs of a tournament are larger than the costs of organizing that tournament. The principal faces on the one hand an increase in the output by the agents, but on the other hand he has to pay a bonus payment to the best-performing agent. Moreover, the altruistic feelings play an important role in principal's decision of organizing a tournament or not. The effect can be either positive or negative, depending on the parameters of the altruism.

$$(24) \qquad \sum_{i=1}^{2} E\big(q\big(e_{i|H}\big) + \gamma_i U_{i|Tourn.} - s_i - \beta_1\big) > \sum_{i=1}^{2} E\big(q\big(e_{i|L}\big) + \gamma_i U_{i|No\ Tourn.} - s_i\big)$$

Equation 24 can be rewritten to a condition which has to be satisfied before the principal organizes a tournament:

$$(25) \qquad \sum_{i=1}^{2} E\big(q\big(e_{i|H}\big) - q\big(e_{i|L}\big) + \gamma_i U_{i|Tourn.} - \gamma_i U_{i|No\ Tourn.}\big) \geq (\beta_1)$$

Equation 25 shows that the increase in output from $(q(e_{i|L})$ to $q(e_{i|H}))$ is one of the factors which affect the decision of the principal to announce a tournament or not. Not only the production of the agents but also the altruism of the principal towards the agents $(\gamma_i U_i)$ plays an important role. A tournament game will be beneficial to the agent if the marginal benefits of the bonus exceed the marginal costs of effort. If the marginal benefits are high enough, then altruistic feelings towards both agents will have a positive effect on the probability of a tournament. Even if the principal is very spiteful (i.e. $\gamma_{1,2} = -1$) towards his agents he will still organize a tournament if the increase of output minus the bonus payment is high enough. Vice versa, a principal with high feelings of altruism towards both agents can still decide not to organize a tournament if the output-increase minus the costs of a bonus payment are low enough. In the remainder of this chapter it is assumed that condition 27 is satisfied and therefore, the principal announces a tournament. It is also assumed that both agents accept the offer of the principal and therefore they will enter the tournament game.

It is also possible that the principal gives a higher fixed wage to the agents to compensate them for a possible loss of utility of the tournament.

The visibility of the altruism will play an important role in the principal's decision to shirk or not. If altruism is visible, both agents know how altruistic the principal is towards both of them. If agents only can base the altruism on their priors, then altruism is called invisible.

3.3.1. Behavior of principal with invisible altruism

For now it is assumed that altruism is invisible. The priors of the agents are important if altruism is invisible. If the agents expect that the difference in altruism is large enough to affect the decision of the principal, then both agents will not respond to the bonus offered in the tournament. Consequently, the principal will decide not to organize a tournament. So, as long as the agents expect, based on their priors, that the principal will shirk there will be no tournament. As the principal does not organize a tournament, it also makes it impossible to check whether a principal keeps his promise or not.

Another option is that the priors of the agents indicate them that the principal will not decide to shirk. If this is the case, the agents will respond to the bonus payments as long as the principal keeps his promise, making it possible to study when a principal will shirk. The principal will only consider shirking if the best-performing agent is not the agent he likes most. If the agent with the highest output is also the agent with the highest altruism-parameter then the principal has no single reason to shirk as it only hurts him. The principal will consider shirking if and only if:

(26) $$\gamma_i > \gamma_{-i} \; and \; q(e_i) + \theta_i < q(e_{-i}) + \theta_{-i}$$

For the remainder of this subsection it is assumed that the conditions under 26 are satisfied and therefore, the principal will consider shirking. Subsequently, the principal will shirk if and only if the payoffs of shirking are larger than the payoffs of keeping his promise. In other words, the one-time payoffs of shirking plus the lower future payoffs of such an unfair decision must exceed the one-time payoffs of keeping the promise plus the higher future payoffs of a fair decision.

