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Oleg Shchetinin

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Department of Economics
School of Business, Economics and Law at University of Gothenburg
Vasagatan 1, PO Box 640, SE 405 30 Göteborg, Sweden
+46 31 786 0000, +46 31 786 1326 (fax)
www.handels.gu.se info@handels.gu.se

Altruism and Career Concerns *

Oleg Shchetinin†

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Abstract

The paper studies the impact of altruism on Agent's motivation in the career concerns model. I show that career concerns incentive is lessened by altruism. As a consequence, altruism can decrease effort, though conventional wisdom suggests that effort should always be higher for the more altruistic worker. This means that not only intrinsic motivation can be crowded by extrinsic incentives; crowding effect can go in the opposite direction as well. This emphasizes a new channel of interaction between intrinsic and extrinsic motivation. The paper also studies the effect of altruism on wage. Interestingly, the model provides an example of winner's blessing and shows that ambitions can hinder altruistic relationship. The model can be naturally applied to the workplace relationship and to the local public good provision.

Keywords: Extrinsic and intrinsic motivation; Career concerns; Altruism; Crowding-out.

JEL Classification Numbers: M52, D82, D64.

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†Gothenburg University, School of Business, Economics and Law, Department of Economics. Mailing address: Department of Economics, School of Business, Economics and Law at the University of Gothenburg. Vasagatan 1, PO Box 640, SE 40530 Göteborg, Sweden. Phone: +46 31 7861344. E-mail: oleg.shchetinin@economics.gu.se

1 Introduction

While economists typically posit self-interest, for instance in contract theory[1], there is strong evidence from the field and laboratory, suggesting that economic agents internalize the welfare of the others[2]. The prominent evidence for pure altruism is provided by the Dictator Game, introduced in Kahneman et al. (1986). Overall, according to the experimental studies, some 50% of people demonstrate altruism in their behavior - see, e.g. Fehr and Schmidt (2003).

The fact that worker's altruism may be exploited to improve organization's performance is known in management[3] and organization theory[4]. Clearly, altruism is an important intrinsic motivator, at least for some workers. The role of intrinsic motivation for agent's performance is a focus of many studies (Benabou and Tirole (2003) is one of the examples; see Rotemberg (2006) for a survey.)

This paper studies the impact of altruism in the Principal-Agent setting under career concerns. I consider a two-period version of Holmstrom (1999) model with altruistic actors.

The analysis identifies the new channel of interaction between intrinsic motivation and extrinsic incentives. While it typically stressed that intrinsic

[1]See Bolton and Dewatripont (2005), Laffont and Martimort (2002).

[2]See, e.g. Andreoni (2006) for a survey of evidence for philanthropy and public goods contribution.

[3]The popular point is that "business should use human nature to motivate employee. Reciprocal altruism is part of our nature. Businesses should embrace that and use it to their advantage by structuring a work environment that encourages such behavior" - The Economist, Apr. 7, 2004 – "The gift relationship".

[4]See, for example, the "motivated agent" papers by Besley and Ghatak (2005) and a survey by Francois and Vlassopoulos (2008).

motivation can be crowded out by the extrinsic incentives[5], I show that the crowding effect can work in the opposite direction - an extrinsic incentive (career concerns) can be lessened for the intrinsically motivated (altruistic) agent.

The obvious consequence of the Agent's altruism, i.e. of partial internalization of the Principal's utility is a weakening of moral hazard and an increase in effort. As a result, social welfare should be improved if the altruistic relationship is established. However, the more detailed analysis discovers more subtle details of the impact of altruism.

The paper demonstrates that in the dynamic context it is important to distinguish between the two types of altruism - current and anticipated, affecting effort in the opposite directions. The former stimulates the Agent through the internalization of the Principal's benefits. The latter, on the contrary, lessens career concerns and weakens incentives.

In fact, the career concerns incentive is based on the Agent's desire for a higher wage in the future. Because of this, he may want to exert effort higher, that expected. In equilibrium, however, the market expects the effort high enough, so that the Agent doesn't want to deviate, as it becomes too costly. However, if the Agent expects to establish the altruistic relationship in the future, he becomes less prone to tricking the subject-to altruism Principal, because it would lead to a wage, higher than his expected output. The equilibrium expectation on effort meets the lower desire of the Agent to tricking, and so the actual effort does.

One or another type of altruism can dominate, depending on the param-

[5]See, e.g. Fehr and Rockenbach (2003).

eters of the model. The intensity of altruism magnifies the prevalence of one of the altruism types. In particular, if the anticipated altruism dominates, higher altruism makes its dominance stronger, leading to effort, decreasing with altruism.

I show that altruism has two effects on wage. One pushes wage downward due to self-compensation, resulted from the partial internalization of the Principal's utility. Less evident, there is also another effect, pushing wage upward, because the altruistic worker is less sensitive to the monetary payments from the subject-to-altruism Principal.

Whether the altruistic relationship is established is endogenous in the model: the Agent chooses whether to accept an offer, proposed by the subject-to-altruism Principal or an offer from another Principal. The conditions for establishing the altruistic relationship are obtained. It is shown that higher uncertainty about Agent's abilities, higher importance of the future and lower Agent's altruism are conducive to the non-establishment of the altruistic relationship. I also show that ambitions, resulted from pushing himself too hard makes it impossible to establish the altruistic relationship in the future, while laziness is conducive for it.

Interestingly, the paper provides an example of the "winner's blessing": the subject-to altruism Principal is better-off when she wins competition with other principals for hiring the altruistic Agent by offering an attractive wage.

The model of the paper allows different interpretations. One is labor contract between friends or relatives. Another is local public good procurement by the local provider, which internalizes some of benefits from the produced public good (unlike the outside provider). The first interpretation is used

throughout the paper for illustrative purposes.

My paper contributes to the stream of literature on "behavioral agency theory".

Rotemberg (1994) considers the 2-stage interaction of the two economic agents, where they first choose their degrees of altruism with respect to each other and then play Prisoner's Dilemma. The paper shows that altruism can emerge endogenously in the equilibrium when the players are paid on the basis of the joint output. In the traditional models, the joint performance evaluation leads to moral hazard in teams. As a result, the workers exert suboptimal effort. However, in the presence of altruism effort is higher and workers are better off. Rotemberg argues that altruism may in fact emerge through the means of socializing.

Itoh (2004) considers the Principal-Agent relation where both the Agent and the Principal has a taste for fairness, i.e. have a spitefulness component in preferences. It is shown that, naturally, in such setting Principal's payoff decreases and wage increases with Agent's spitefulness. More subtle, in the multi-agent case with agents spiteful to each other the Principal can exploit the other-regarding nature of the Agents in the optimal contract design.

Dur and Glazer (2008) consider the model with Agent, envious to the Principal. The paper shows there are two effects of envy, affecting effort in different directions: envy reduces effort for a given incentive, but in equilibrium the Principal provides stronger incentives. The overall effect is then unclear. In some cases envy can make profit-sharing optimal even if effort is contractible.

Bartling and von Siemens (2006) consider the team work with wages de-

pendent on team output. The workers are assumed to be inequity-averse and envious to each other. It is shown that envious agents suffer if other agents receive higher wage due to random performance shocks. The necessary compensation for the expected envy renders incentive provision more expensive, generating a tendency towards flat-wage contracts.

The analysis of Goel and Thakor (2003) demonstrates difference in optimal contract design for envious agents and shows that envy has two impacts on effort affecting in different directions.

Grund and Sliwka (2005) consider the other-regarding preferences in the framework of tournaments. They show that the inequality averse agent dislikes the inherent inequality of the tournament and needs to be compensated through an increase in wage. On the other hand, inequality aversion creates extra incentive to exert effort.

