Optimal incentive contracts under inequity aversion ☆

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ABSTRACT

We analyze the classic moral hazard problem with the additional assumption that agents are inequity averse. The presence of inequity aversion alters the structure of optimal contracts. When the concern for equity becomes more important, there is convergence towards linear sharing rules. The sufficient statistics result is violated. Depending on the environment, contracts may be either overdetermined, i.e. include non-informative performance measures, or incomplete, i.e. neglect informative performance measures. Finally, our model delivers a simple rationale for team based incentives, implying wage compression.

1. Introduction

"*A given level of pay may be viewed as good or bad, acceptable or unacceptable, depending on the compensation of others in the reference group, and as such may result in different behavior. [...] This is a constraint on the use of any sort of incentive pay.*"

Milgrom and Roberts (1992, p. 419)

Although Milgrom and Roberts (1992) clearly state that social preferences matter in the design of incentive schemes this issue has received little attention – though the question how to provide appropriate incentives was analyzed in much detail since Holmström's (1979) seminal paper on Moral Hazard.[1] Recently, motivated by real-world anomalies and many experimental results,[2] there has been a lot of interest in social preferences and theoretical frameworks have been developed

[1] Kandel and Lazear's (1992) work on peer pressure is one of the few exceptions.
[2] See e.g. Fehr and Schmidt (2003) for a comprehensive survey of these experimental studies.

to model other-regarding preferences. However, so far little work has been done to see how classical contract-theoretic predictions change when social preferences enter the picture. This paper takes steps in this direction.

We introduce social preferences, captured by inequity aversion in the spirit of Fehr and Schmidt (1999) and Bolton and Ockenfels (2000),[3] into a Holmström (1979) setting where a principal hires an agent who, by his choice of effort, determines the probability distribution of profits. Although one may look at a variety of contract-theoretic models and consider a variety of ways how social preferences matter,[4] we choose these widely cited classics as natural starting points of an analysis in this field. In this new situation, we find that the optimal contract has to trade off three factors: insurance, incentives, and fairness. The agent's concern for a fair distribution of profits leads to a tendency towards linear sharing rules. Furthermore this concern delivers a new incentive instrument, as the agent can be rewarded for good performance not only by paying more, but also by paying more equitably. Moreover we find that Holmström's sufficient statistics result[5] is violated as optimal contracts may be either overdetermined or incomplete. Finally, turning to the multiple-agents case, the fairness motive gives a rationale for the widespread use of team incentives even if the performed tasks are independent. This latter effect also implies wage compression, as for example described by Frank (1984), compared to the situation without inequity aversion.

We find that analyzing the moral hazard problem with an agent that suffers from being worse off or better off than the principal delivers predictions that can explain several empirical regularities that cannot be easily explained by standard models. The intuition why inequity aversion leads to a tendency towards **linear sharing rules** in our model is straightforward. An inequity averse agent cares for everybody getting a "fair share" of surplus. Every additional unit of surplus has to be distributed according to these fair shares, implying a linear sharing rule. Similarly we find that optimal contracts may **violate Holmström's (1979) sufficient statistics result**. Contracts may be overdetermined as inequity aversion implies an intrinsic interest in the distribution of firms' profits. Even if profit consists not only of parts influenced by agents' effort choices, agents might still want to participate in variations of overall profit. On the other hand this intrinsic interest in a firm's profit might render it infeasible to contract on better performance measures than profit as this might lead to too inequitable distributions. Thus contracts may be incomplete in equilibrium. Hence, as inequity aversion generates an intrinsic interest in the distribution of profit, we should expect non-informative measures of profit to be included and informative but not profit related measures to be excluded from contracts. Finally, our analysis offers an explanation for the **prominence of team incentives**. If workers care about each others payoffs it may be optimal to condition workers' pay on their co-workers' performance. This type of team incentives can be interpreted as an insurance not only against income shocks but also against the disutility from being worse or better off than the co-workers. An implication of this insurance is that wages are more compressed than they would be in absence of workers' inequity aversion.

A few recent papers have dealt with the matter of incorporating social preferences into contract theory.[6] Itoh (2004) and Dur and Glazer (2008) are closest to our setting. However, these two papers restrict attention to discrete outcomes and the agent's effort choice to a binary decision while we allow both to be continuous.

A different approach to incorporate social preferences into a contracting problem is pursued by Hart and Moore (2008). They analyze an incomplete contracting environment and argue that contracts provide reference points for the contracting parties' feelings of entitlement. Hart and Moore (2008) focus on the tradeoff between flexibility and rigidity. A flexible contract maximizes the ex-post probability of trade but also causes the most extreme feelings of entitlement. Conversely, an ex ante contract that pins down future outcomes very precisely, and therefore leaves little room for disagreement and agreement has the drawback that it does not allow the parties to adjust to different states of the world. Fehr et al. (2008) examine experimentally the behavioral forces stipulated in Hart and Moore (2008) and find evidence for the model's predictions. Englmaier and Leider (2008) incorporate reciprocal preferences, as developed by Rabin (1993), Dufwenberg and Kirchsteiger (2004), or Falk and Fischbacher (2006), into a moral hazard model and derive properties of the optimal contract and implications for organizational structure. Charness and Dufwenberg (2006) present a theory of guilt aversion in a principal-agent game with hidden action and test their prediction, namely that agents try to perform as to conform to others' expectations, experimentally. They vary the communication structure and document that players tend to keep their non-binding promises, which squares well with the notion of guilt-aversion.

The remainder of this paper is structured as follows. In Section 2 we set out the model and derive and discuss the structure of optimal contracts for the situations where effort is contractible and non-contractible, respectively. We also discuss our assumptions and their implications in detail. Section 3 contains extensions where we first allow for additional signals and address the question of contractual completeness and then study the multi-agent case. Section 4 compares our main findings with several stylized empirical facts. Section 5 concludes. All proofs are collected in Appendix A.

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[3] Both in Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) the agents' utility increases in own profit but decreases if they are better or worse off than others. While in Fehr and Schmidt (1999) agents compare own payoffs to everybody else's payoff, in Bolton and Ockenfels (2000) they compare themselves only to the average in the reference group. For almost all of our results the two models coincide in their predictions as there are only two players.

[4] Among the most prominent examples of models of other-regarding preferences are Rabin (1993), Dufwenberg and Kirchsteiger (2004), Falk and Fischbacher (2006), Cox et al. (2007), and Charness and Rabin (2002).

[5] The sufficient statistics result states that optimal contracts should condition on all informative signals with respect to effort choice and not on uninformative signals.

[6] For a comprehensive treatment of this literature see Englmaier (2005).