(27) $$\sum_{i=1}^{2}\left(\gamma_i U_{i|S} + E\sum_{T=1}^{\infty}\left(1/_{r}\right)^{T}\left(q(e_{i|L}) + \theta_i + \gamma_i U_{i|S}\right)\right)$$
$$> \sum_{i=1}^{2}\left(\gamma_i U_{i|KP} + E\sum_{T=1}^{\infty}\left(1/_{r}\right)^{T}\left(q(e_{i|H}) + \theta_i + \gamma_i U_{i|KP} - (\beta_1)\right)\right)$$

Where $\gamma_i U_{i|S}$ in equation 27 is used to denote the altruism-effect if the principal shirks, while $\gamma_i U_{i|KP}$ shows the altruism-outcome after keeping the promise. The principal will discount future utility with discount factor r. At $T = 1$ the principal will have to make a decision between shirking and keeping his promise. As altruism is assumed invisible, both agents can only punish the principal ex-post. The one-time utility of principal's favorite agent i, who will receive the bonus payment, if the principal shirks is equal to $U_{i|S} = (s_i + \beta_1 - C(e_i))$. The second participating agent (agent $-i$) will only receive a fixed salary and therefore have a one-time utility of $U_{i|S} = (s_{-i} - C(e_{-i}))$ if the principal shirks. Both agents will in the future only receive a fixed wage as both agents will not respond to future bonuses after a shirking action and the principal will not organize a tournament.

(28) $$E\sum_{T=1}^{\infty}\left(1/_{r}\right)^{T}\left(U_{i,-i|S}\right) = E\sum_{T=1}^{\infty}\left(1/_{r}\right)^{T}\left(s_{i,-i}\right)$$

If the principal keeps his promise and grants the bonus payment to best-performing agent $-i$ then the one-time utility of principal's favorite agent i will be $U_{i|KP} = (s_i - C(e_i))$. The best-performing agent $-i$ will receive the bonus payment if the principal keeps his promise and therefore her utility will be $U_{-i|KP} = \left(s_{-i} + \beta_1 - C(e_{-i})\right)$. A fair decision by the principal also leads to a situation where both agents will respond to the bonus payment in subsequent periods. The future utility of both agents i and $-i$ if the principal keeps his promise will be:

(29) $$E\sum_{T=1}^{\infty}\left(1/_{r}\right)^{T}\left(U_{i,-i|KP}\right) = E\sum_{T=1}^{\infty}\left(1/_{r}\right)^{T}\left(s_{i,-i} + P_{i,-i}\beta_1 - C(e_{i,-i})\right)$$

Where $P_{i,-i}$ is the probability that agent $i, -i$ wins the tournament. In the previous subsection it is shown that as long as the principal keeps his promise both agents will set the probability equal to $P_{i,-i} = P = {}^{1}\!/_{2}$. The next step is to substitute all utilities of the agents into the equation 27 to check when the principal will shirk:

$$(30) \qquad (\gamma_i - \gamma_{-i})\beta_1 + E\sum_{T=1}^{\infty}\left({}^{1}\!/_{r}\right)^{T}\Big(q(e_{i|L}) + q(e_{-i|L}) + \theta_i + \theta_{-i} - q(e_{i|H}) - q(e_{-i|H}) - \gamma_i\left({}^{1}\!/_{2}\,\beta_1 - C(e_i)\right) - \gamma_{-i}\left({}^{1}\!/_{2}\,\beta_1 - C(e_{-i})\right) + \beta_1\Big) > 0$$

Equation 30 gives some conclusions regarding the decision of the principal if altruism is invisible. The one-time utility of shirking is shown by $(\gamma_i - \gamma_{-i})\beta_1$. If the principal has asymmetric feelings of altruism towards both agents (i.e. $\gamma_i > \gamma_{-i} > 0$) then he is on the one hand more likely to shirk as the one-time utility of shirking increases his own utility. It is on the other hand less likely that the principal will shirk as the long-term payoffs influence his utility in a negative way. If the principal shirks he will have higher one-time utility gain due to granting the bonus-payment to the agent with the highest γ_i, but in the future he is not able to pay the bonus payment as the agents will not respond to his bonus offers anymore. So, the punishment of the agents not only contains a lower output ($q(e_{i|H})$ to $q(e_{i|L})$) but also the loss of future utility due to altruism.

It means that the discount rate r plays, ceteris paribus, an important role in the decision of the principal. If the future is more important to the principal (discount rate r is low) then it is less likely that he will shirk. The principal prefers the future payoffs of keeping his promise more than the one-time payoffs of shirking. However, if the principal gives a low weight to the future (discount rate r is high) then he is tempted more to shirk, as the future is less important to the principal.