The paper proceeds as follows. Section 2 describes a model, section 3 characterizes the Pareto-optimal effort level, the equilibrium is characterized in section 4. Section 5 discusses the insights and applications of the formal the analysis.

2 The model setup

Consider the Principal-Agent two-period relationship as in Holmstrom (1999) career concerns model. Workers (agents) are characterized by their type (skill or talent) θ. Assume for simplicity that θ is not known neither by the Agent nor by the Principal. There is common prior belief that θ is normally distributed with mean $\overline{\theta}$ and variance σ_θ^2: $\theta \sim N\left(\overline{\theta}, \sigma_\theta^2\right)$.

In each period $j = 1, 2$ the Agent chooses effort level a_j. Output level is determined by $y_j = \theta + a_j + \varepsilon_j$.

Output noises ε_j are independent from each other and from θ. Each of them is normally distributed with mean 0 and variance σ_ε^2: $\varepsilon_j \sim N(0, \sigma_\varepsilon^2)$.

Effort is costly with cost function $C(a)$ assumed to be increasing, convex, with no cost at zero effort: $C'(a) \geq 0$, $C''(a) \geq 0$, $C(0) = 0$, $C'(0) = 0$.

Assume that there are many workers and managers and that there is reciprocal altruism in only one pair worker-manager. It means that there is one particular worker, altruistic to one particular manager, and vice versa, whereas there is no altruism in any other worker-manager pair.

To justify such exclusivity of the altruistic relationship, consider an example of two friends, one of them is an entrepreneur, looking for an engineer for his enterpriser, the other is an engineer. There are many other enterprisers, which need engineers to hire, and many other engineers seeking for the job. There is no friendship relation in any other pair entrepreneur-engineer. Of course, one can think of another form of a social relationship (for example, family members).

The two altruistic persons have an opportunity of establishing the altruistic relationship, but each of them also has an outside option to establish the non-altruistic relationship with someone else. The existence of the outside option captures the fact that altruism is not universal - the person is not altruistic to everyone.

The timing is standard for career concerns models. At the beginning of the first period the managers offer salaries to workers. The salaries can be worker-specific; take-it-or-leave-it offers are made. After this, each worker

chooses a manager, whose proposal he accepts. The output produced by each worker in the first period is observed by everyone. On the basis of this observation, all workers and managers make an inference on the workers' type. At the beginning of the second period all the managers again make worker-specific salary offers, then each worker chooses manager.

The pecuniary components of utilities of the Agent (worker) and the Principal are respectively $u_j = w_j - C(a_j)$ and $v_j = y_j - w_j$, $(j = 1, 2)$.

The Principal's and Agent's utilities consist of pecuniary and social (altruistic) component:

$$U_j = u_j + \beta v_j = w_{A_j} - C\left(a_{A_j}\right) + \beta\left(y_{P_j} - w_{P_j}\right)$$
$$V_j = v_j + \alpha u_j = y_{P_j} - w_{P_j} + \alpha\left(w_{A_j} - C(a_{A_j})\right)$$

where the parameters α and β $(0 \leq \alpha, \beta \leq 1)$ show altruism intensity of the Principal and the Agent respectively[6]. An altruistic actor partially internalizes the gains of another one. It is assumed that α and β are common knowledge.

The following notation is used: y_{P_j} is output, obtained by Principal, w_{P_j} is salary, paid by Principal, w_{A_j} is salary received by Agent, a_{A_j} is effort level, exerted by Agent.

Note that in general there are two possibilities: 1) the altruistic Agent works for the subject-to-altruism Principal or 2) the altruistic Agent works

[6]The Principal's altruism doesn't play any role in the analysis since the only decision of the Principal is wage setting (and the type of the relationship - altruistic or not). Since the Principal cares about himself more than about the Agent (α¡1), she won't pay higher wage because of her altruism. The Agent plays a more important role, because he chooses effort and creates surplus.

for another Principal and another Agent works for the subject-to-altruism Principal. In the first case the altruistic relationship is established. In the second case the non-altruistic relationship is established. In the analysis of the altruistic relationship the latter is considered as an outside option for the former.

In the first (altruistic) case $w_{P_j} = w_{A_j}$ and we will refer to this salary level as "altruistic salary" and denote it by w_j^A. The effort exerted by the altruistic Agent will be referred to as "altruistic effort" and denoted by a_j^A. Output, obtained by the subject-to-altruism Principal is referred to as "altruistic output".

In the second case, when the altruistic relationship is not established, the subject-to-altruism Principal hires another worker and the altruistic Agent goes to another principal. For the two pairs the non-altruistic relationship is established. Clearly, the two relations are totally equal, and hence salaries paid by the Principal (to another worker) and received by the Agent (from another principal) will be at the same level, as well as efforts and (expected) outputs. They will be denoted by w_j^{NA}, a_j^{NA} and $E[y_j^{NA}]$ respectively and referred to as "non-altruistic" levels.

The symbols without superscripts A or NA will be used to denote the equilibrium values of parameters.

The two-periods utility is $U = U_1 + \delta U_2$ ($V = V_1 + \delta V_2$), where $\delta > 0$ is the relative value of the second period utility with respect to the first period utility. Notice that $\delta \geq 1$ is possible as well as $\delta < 1$. The latter is the case in the model with time discounting, he former is the case if, for example, the first period (trial, untenured job) is shorter than the second (permanent,

tenured job).

The actors maximize their respective two-period total utilities.

3 Efficiency

The Pareto-optimal level of effort is characterized by

Lemma 1. *The Pareto-optimal level of effort is determined by* $C'(a^*) = 1$ *and doesn't depend on the level of altruism.*

The proof of Lemma 1 is given in the Appendix.

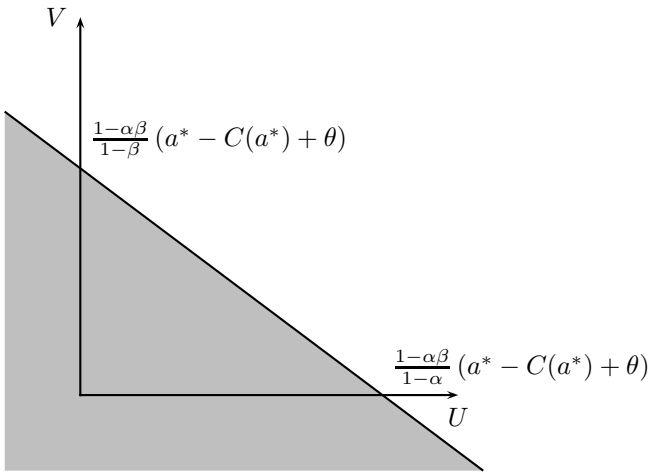


Figure 1: Utility Possibility set

The utility possibility set under the optimal effort is given by:

$$(1-\alpha)U_A + (1-\beta)U_P \leq (1-\alpha\beta)\left(a^* + \theta - C\left(a^*\right)\right)$$

The efficient effort doesn't depend on altruism and, in particular, coincides with that for the non-altruistic relationship. The reason for this is that

the effort determines "the size of the pie", net of cost, which is then divided among the Principal and the Agent through wage payment. To achieve the efficient outcome, the amount of welfare should be maximized, independently of altruism. So, adding the social component to utility doesn't alter the efficient effort. This can also be seen from Figure 3. The shaded area shows the utility possibility set. The frontier of this set is a straight line, which location depends on the altruism parameter, but the utility possibility set is largest for effort a^*, independent of α.

4 Equilibrium

I proceed backwards in the analysis of the game.

At the beginning of the first period the prior belief on the distribution of Agent's ability θ: $\theta \sim N\left(\overline{\theta}, \sigma_\theta^2\right)$ is held.

At the end of the first period, the output is observed, and the distribution of the talent parameter θ is updated. It will be shown below that this update doesn't depend on the type of the relationship, established in the first period (altruistic or not).

4.1 Period 2

First, beliefs on the Agent talent are updated. Since the Agent doesn't know his type at the beginning of the first period, the effort choice and the Principal's belief don't depend on θ. The following standard lemma describes the beliefs update.

Lemma 2. *Suppose that the Principals believes that the first period effort level is a_1^μ while the actual effort is a_1. Then:*

1. The Principals update their beliefs on the distribution of the worker's type θ according to $\theta \sim N\left(\overline{\theta_2^P}, \sigma_\theta^2\right)$, where $\overline{\theta_2^P} = \lambda\left(y_1 - a_1^\mu\right) + (1-\lambda)\overline{\theta}$

2. The Agent updates his belief on the distribution of his own type θ according to $\theta \sim N\left(\overline{\theta_2^A}, \sigma_\theta^2\right)$, where $\overline{\theta_2^A} = \lambda(y_1 - a_1) + (1-\lambda)\overline{\theta}$ and $\lambda = \frac{\sigma_\theta^2}{\sigma_\theta^2 + \sigma_\varepsilon^2}$

Proof is standard. See, e.g. Holmstrom (1999).

The parameter λ may be interpreted as the relative uncertainty of the Agent's talent.

Notice that the Agent's belief update doesn't depend on the actually exerted effort (the Agent can't fool himself). In fact, any increase in effort results in the same increase in output, so the difference $y_1 - a_1$ is not affected.

Notice also that if the Agent exerts higher (lower) effort, compared to what had been expected by the Principal, his own update isn't affected, but the Principal's update is.

Consider now the effort and wage choice in the second period.

The Non-Altruistic relationship

If the non-altruistic relationship is established, the altruistic Agent's program is

$$\max_{a_2} \left\{-C(a_2) + w_2^{NA} + \beta v_2^{NA}\right\}$$

Since the altruistic Agent still cares about the subject-to-altruism Principal, even though they are not working together, the term βv_2^{NA} appears, where v_2^{NA} is the utility, obtained by the the Principal, when she hires a

non-altruistic worker. Evidently, this term doesn't depend on the altruistic Agent's decision.

The non-altruistic worker's program is the same with $\beta = 0$.

The non-altruistic effort (exerted by the non-altruistic as well as by the Altruistic Agent) is

$$a_2^{NA} = 0 \tag{1}$$

which leads to the pecuniary component in the Principal's expected utility, equivalent to the non-altruistic Principal's utility

$$E_2^P \left[\widetilde{y}_2 - \widetilde{w}_2\right] = E_2^P \left[\theta + a_2^{NA} + \varepsilon_2 - \widetilde{w}_2\right] = \overline{\theta_2^P} - \widetilde{w}_2$$

Here $\widetilde{y}_2$ is the output, obtained by Principal and $\widetilde{w}_2$ is the wage, paid to the Agent by one of the managers.

Bertrand competition among Principals leads to zero expected utility of the non-altruistic principals, so that the non-altruistic wage offered to all agents is $w_2^{NA} = \overline{\theta_2^P}$.

The utilities, obtained under the non-altruistic relationship by the altruistic Agent and the subject-to-altruism Principal are:

$$U_2^{NA} = \overline{\theta_2^P} + \beta \cdot 0 \tag{2}$$

$$V_2^{NA} = 0 + \alpha\overline{\theta_2^P} \tag{3}$$

Notice that the Principal's belief (not the Agent's!) determines the Agent's utility in (2).

The Altruistic Relationship

The Agent's expected utility, obtained in the second period is

$$E_2^A\left[w_2^A - C\left(a_2^A\right) + \beta(y_2^A - w_2^A)\right] =$$
$$= E_2^A\left[w_2^A - C\left(a_2^A\right) + \beta\left(\theta + a_2^A + \varepsilon_2 - w_2^A\right)\right] =$$
$$= \beta a_2^A - C\left(a_2^A\right) + (1-\beta)w_2^A + \beta\overline{\theta_2^A}$$

The Agent's program is then

$$\max_{a_2}\left\{\beta a_2 - C(a_2) + (1-\beta)w_2^A + \beta\overline{\theta_2^A}\right\}$$

As for the non-altruistic relationship, the solution doesn't depend on the wage.

The altruistic effort level in the second period is given by

$$C'\left(a_2^A\right) = \beta \tag{4}$$

So, we obtain the following characterization of the altruistic relationship in the second period.

Lemma 3. *In the last period (or in the one-period interaction), the effort is given by* (4)*. Effort increases with altruism.*

Notice that effort doesn't depend on the inference on θ.

Claim 1. *In the last period, the altruistic relationship is more efficient than the non-Altruistic one.*

Indeed, the effort of the altruistic worker, determined by (4), is closer to the optimal effort ($C'\left(a^{FB}\right)=1$) than the effort of the non-altruistic worker $\left(a_2^{NA}=0\right)$. Still, the altruistic effort level is suboptimal.

Utilities, obtained under the altruistic relationship, are

$$U_2^A = w_2^A - C\left(a_2^A\right) + \beta\left(\overline{\theta_2^A} + a_2^A - w_2^A\right) \tag{5}$$

$$V_2^A = \overline{\theta_2^P} + a_2^A - (1-\alpha)w_2^A - \alpha C\left(a_2^A\right) \tag{6}$$

The Choice of the Relationship Type

Consider now the possibility of establishing the altruistic relationship in the second period on the equilibrium path.

Lemma 4. *On the equilibrium path,* $\overline{\theta_2^A} = \overline{\theta_2^P} (= \overline{\theta_2})$ *and in the second (last) period:*

1. *The altruistic relationship is always established.*
2. *The worker gets utility* $U_2 = \overline{\theta_2}$

and receives wage

$$w_2^A = \overline{\theta_2} - \frac{\beta}{1-\beta}a_2^A + \frac{1}{1-\beta}C\left(a_2^A\right)$$

The proof of Lemma 4 is given in the Appendix.

We can conclude, based on Claim 1 that if the beliefs of the Agent and the Principal coincide, then altruism always leads to efficiency improvement in the second period.

For the analysis of possible deviations from the equilibrium path it is important to consider the period 2 decision making when beliefs of the Agent

and the managers on the worker's type are different.

Denote[7] by A_L (A_H) the principals' beliefs about the Agent's effort in the first period, conditional on the choice of the Altruistic (Non-Altruistic) relationship in the second period.

Lemma 5. *If Agent's effort in the first period a_1 differs from A_L (A_H), then in period 2:*

1. *The altruistic relationship is established iff $a_1 \leq A_L + \frac{A_H - A_L}{\beta}$*
2. *The non-altruistic relationship is established iff*

$$a_1 \geq A_L + \frac{A_H - A_L}{\beta} = A_H + \left(\frac{1}{\beta} - 1\right)(A_H - A_L)$$

3. *The utilities obtained by the Agent under the altruistic and the non-altruistic relationship are, respectively*

$$U_2^A = \overline{\theta} + \lambda a_1 - \lambda\left((1-\beta)A_L + \beta a_1\right)$$
$$U_2^{NA} = \overline{\theta} + \lambda a_1 - \lambda A_H$$

The proof of Lemma 5 is given in the Appendix.

The first case in the lemma appears after a first period downward deviation or not too high upward deviation. It appears, for example, when the Agent is lazy at the first period and exerts less effort than it is expected by the Principal. In this case the altruistic relationship at the second period is established.