An increase in the difference of the altruism towards the agents (such that $(\gamma_i - \gamma_{-i})$ is increasing) has also two effects: firstly, the principal will be more likely to shirk. The reason is that shirking is becoming more interesting as the utility of the principal is increasing in the utility of the agent. Secondly, this effect is weakened by the loss of future payoffs. So, the exact effect of an increase in the difference of altruism depends, ceteris paribus, on the discount rate.

Of course, it also possible that the principal has feelings of spite towards the agents (e.g. $0 > \gamma_i > \gamma_{-i}$). Also with such negative altruism feelings the effects are twofold. However, the one-time payoffs of the bonus are now negative which make it less likely to shirk. The future payoffs make it more likely that a spiteful principal will shirk. The reasoning behind these two conclusions is that the principal does not like that the agent gets a bonus now as it has a negative effect on his own utility. The discount rate plays again an important role.

An increase of the bonus payment has also different effects on the decision of the principal. First of all, an increase of the bonus payment β_1 makes it, ceteris paribus, on the short-term part of the equation ($(\gamma_i - \gamma_{-i})\beta_1$) more likely that a principal with altruistic feelings will shirk. A shirking principal will get a higher one-time utility if β_1 increases. Secondly, if he keeps his promise he will in the future also have to pay bonuses to the agents. The future bonus payments can be seen as a cost to the principal and therefore, an increase makes it more likely that the principal will shirk to avoid these future costs. Thirdly, these two effects are weakened by the future benefits of keeping the promise.

The principal not only has some costs in the future, but he can also have some benefits due to the fact that agent i wins that bonus payment in the future with probability $1/_2$. Moreover, also agent $-i$ can win the tournament with probability $1/_2$. Suppose that $\gamma_i > \gamma_{-i}$, $\gamma_i = 1$ and $\gamma_{-i} > 0$, then the principal will receive with probability $P = 1/_2$ the costs of the future bonus payment completely back as gain in utility if agent i wins the tournament. However, if agent $-i$ wins the tournament the principal will not receive the total costs of bonus with gain of utility due to altruism. Only if the benefits of the increase in output due to effort are large enough the costs of the bonus will be covered. It also shows that if $1 > \gamma_i > \gamma_{-i}$ the principal will never receive the costs of the future bonus payments completely back as benefits due to altruism and an increase in the output due to effort is needed to cover the costs.

The effect of the punishment of the agents if he decides to shirk can be shown by the difference between high $(q(e_{i|H}))$ and low output $(q(e_{i|L}))$. An increase in the difference of production caused by the punishment will make it less likely that the principal shirks.

The decision of the principal is also affected by the costs of effort $C(e_i)$ of the agents. An increase of the costs of effort will make it, ceteris paribus, more likely that the principal will shirk if he has altruistic feelings towards the agents. The reasoning behind this statement is that the costs of effort have a negative effect on the utility of the agents. Consequently, as the principal is altruistic towards his agents these costs will also have a negative effect on his own utility. If the principal is spiteful then an increase of the costs of effort will increase his utility and therefore make it less likely that he will shirk; keeping his promise means that the agents will exert costly effort in the future, which has a positive effect on the utility of the principal.

3.3.2. Equilibria with invisible altruism

The next step is to get the equilibria in case that altruism is invisible to the agents. As already shown there will be an equilibrium where the agents do not respond to the bonus payments if they believe that based on their priors the principal will shirk. Consequently, the principal will not organize a tournament as both agents will not respond. Even if the principal has no stronger social preferences for one of the agents $(\gamma_i = \gamma_{-i})$, it is possible that the agents belief that the principal has such asymmetric altruism that it will affect his decision.

In case that altruism is invisible to both agents and their priors indicate that principal's decision will not be affected by asymmetric altruism, both agents will respond to the bonus payment of the principal. Suppose for now that the principal has no asymmetric altruism, such that $\gamma_i = \gamma_{-i}$. In this case he will never be considering shirking as equation 26 is not satisfied. Moreover, in case that the principal has no stronger social preferences over one of the agents it is also impossible that the payoffs of shirking exceed the payoffs of keeping the promise (equation 27 and 30). In other words, the principal will never shirk.

As already shown, the agents will exert high effort as long as the principal keeps his promise. To conclude, if altruism is invisible (where agents expect that the principal will keep his promise) and the principal has no stronger social preferences for one of the agents, then an equilibrium exists where the principal always keeps his promise, both agents exert always high effort and win the tournament with probability $P = {}^{1}/_{2}$.