The second case appears after a high enough upward deviation, i.e. when

[7] It will be shown that $A_L < A_H$, which explains the notation.

the Agent exerts much higher effort than he is expected to. He did this on the purpose of tricking the market by making the others believe he is very productive (or talented). In this case he becomes demanding (ambitious) in the second period and wants a higher wage. He knows that any manager would get less output than he expects, but will pay a high wage, according to the expectation, and consequently would suffer from losses. The worker regrets that the subject-to altruism Principal would have losses and doesn't regret about the losses of another manager. This pushes the Agent to establish the non-altruistic relationship, i.e. the Agent prefers tricking anyone but his friend. In short, ambitions undermine the establishment of the altruistic relationship.

Formally, notice that the utilities obtained by the Agent may be rewritten as $U_2^A = \overline{\theta_{2H}^P} + \beta(\beta\overline{\theta_2^A} - \overline{\theta_{2H}^P})$ and $U_2^{NA} = \overline{\theta_{2L}^P}$, where $\overline{\theta_{2H}^P}$ and $\overline{\theta_{2L}^P}$ are the Managers' updated beliefs, conditional on the relationship type choice in the second period. The term $\beta(\beta\overline{\theta_2^A} - \overline{\theta_{2H}^P})$ reflects the Agent's regret of causing losses to the subject-to altruism Principal in case $\overline{\theta_2^A} < \overline{\theta_{2H}^P}$.

To sum up, downward or laziness deviation is relatively safe to hold friends working together, whereas high upward deviation makes the Agent ambitious and severs altruistic relationship. This means, for example, that if the altruistic relationship has some additional value for the Agent, not related to the production process, it is more likely that he would be lazy rather than overworking.

4.2 Period 1

The key difference from the period-2 interaction is that in the first period the career concerns play a role. The decision, made in the first period (effort), affects the expected utility for the second period since it influences the Principal's beliefs update. So, when making the decision (choosing the effort), the worker cares not only about period-1 utility, but also about the expected utility for the second period.

The model may be summarized by the following sketch of the game tree (see Figure 2).

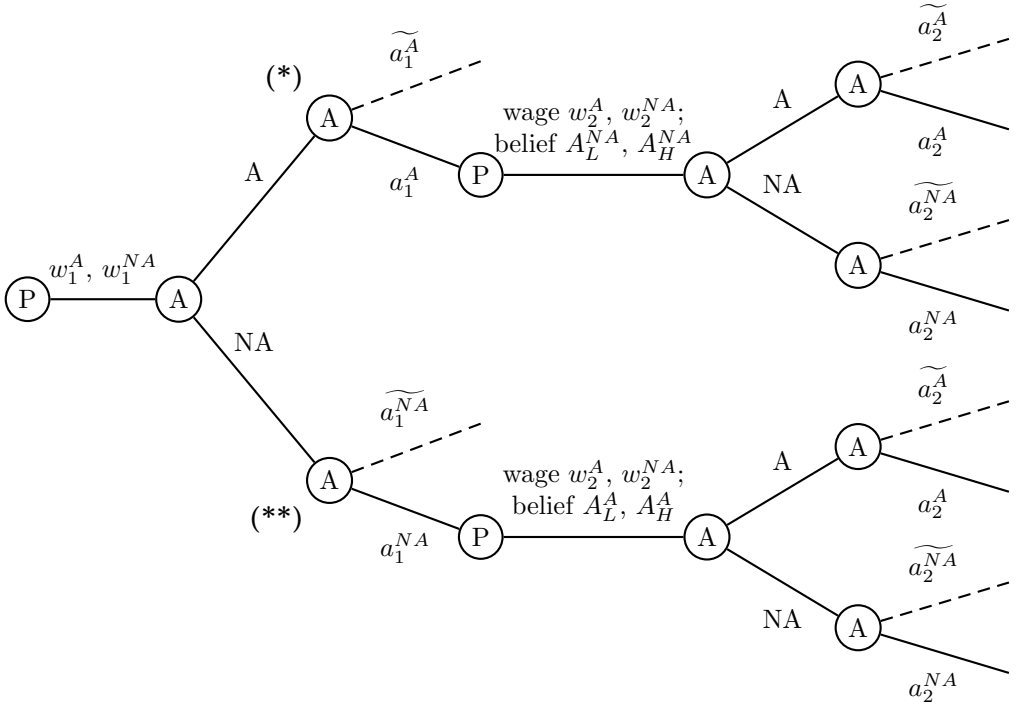


Figure 2: Sketch of the game tree

Comment to the game tree. Notation: P - Principal(s) move, A - Agent move. Efforts with tilde and dashed nodes mean deviation from equilibrium effort choice. Nature moves (output noise realizations) are not shown to keep the tree simpler.

Importantly, the beliefs on the first period effort are based on the choice

of the relationship type in the second period. Consequently, the second period wage offers (w_2^A, w_2^{NA}) are different for altruistic and non-altruistic relationship choice in the second period. It is easier to think that the Principals observe the relationship type choice, made by the Agent in the second period, and after this update their beliefs on the first period effort and afterwards on the Agent's type.

Proposition 1. *There exists pure strategies Perfect Bayesian Equilibrium, in which*

1. *The beliefs on the effort choice in first period are conditional on the relationship type, chosen in the second period;*

2. a_L^A *and* a_L^{NA} *are the actually chosen efforts under the altruistic and non-altruistic relationship in the first period; these efforts are conditional on the choice of the altruistic relationship in the second period and are determined by* $C'\left(a_L^{NA}\right) = (1-\beta)\delta\lambda$ *and* $C'\left(a_L^{A}\right) = (1-\beta)\delta\lambda + \beta$.

3. a_H^A *and* a_H^{NA} *are the potential efforts choices (which are never realized, they only support equilibrium) under the altruistic and non-altruistic relationship in the first period ; these efforts are conditional on the choice of the non-altruistic relationship in the second period and are determined by* $C'\left(a_H^{NA}\right) = \delta\lambda$ *and* $C'\left(a_H^{A}\right) = \delta\lambda + \beta$.

4. *Principals' beliefs* $A^{\bullet}_{\bullet}$ *coincide with the effort levels.*

The proof of Proposition 1 is given in the Appendix.

Notice that the Agent may exert an overoptimal effort in the first period due to high career concerns. The result is similar to one obtained by Holm-

strom (1999). However, in the presence of altruism, the excessive effort is softened; whereas in the case of the underprovision of effort, altruism incentivizes the worker. So, effort is always closer to the optimum in the presence of altruism.

Finally, consider the choice of the relationship type in the first period.

Proposition 2. *1. The altruistic relationship is established in the first period iff it's more efficient than the non-altruistic relationship, i.e.* $\Delta C \leq \Delta a$, *where* $\Delta C = C\left(a_L^A\right) - C\left(a_L^{NA}\right)$, $\Delta a = a_L^A - a_L^{NA}$.

2. For a given β, *the altruistic relationship is established iff* $\delta\lambda < r(\beta)$, *where* $r(\beta)$ *is an increasing function and* $r(0) = 1$, $r(\beta) > 1$ *for* $\beta > 0$, $\lim\limits_{\beta \to 1} r(\beta) = +\infty$.

The proof of Proposition 2 is given in the Appendix.

Figure 3 below illustrates the Proposition 2.

It follows from Proposition 2 that higher relative importance of the future (δ) and higher relative uncertainty of the worker's talent (λ) limit the establishment of the altruistic relationship in the first period, whereas higher altruism is conducive to the altruistic relationship in the first period.

Notice that, despite the Agent internalizes only a part of the Principal's utility, this is enough to achieve the efficient outcome in the worker's choice of the relation type (though the choice is binary).

5 Discussion and Applications

This section complements previous formal analysis by developing economic intuition on the impact of altruism and discusses applications of the model.

5.1 Effect of Altruism on Effort

It has been shown that when the altruistic relationship is established in the first period, the equilibrium effort is determined by (see proposition 1)

$$C'(a) = (1 - \beta)\delta\lambda + \beta \tag{7}$$

The multiplier $(1-\beta)$ in the career concerns incentive term $(1-\beta)\delta\lambda$ reflects the weakened career concerns. It appears only for the altruistic worker independently of the relationship type, established in the first period and is due to *anticipation* of establishing altruistic relationship in the future. The term $(+\beta)$ appears only if altruistic relationship is *currently* established and reflects intrinsic motivation, emerged from altruism. It is clear now that it is important to distinguish between current and anticipated altruism as they have different nature and different impact on effort.

Comparing (7) with effort, chosen by the non-altruistic agent ($\beta = 0$), determined by $C'(a) = \delta\lambda$, and effort, chosen by the altruistic Agent under the non-altruistic relationship in the first period, determined by $C'(a) =$

$(1-\beta)\delta\lambda$, one can decompose incentives as

$$C'(a) = \underbrace{\delta\lambda}_{\substack{\text{impact of career} \\ \text{concerns} \\ \text{incentive}}} - \underbrace{\beta\delta\lambda}_{\substack{\text{impact of} \\ \text{anticipated} \\ \text{altruism}}} + \underbrace{\beta}_{\substack{\text{impact of} \\ \text{current altruism}}} \tag{8}$$

Whether the weakening impact of anticipated altruism or the stimulating impact of current altruism dominates, depends on the relative uncertainty of worker's skills λ and relative importance of the future δ. The following claim follows directly from equation (8) and Proposition 2 and summarizes the discussion.

Claim 2. *1. Anticipated altruism increases with the relative uncertainty about skills λ, relative importance of the future δ and altruism β.*

2. Current altruism is determined by altruism β.

3. Current altruism increases effort, whereas anticipated altruism decreases it.

4. Anticipated altruism is dominant iff $\delta\lambda > 1$, $\frac{\partial e}{\partial \beta} < 0$, but there is a jump, corresponding to the switching of the relationship type. In this case the altruistic or non-altruistic relationship can be established.

5. Current altruism is dominant iff $\delta\lambda < 1$, $\frac{\partial e}{\partial \beta} > 0$. In this case the altruistic relationship is always established.

Figure 4 illustrates the Claim.

Notice that the dominance of one of the altruism types is determined by the career concerns $\delta\lambda$, and not by altruism. The impact of altruism is to magnify the prevalence of one of the altruism types.

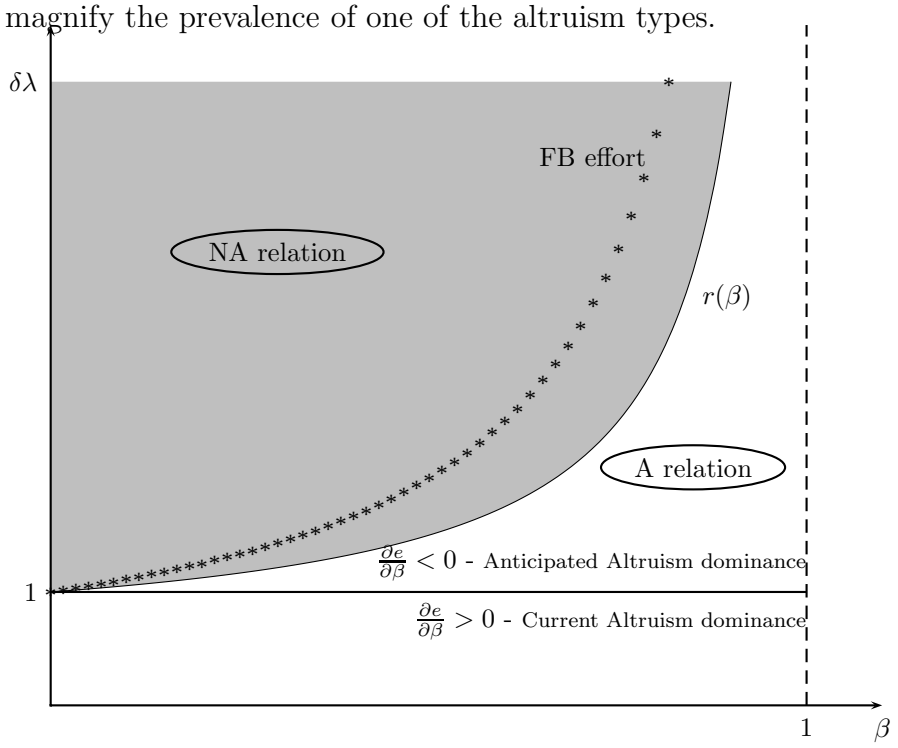


Figure 3: Type of relationship and dominant type of altruism.

Figure 3 illustrates Claim 2 and Proposition 2. The horizontal line $\delta\lambda = 1$ separates the regions of the current altruism and the anticipated altruism dominance as followed from Claim 2. The area of the non-altruistic relationship is shaded. The separating line between the altruistic and non-altruistic relationship areas is determined by the function $r(\beta)$ from Proposition 2. Interestingly, the optimal effort level is achieved only under the non-altruistic relationship.

Figure 4 may be thought of as projections of figure 3. The left panel corresponds to the case of the dominance of the anticipated altruism and

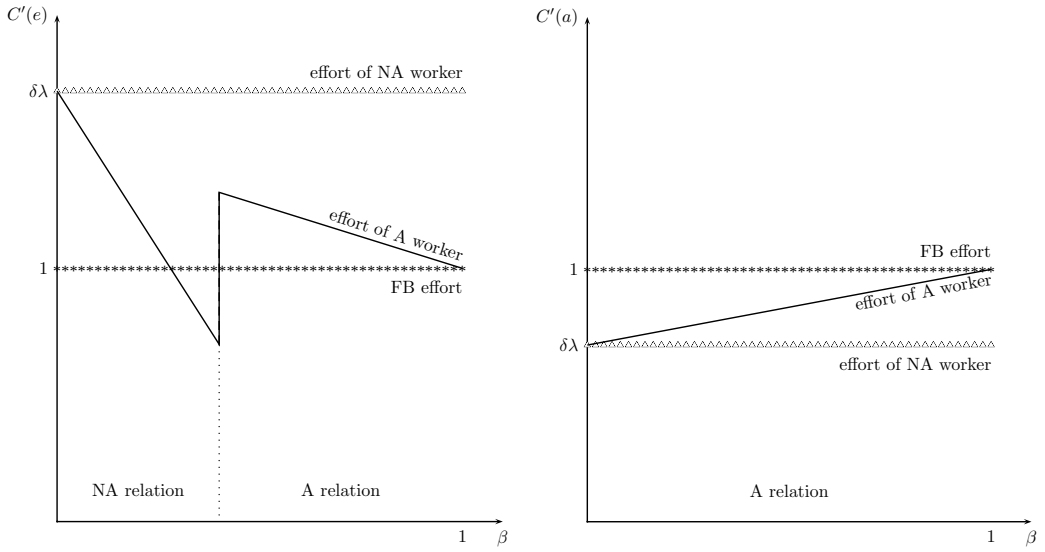


Figure 4: Effort level as function of altruism. Left - case $\delta\lambda > 1$, Right - case $\delta\lambda < 1$.

the right panel - to the dominance of the current altruism. The Figure shows effort as a function of altruism β. When $\delta\lambda > 1$, effort is piecewise decreasing with a jump at the point of switching from non-altruistic to altruistic relationship. So, in general effort is a non-monotone function of altruism.

5.2 Effect of Altruism on Wage

Consider now the impact of altruism on wages.