When the principal has social preferences over one of the agents ($\gamma_i > \gamma_{-i}$) and the agents expect that the principal will keep his promise then an equilibrium exists where the principal shirks if and only if the payoffs of shirking exceed the payoffs of keeping the promise (Equation 30). Both agents exert high effort as long as the principal keeps his promise. When the principal shirks, both agent will ex-post punish him by not responding anymore to the bonus payments offered in the tournament.

	Altruism invisible **Prior: $\gamma_i > \gamma_{-i}$ small enough to not affect decision**	**Altruism invisible** **Prior: $\gamma_i > \gamma_{-i}$ large enough to affect decision**
Principal's altruism: $\gamma_i = \gamma_{-i}$	• Agent's always exert high effort; • Principal never shirks;	• Agent's will never respond to bonus; • Principal does not organize tournament;
Principal's altruism: $\gamma_i > \gamma_{-i}$	• Agent's exert ex-ante high effort; • Agents exert ex-post high effort as long as principal keeps promise. If not, low effort; • Principal shirks if equations 26 and 30 are satisfied;	• Agent's will never respond to bonus; • Principal does not organize tournament;

Table 2: equilibria with invisible altruism

3.4.1. Behavior of principal with visible altruism

From now on it is assumed that the altruism is visible to the agents. The agents are now aware that the principal may decide to shirk if he has social preferences over one of his agents.

In the previous subsection it is already shown that the agents will ex-ante decide not to exert effort if they believe that the principal is planning to shirk. The utilities of the agents will therefore be different in a situation where altruism is visible compared to the previous situation where altruism was invisible. If altruism is visible a shirking principal cannot receive one-time utility related to the bonus payment as the agents do not respond to it. The agents will therefore only get a fixed wage. In other words, the agent's utility of a shirking principal will be $U_{i,-i|S} = \left(s_{i,-i}\right)$. All other utilities will not change compared to the situation where altruism was invisible.

By substituting the utilities into equation 27:

(31)
$$-\gamma_i\left(-C(e_i)\right) - \gamma_{-i}\left(\beta_1 - C(e_{-i})\right)$$
$$+ E\sum_{T=1}^{\infty}\left({}^1\!/_r\right)^T \left(q(e_{i|L}) + q(e_{-i|L}) + \theta_i + \theta_{-i} - q(e_{i|H}) - q(e_{-i|H})\right.$$
$$\left. - \gamma_i\left({}^1\!/_2\,\beta_1 - C(e_i)\right) - \gamma_{-i}\left({}^1\!/_2\,\beta_1 - C(e_{-i})\right) + \beta_1\right) > 0$$

It is assumed that the principal likes the worst-performing agent i more that the best-performing agent $-i$. Equation 31 shows the effect of the visibility of altruism on the decision of the principal. The expected future payoffs will not change compared to the previous situation where altruism was invisible (equation 30). Only the one-time utility of the agents will change compared to equation 30: the most important difference is that the principal is not able to grant the bonus payment to agent i as both agents will not respond ex-ante to the bonus-payment as they are aware that the decision is only based on altruism and therefore, production does not matter. Consequently, the principal will not organize a tournament as both agents will not respond to the bonus. Only if the principal is planning to keep his promise, both agents will respond. The one-time payoffs will therefore depend on the altruism and the costs of effort of principal's favorite agent and on the altruism of the principal towards the other agent $-i$, the costs of effort of $-i$ and the bonus payment. Recall that in the previous situation the (invisible) altruism depended only on the difference in altruism and the bonus payment towards both agents.

Comparing equation 31 where altruism is visible with equation 30 where altruism is invisible leads to one important conclusion: ceteris paribus, a principal with altruistic feelings will be more likely to shirk if altruism is invisible. The reason is that with invisible altruism the principal is only punished ex-post, while with visible altruism he is punished ex-ante and ex-post.

A principal with feelings of altruism towards agent i will again cause a two-fold effect. The principal will be more likely to shirk if γ_i is high as he does not like the costs of effort of the agent. So, the principal knows that if he shirks both agents will not exert effort and therefore he may be tempted to shirk if the costs of effort of an agent he likes are increasing. But again, the principal is aware that if he shirks the agents will in the future not believe his promise of a bonus payment. So, a principal with altruistic feelings has some one-time incentives to shirk because of the costs of effort but on the long-term he has incentives to keep his promise because of the existence of a possible bonus payment.