Claim 3. *A. There are two effects related to monetary compensation from the Principal which is subject to altruism:*

1. *Decreased sensitivity to monetary payments: the altruistic Agent is harder to attract by monetary payments from subject-to-altruism Principal.*

2. *"self-compensation": the altruistic Agent gets extra utility due to extra output resulted from extra effort and requires less monetary compensation.*

B. The two effects work in the opposite directions.

To prove the claim, notice that the difference in wages for the altruistic and non-altruistic worker[8] is given by

$$\Delta w = \frac{\Delta C}{1-\beta} - \frac{\beta \Delta a}{1-\beta}$$

where $\Delta w = w^A - w^{NA}$, $\Delta C = C\left(a^A\right) - C\left(a^{NA}\right)$, $\Delta a = a^A - a^{NA}$

For the altruistic worker an increase in wage not only means an increase in his own utility (one-for-one) but also a decrease in the altruistic part of his utility, related to the Principal's wealth decrease (in β for 1 proportion). So, the overall effect of a wage increase for the worker's total utility is only $(1-\beta):1$, i.e. to increase his utility by 1 unit (in order to compensate for effort cost), the required wage increase is $\frac{1}{1-\beta}$ monetary units. As a result, to compensate marginal cost of extra effort for an altruistic worker, the wage increase should be higher than the monetary equivalent of the cost. The more altruistic the worker is, the higher is the difference. This is captured by the multiplier $\frac{1}{1-\beta} > 1$ before the term ΔC and demonstrates the decreased sensitivity to money.

On the other hand, the share β of the output increase, resulted from an increased effort, is incorporated into the altruistic worker's utility. So, there is

[8]The analysis below is valid for the required monetary compensation for any increase of effort from some a_1 to some a_2.

partial "self-compensation" from the effort increase for the altruistic worker. Because of this, the Principal can decrease the monetary compensation for the altruistic worker. The more altruistic the worker is, the stronger is the self-compensation effect.

5.3 Winner's Blessing

Another interesting feature of the model is "winner's blessing". The subject-to altruism Principal competes for hiring the altruistic worker with others managers. To attract the altruistic worker, the wage should be attractive enough. However, once the altruistic relationship is established, the altruistic worker works harder and the Principal is better off, comparing to "losing" the competition for the altruistic worker.

5.4 Organization Design

The model extension to T periods with $T \geq 3$ may be considered as a sequence of two-period models with decreasing δ_t, $\sigma_{\theta t}$ and as a consequence λ_t. The dynamics of effort for the altruistic and non-altruistic worker is shown at the Figure 5.

It can be seen see from Proposition 2 that only two scenarios are possible: either the altruistic relationship is established from the very beginning either the non-altruistic relation is be established first and at some moment it switches to the altruistic one. In the latter case, at the beginning effort decreases and it is below the non-altruistic effort. At the moment of switching to the altruistic relationship, effort jumps and starting from some point

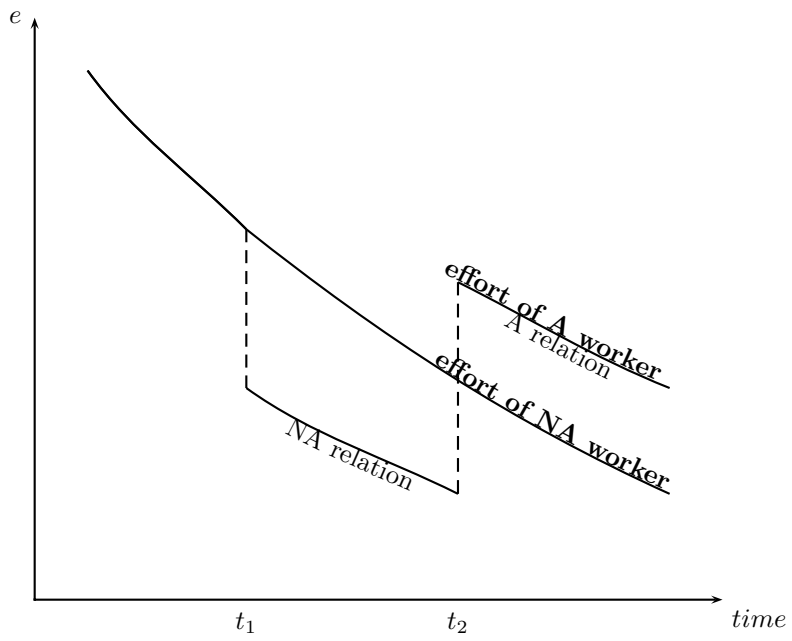


Figure 5: The effort dynamics

if not from the moment of the jump it higher than the non-altruistic one.

The analysis of the paper can be applied to some issues in organizational economics. For instance, should the Agent be informed about a possibility of working with the subject-to altruism Principal (his friend or family member) in the organization? If yes - at which moment? Consider the multi-period setup. Assume that up to time t_1 the Agent works with some Principal ($\beta = 0$) and doesn't know about a possibility of establishing the altruistic relationship with the subject-to altruism Principal (such possibility didn't exist or the organization designer didn't inform the Agent). So, up to the moment t_1 the Agent acts as the non-altruistic Agent - see Figure 5. At time t_1 the Agent learns about the possibility of establishing the altruistic relationship and may choose to change the Principal. Assume that $\delta_{t_1}\lambda_{t_1}$ is high enough, so that the altruistic relationship isn't established. As a result, effort

jumps down as a result of the anticipated altruism. Over time, $\delta_t \lambda_t$ decreases and at some moment t_2 the Agent switches to the altruistic relationship. At this moment effort jumps upward, because now both anticipated and current altruism take an effect.

It is clear that to avoid an undesirable effort decline between t_1 and t_2 the Agent should be informed about the possibility of establishing altruistic relationship not earlier than he wants to switch himself.

5.5 Local Public Good Provision

Let us discuss an application of the model to a local public good provision.

Assume that local government (Principal) wants to hire a public good provider. After the public good is produced, it may be partially used by the producer if it resides in the locality. Consider, for example, road (or roads network) construction, which is large enough so that its construction takes a long time and is undertaken part-by-part with contracting before before construction of each part. The road is long enough, so that after it is constructed, the producer will use only part of it. There is also an alternative producer of the public good (the large nation-wide corporation), which doesn't reside in the locality, so it will not use a produced public good. The local provider may produce the public good in some other location where it doesn't reside, so it won't use this public good after production.

For simplicity, assume that provision of the public good is required for two periods. The contract for the public good provision lasts only one period and specifies compensation from the local government to the provider. The

provider is characterized by skill θ and chooses effort a. The quality of the public good is $\theta + a + \varepsilon$ (ε is some noise). The local provider uses share β of the produced public good. The public funds are used to build roads and as well to produce other public goods. So, higher payments to the firm means lack of other public good provision.

The model, analyzed in the paper, can be applied to the setting. In particular, one can conclude that under high uncertainty ($\delta\lambda > 1$) the highest quality at the first period will be provided by the outside provider. On another hand, if due to some reason the local provider should be hired, in order to obtain the higher quality of the public good, it shouldn't be too involved (i.e. β shouldn't be too high - see Figure 4).

6 Appendix

Proof of Lemma 1

Proof. In the one-period interaction with perfect information utilities are

$$V = y - w + \alpha(w - C(a)) = \theta + a - w + \alpha(w - C(a)) = a - \alpha C(a) - (1 - \alpha)w + \theta$$
$$U = w - C(a) + \beta(y - w) = w - C(a) + \beta(\theta + a - w) = \beta a - C(a) + (1 - \beta)w + \beta\theta$$

Pareto-optimum is derived from

$$\max_{a,w} \{\beta a - C(a) + (1 - \beta)w + \beta\theta\}$$
$$s.t.\ a - \alpha C(a) - (1 - \alpha)w + \theta \geq \overline{u_M}$$

which solution is $C'(a^*) = 1$, $w^* = \frac{2-\alpha}{2(1-\alpha)} + \frac{\theta - \overline{u_M}}{1-\alpha}$ $\square$

Proof of Lemma 4.

Proof. To establish the altruistic relation both Principal and Agent should be better off compared to the non-altruistic relationship, i.e. two inequalities should hold:

$$\begin{cases} U_2^A \geq U_2^{NA} \\ V_2^A \geq V_2^{NA} \end{cases}$$

After substituting utility levels from (2), (3), (5) and (6) and rearranging we obtain:

$$w_2^A \geq \overline{\theta_2} + \frac{C\left(a_2^A\right) - \beta a_2^A}{1-\beta} \tag{9}$$

$$w_2^A \leq \overline{\theta_2} + \frac{a_2^A}{1-\alpha} - \frac{\alpha}{1-\alpha} C\left(a_2^A\right) \tag{10}$$

For the two inequalities to hold simultaneously the right-hand side of (10) should be greater than that of (9). After rearranging the terms, we obtain the condition for establishing the altruistic relationship:

$$a_2^A \geq C(a_2^A) \tag{11}$$

Since altruistic effort is given by (4): $C'\left(a_2^A\right) = \beta$ and $C'(\cdot)$ is increasing function, we have $C'\left(a_2^A\right) \leq \beta$ for all $a \leq a_2^A$. Taking into account that $C(0) = 0$ leads to $C\left(a_2^A\right) = \int\limits_0^{a_2^A} C'(a)da \leq \beta a_2^A \leq a_2^A$, which guarantees that condition (11) holds. So, the first claim is proved.

For the second claim, note that since the Principal makes take-it-or-leave-

it offer, the Agent obtains utility at the outside option level, equal to utility under the non-altruistic relationship. So, the first inequality in (9) holds with equality. This establishes the result. □

Proof of Lemma 5.

Proof. If non-altruistic relationship is established, the Agent gets utility

$$U_2^{NA} = w_2^{NA} - C\left(a_2^{NA}\right) + \beta v_2^{NA} = \overline{\theta_{2H}^P} = \lambda(y_1 - A_H) + (1-\lambda)\overline{\theta} \qquad (12)$$

since $a_2^{NA} = 0$ - see (1), $v_2^{NA} = 0$; and $w_2^{NA} = \overline{\theta_{2H}^P}$ because of Bertrand competition between Principals for the establishment of the non-altruistic relationship.

If the altruistic relationship is established, then the wage is set by the Principal according to **her** beliefs about the outside option for the Agent (see Proposition 4):

$$(1-\beta)w_2^A = (1-\beta)\overline{\theta_{2L}^P} - \beta a_2^A + C(a_2^A) \qquad (13)$$

The worker's utility if he accepts the offer is (see (5))

$$U_2^A = w_2^A - C\left(a_2^A\right) + \beta\left(\overline{\theta_2^A} + a_2^A - w_2^A\right) = (1-\beta)w_2^A - C\left(a_2^A\right) + \beta\left(\overline{\theta_{2L}^A} + a_2^A\right)$$

which gives after substituting w_2^A from (13)

$$U_2 = (1-\beta)\overline{\theta_{2L}^P} + \beta\overline{\theta_2^A} = \lambda(y_1 - (1-\beta)A_L - \beta a_1) + (1-\lambda)\overline{\theta} \qquad (14)$$

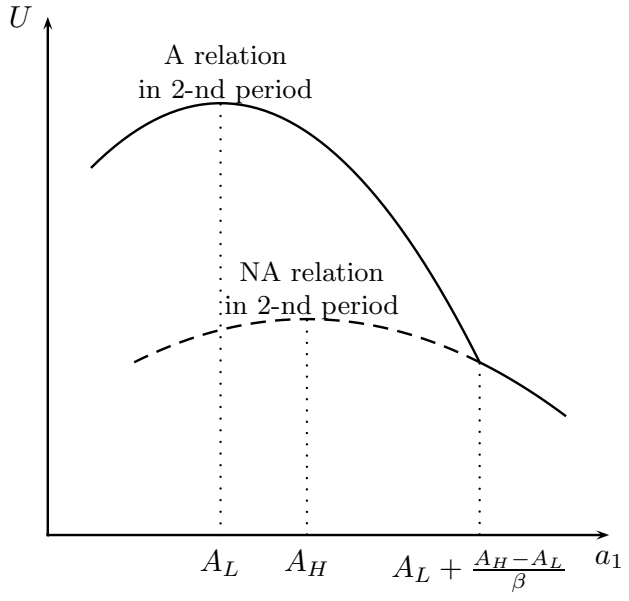
Comparison of the two utility in (12) and (14) establishes the result. □

Proof of Proposition 1.

Proof. Consider the game tree at the Figure 2. Let us start from the node marked by (*) where NA relation is established in the first period.

Equilibrium requires that the altruistic relationship is established in the second period, according to Proposition 4 and then effort should be equal to belief: $a_1 = A_L^{NA}$. To support equilibrium, a deviation in the first period effort, followed by the choice of NA relation in the second period, should coincide with belief: $a_1 = A_H^{NA}$.

Consider the case $A_H^{NA} > A_L^{NA}$. Figure 6 illustrates the proof.



If the altruistic relationship is going to be established at the second period,

the expected utility of the two periods[9] is:

$$U_{A1} = w_1 - C(a_1) + \beta\left(\widetilde{y}_1 - w_1\right) + E_1^A\left[U_2^A\right]$$

The term with expectation is obtained from (14):

$$E_1^A\left[U_2\right] = (1-\beta)\lambda a_1 + \overline{\theta} - (1-\beta)\lambda A_L^{NA}$$

Substituting this we get

$$U_{A1} = w_1 - C(a_1) + \beta(\widetilde{y}_1 - w_1) + (1-\beta)\lambda a_1 + \overline{\theta} - (1-\beta)\lambda A_L^{NA} = \\ = (1-\beta)\lambda a_1 - C(a_1) + \{const\left[a_1\right]\}$$

and the maximization program is

$$\max_{a_1 \leq A_L^{NA} + \frac{1}{\beta}(A_H^{NA} - A_L^{NA})} \{(1-\beta)\lambda a_1 - C(a_1) + \{const\left[a_1\right]\}\} \tag{15}$$

Solution should satisfy $a_1^* = A_L^{NA}$ so it has to be internal and is given by

$$C'(A_L^{NA}) = C'(a_1) = (1-\beta)\lambda$$

If NA relation is going to be established in the second period, then ac-

[9]since the non-altruistic relationship is established, $\widetilde{y_1}$ denotes output obtained by subject-to altruism Principal when another worker works for him. Analogously, the notation $\widetilde{w_1}$ is used. Notice that $\widetilde{y_1}$ is NOT affected by the altruistic worker effort choice in the period 1

cording to Lemma 5: $E_1^A[U_2] = \lambda a_1 + \overline{\theta} - \lambda A_H^{NA}$ and

$$U_{A1} = w_1 - C(a_1) + \beta(\widetilde{y}_1 - w_1) + \lambda a_1 + \overline{\theta} - \lambda A_H^{NA} = \lambda a_1 - C(a_1) + \{const[a_1]\}$$

The Agent's maximization program is

$$\max_{a_1 \geq A_H^{NA} + \left(\frac{1}{\beta} - 1\right)\left(A_H^{NA} - A_L^{NA}\right)} \{\lambda a_1 - C(a_1) + \{const[a_1]\}\} \tag{16}$$

Notice that $A_H^{NA} > A_H^{NA} + \left(\frac{1}{\beta} - 1\right)\left(A_H^{NA} - A_L^{NA}\right)$ since $\beta < 1$ and $A_H^{NA} > A_L^{NA}$. So, $A_H^{NA} \notin [A_H^{NA} + \left(\frac{1}{\beta} - 1\right)\left(A_H^{NA} - A_L^{NA}\right); +\infty)$. This means that it is never possible to obtain solution $a_1^* = A_H^{NA}$ which means that it is never possible to have NA relation established in the second period at the equilibrium path.