If the principal decides to shirk, he will not organize the tournament as the condition that he will announce a tournament if the benefits of a tournament are larger than the costs of that tournament is not satisfied. Given that the agents do not respond to the tournament bonus payment, it is possible to set $q(e_{1,2|H}) = q(e_{1,2|L})$. Together with a bonus payment $\beta_1 > 0$:

(32) $$\sum_{i=1}^{2} E\big(q(e_{i|H}) - q(e_{i|L}) + \gamma_i U_{i|Tourn.} - \gamma_i U_{i|No\ Tourn.}\big) \geq (\beta_1)$$

(33) $$E(\beta_1) > \sum_{i=1}^{2} E\big(U_{i|Tourn.} - \gamma_i U_{i|No\ Tourn.}\big)$$

Where the difference between $\gamma_{i,} U_{i,|Tourn.}$ and $\gamma_i U_{i|No\ Tourn.}$ is equal to the bonus payment to the best-performing agent, who has the lowest altruism. The difference can be denoted by: $\gamma_{-i}\beta_1$. Given that the maximum value of $\gamma_{i,-i} = 1$ and the assumption that $\gamma_i > \gamma_{-i}$, it is possible to set that $\gamma_{-i} < 1$. In other words, the costs of the bonus payment will be higher than the increase in utility due to altruism:

(34) $E(\beta_1) > \gamma_{-i}\beta_1$ where $\gamma_{-i} < 1$

If the principal decides to shirk (equation 31), he will never organize a tournament because condition 32 is never met. So, the conclusion is that if altruism is visible to the agents it is still possible that the principal keeps his promise. However, for certain values the principal will decide to shirk, consequently the agents will not respond to the bonus payments offered by the principal. Finally, the principal will not organize the tournament.

3.4.2. Equilibria with visible altruism

This analysis will end again by setting up the equilibria in case that altruism is visible. Symmetric altruism, such that $\gamma_i = \gamma_{-i}$, will lead to an equilibrium where the principal will always keep his promise. Both agents are fully informed and therefore aware that the principal will never consider shirking or that he is triggered to shirk as equations 26 and 31 are never satisfied. Therefore, all agents know that the principal will always make a fair decision and that the probability of winning depends on the output. As explained earlier, if altruism is visible and the principal keeps his promise then both agents will exert always high effort (equation 18). To conclude, if altruism is visible and the principal has no social preferences for one of the agents then an equilibrium exists where the principal will always keep his promise, both agents will exert the same amount of high effort and will receive the bonus payment with probability $P = {}^{1}/_{2}$.

These results show an important aspect of the use of tournament theories in combination with subjective performance data: if the principal likes one of the agents as much as the other agent then the results of the tournament game are exactly the same as in a situation with objective performance data as described in Lazear and Rosen (1981). This result is driven by the fact that the principal is not triggered to deviate from his promise. As altruism does not play a role in assigning a winner, the principal will always base his decision on the output of the agents. These results are logical, as in both papers the principal will not look to altruism but only to the objective output. Even if objective data is unavailable, the same results can be achieved if a principal likes both participating agents in exactly the same way.

In a situation where the principal has asymmetric altruistic feelings towards his agents ($\gamma_i > \gamma_{-i}$) there will be an equilibrium where the principal will shirk if he likes the worst-performing agent most and if the payoffs of shirking exceed the payoffs of keeping the promise (equation 31). If the principal is triggered to shirk, both agents will ex-ante not respond to the bonus payment offered by the principal. Therefore, a tournament will not be organized. If equation 31 is not satisfied and the principal keeps his promise, then both agents will decide to respond to the bonus payment by exerting effort equal to equation 18. The principal is now able to organize a tournament. In equilibrium, the agents will respond to the bonus payment and they will win the tournament with probability $P = {}^{1}/_{2}$.

Table 3 gives a short view on all equilibria of this chapter. A principal without social preferences over one of the agents can only organize a tournament if the agents do not expect based on their priors that altruism will affect his decision. These results are the same if the principal has asymmetric altruism. A principal with asymmetric feelings who is planning to shirk cannot organize a tournament if altruism is visible as agents will punish him ex-ante and ex-post. However, although the principal has asymmetric feelings which trigger him to shirk, he is still able to organize a tournament if the agents believe that the asymmetric altruism will not affect his decision. The agents are then only able to punish the principal ex-post.