Now consider the case $A_H^{NA} \leq A_L^{NA}$. The two maximization programs are the same but now the problem (16) has internal solution

$$C'\left(A_H^{NA}\right) = C'(a_1) = \lambda$$

and program (15) doesn't have solution $a_1^* = A_L^{NA} \in \left[0, A_L^{NA} + \frac{1}{\beta}(A_H^{NA} - A_L^{NA})\right]$. Then NA relation is going to be established in the second period which contradicts Lemma 4. This means that at the equilibrium path the beliefs should satisfy $A_H^{NA} > A_L^{NA}$.

We have proofed so far that if the altruistic relationship is going to be established, effort is $a_1 = A_L^{NA}$. If deviation to NA relation in the second period is considered, then utility will not be lower than those for effort $a_1' =$

A_H^{NA} because this corresponds to the global maximum of (16).

Compare the first period (maximized) expected utility levels for these two possibilities.

For $a_1 = A_L^{NA}$ and altruistic relationship in the second period:

$$U_{A1} = w_1 - C(a_1) + \beta\left(\widetilde{y}_1 - w_1\right) + (1-\beta)\lambda a_1 + \overline{\theta} - (1-\beta)\lambda a_1^{\mu} = \\ = -C\left(a_L^{NA}\right) + w_1 + \beta(\widetilde{y}_1 - w_1) + \overline{\theta}$$

For $a_1' = A_H^{NA}$ and NA relation in the second period

$$U_{A1} = w_1 - C(a_1) + \beta\left(\widetilde{y}_1 - w_1\right) + \lambda a_1 + \overline{\theta} - \lambda A_H^{NA} = \\ = -C\left(A_H^{NA}\right) + w_1 + \beta\left(\widetilde{y}_1 - w_1\right) + \overline{\theta}$$

It is easy to see that the only difference is in the cost of effort. So, the Agent prefers (ex-ante) to establish altruistic relationship in the second period and hence chooses effort $a_1 = A_L^{NA}$ under the non-altruistic relationship in the first period[10].

The case of altruistic relationship in the first period (the node ** on the game tree) is considered in the same manner.

This finishes the proof. □

[10]Intuition behind this is the following. Extra effort in the first period might lead to extra wage in the second period. But since the relationship type in the second period switches from Altruistic to Non-Altruistic, the extra effort is revealed and wage in the second period will be adjusted accordingly.

Proof of Proposition 2.

Proof. 1. To establish the altruistic relationship in the first period, the two participation constraints at the first period – for the Principal and for the Agent should hold (we omit the index 1 to simplify notation in the proof).

IC for the Agent:

$$w^A - C\left(a^A\right) + \beta\left(y^A - w^A\right) + U_2^A \geq w^{NA} - C\left(a^{NA}\right) + \beta\left(y^{NA} - w^{NA}\right) + U_2^A$$

where the left-hand side is the workers's total (period 1 and 2) utility on the equilibrium path after establishing the altruistic relationship in the first period and the right-hand side is that for the case of the non-altruistic relationship.

Taking into account that $y^A = \overline{\theta} + A_L^A$, $y^{NA} = \overline{\theta} + A_L^{NA}$, $w^{NA} = y^{NA}$, $a^A = A_L^A$, $a^{NA} = A_L^{NA}$ the Agent's Ic leads to

$$w^A \geq \overline{\theta} + A_L^{NA} + \frac{\Delta C - \beta \Delta a}{1 - \beta} \tag{17}$$

IC for the Principal:

$$y^A - w^A + \alpha\left(w^A - C\left(a^A\right)\right) + V_2^A \geq y^{NA} - w^{NA} + \alpha\left(w^{NA} - C\left(a^{NA}\right)\right) + V_2^A$$

leads to

$$w^A \leq \overline{\theta} + A_L^{NA} - \frac{\alpha \Delta C - \Delta a}{1 - \alpha} \tag{18}$$

For the two inequalities (17) and (18) hold simultaneously, the following

inequality for the right-hand sides should hold:

$$\overline{\theta} + a_L^{NA} - \frac{\alpha\Delta C - \Delta a}{1-\alpha} \geq \overline{\theta} + a_L^{NA} + \frac{\Delta C - \beta\Delta a}{1-\beta}$$

which gives

$$\Delta C \leq \Delta a \tag{19}$$

2. Rewrite (19) in the form $\Delta C(\delta\lambda, \beta) = \Delta a(\delta\lambda, \beta)$, which together with $\delta\lambda = r(\beta)$ implicitly determines the function $r(\beta)$.

Prove, first, that the condition for establishing the altruistic relationship (19) can be written as $\delta\lambda \leq r(\beta)$ and then the properties of $r(\beta)$.

Clearly, $\Delta C = C(a_L^A) - C(a_L^{NA}) = \int\limits_{a_L^{NA}}^{a_L^A} C'(x)dx = C'(\xi)\Delta a$ with $\xi(\delta\lambda, \beta) \in (a_L^{NA}, a_L^A)$. It's easy to show that the function $\xi(\delta\lambda, \beta)$ is increasing in its first argument and decreasing in the second one[11]. It follows then that the condition for establishing the altruistic relationship writes as $\xi(\delta\lambda, \beta) \leq (C')^{-1}(1)$, which leads to $\delta\lambda \leq r(\beta)$ with an increasing function $r(\beta)$.

To justify the properties of $r(\beta)$, notice first that $r(\beta) \geq 1$. In fact, if $\delta\lambda < 1$, then the altruistic relationship is established, since both $C'(a_L^{NA}) = (1-\beta)\delta\lambda < 1$ and $C'(a_L^{NA}) = (1-\beta)\delta\lambda + \beta < 1$ and then $C'(x) < 1$ for all $x \in \left[a_L^{NA}, a_L^A\right]$, consequently $\Delta C = \int\limits_{a_L^{NA}}^{a_L^A} C'(x)dx < \Delta a$.

Second, $C'(\xi)$ takes a value between $C'(a_L^{NA})$ and $C'(a_L^A)$ and can be written as $C'(\xi) = (1-\beta)\delta\lambda + \eta(\delta\lambda, \beta)\beta$ with some $0 < \eta(\delta\lambda, \beta) < 1$ and then $r(\beta)$ satisfies

$$r(\beta) = \frac{1 - \eta(\delta\lambda, \beta)\beta}{1-\beta}$$

[11]Notice that $a_L^{NA}(\delta\lambda, \beta)$ and $a_L^A(\delta\lambda, \beta)$ are increasing in $\delta\lambda$ and decreasing in β and that $C'(a)$ is an increasing function.

Then $\lim_{\beta\to 0} r(\beta) = 1$, since $0 \leq \eta \leq 1$ and $\lim_{\beta\to 1} r(\beta) = \lim_{\beta\to 1} \frac{1-\eta\beta}{1-\beta} = \lim_{\beta\to 1} \left[\eta(\delta\lambda,\beta) + \frac{1-\eta(\delta\lambda,\beta)}{1-\beta}\right] = +\infty$, since $0 < \eta(\delta\lambda,\beta) < 1$.

This finishes the proof. □

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