	Altruism visible	Altruism invisible Prior: $\gamma_i > \gamma_{-i}$ small enough to not affect decision	Altruism invisible Prior: $\gamma_i > \gamma_{-i}$ large enough to affect decision
Principal's altruism: $\gamma_i = \gamma_{-i}$	• Agent's always exert high effort; • Principal never shirks;	• Agent's always exert high effort; • Principal never shirks;	• Agent's will never respond to bonus; • Principal does not organize tournament;
Principal's altruism: $\gamma_i > \gamma_{-i}$	• Agent's responds only to bonus if principal is planning to keep his promise. If not, low effort; • Principal shirks if equations 26 and 31 are satisfied;	• Agent's exert ex-ante high effort; • Agents exert ex-post high effort as long as principal keeps promise. If not, low effort; • Principal shirks if equations 26 and 30 are satisfied;	• Agent's will never respond to bonus; • Principal does not organize tournament;

Table 3: All equilibria with visible and invisible altruism

4. Conclusions

This study shows a new insight related to the tournament theory. In addition to existing literature this paper focuses on cases in tournament theory where the performance is measured in a subjective way instead of with objective measurements.

A first conclusion of this paper is that a tournament does not provide incentives if altruism is visible and sufficiently asymmetric so that the principal is expected to shirk.

If altruism is invisible it is possible that agents expect that the principal will keep his promise, while in reality is he plans to shirk. A principal is more likely to shirk if the altruism is invisible (with agents expecting that asymmetric altruism is not affecting his decision) instead of visible. With such invisible altruism the principal is able to grant the prize to the agent he likes most instead of to the best-performing agent. If altruism is visible, then such a shirking action will be ex-ante seen by the agents and they will not respond to the bonus.

A principal will be more likely to shirk if the weight he assigns to the future is low. With a low discount rate, the one-time utility of shirking becomes more important to him. If the future is important to the principal, then he will be less likely to shirk as the future payoffs of keeping the promise are more important to him.

The principal and the agents will enter the tournament if and only if specific conditions are met. The principal will choose to organize a tournament if the utility gained by organizing exceeds the loss of utility caused by the tournament. The agents will accept and enter the tournament if the expected utility of the tournament is larger than their outside option. This paper shows that the condition of the principal cannot be satisfied if the altruism is visible to the agents and the parameters are such that the principal will shirk: a tournament cannot be organized as the agents will not respond to the bonus payment, partly because they are now the ones with a credibility problem. Consequently, the principal will not organize the tournament game. It is also been shown that if the parameters do not induce the principal to shirk that then the tournament can take place without any problem. The results in such a situation are exactly the same as the results of a tournament game without altruism: the principal keeps his promise and the agent exerts high effort.

If the principal has no stronger altruistic feelings towards one of the agents then the results are the same as in a case with objective performance data as long as altruism is invisible and the priors are such that the agents expect that the principal will not shirk. The principal will always make a fair decision and both agents will exert high effort.

There are some limitations related to this paper. The first limitation is the absence of a relation between production and altruism. It is interesting to allow the model for changes in altruism which are caused by the production in the previous period. It is logical to think that a principal will feel more altruistic feelings to an agent who exert a high level of effort. Another limitation of this study is the lack of practical evidence. Most of the conclusions pointed out in this paper are mainly based on theoretical evidence and assumptions. Therefore, it would be interesting to investigate this model in a practical setting.

A third limitation is the simplicity of this model as the firm has only a principal and two agents. Adding more agents would not give shocking new insights or results but the introduction of several new levels above the principal could change the behavior of the principal and agents. If, for example, the principal's wage, bonus payments or promotion chances are (partly) based on the output of his agents then the principal's decision will be influenced more by the payoffs than by the altruism-utility. Even more, additional levels could give rise to a new extra punishment if the principal does not keep his promise. As most of the larger firms have a lot of levels it is interesting to take a further look into the mechanisms which play a role in tournament games with subjective data performance.

Another interesting point for further research lies in the information of the agents. Now, they know everything or nothing, but it can be interesting to study their behavior if they know only their own altruism. Lastly, it is also interesting to investigate in more detail the effect of an agent with altruistic or spiteful feelings towards the principal.

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