Chapter 5

MORAL HAZARD WITH HIDDEN INFORMATION

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Abstract: Moral hazard with hidden information refers to a control problem where the agent's actions are observable, but not the information on which they are based. This paper analyses the case in which an agent (for example a subcontractor or a dealer) obtains perfect information before deciding on his action. The close relationship to adverse selection allows easy derivation of the set of feasible sharing rules. The optimal action (production plan) is then derived, and it is shown that action efficiency (and incentive power) is uniformly lower than first-best (except in the best and the worst state), but greater than efficiency in the corresponding adverse selection problem. It is shown that efficiency and incentive strength is decreasing uniformly in the agent's aversion to risk (properly defined). The level of risk may be endogenously as well as exogenously determined. Holding exogenous risk constant it is shown that risk averse agents tend to end up with more risky production plans. However, the effects of exogenous changes in risk are ambiguous. It is further demonstrated that the risk aversion of the principal will have the opposite effect as a more risk averse principal will tend to prefer more efficient (and less risky) production. Finally, it is argued that principals prefer agents to be informed before actions are taken, but after contracting. This information structure also represents a social optimum.

Key words: Incentives, risk sharing, moral hazard, outsourcing

1. INTRODUCTION

Many observers have noted that moral hazard may not only arise from unobservable actions. In fact actions taken by a decision maker on behalf of others may be readily observable. Still the moral hazard problem remains if decisions are based on the agent's private, non-verifiable information. To

establish what the agent actually did is one thing, to determine whether the action was called for under the circumstances is quite a different matter.

Consider the level of production at a subcontractor (sales volume at a dealership). Production volume (sales) will in general be measurable. An audit may have established that actual quantity in a period was low. Still the subcontractor (dealer) may argue that low production (sales) was optimal due to high costs (low demand). Also consider a budget-controlled department in a larger organization. An audit may document how money has been spent without being able to draw strong conclusions about the effectiveness of the operations. If information about demand and costs is local, in the sense that it is hard to verify and communicate, there is no way of proving whether shirking is involved.

This paper will consider an organizational setting where production is outsourced to a subcontractor with private information about unobservable production costs. Regulating the relationship with spot contracting will not work well as the agent may take advantage of superior information. Nor will relational contracts work if the joint information is insufficient to sustain such contracts.[14] Hence long term (ex ante) contracts will be considered the instrument of control. Contracts may be fixed or variable. Contracts for a fixed quantity of the good at a fixed fee are feasible. Such contracts will avoid any incentive problems, but will impose risk on the agent. More importantly fixed contracts will not allow the parties to take advantage of variations in cost. Variable contracts, on the other hand, will allow principal and agent to fine tune production and improve risk sharing, at the cost of potentially serious incentive problems. Optimal contracting in such a setting is the topic of this paper.

The contracting problem referred to here has been termed "moral hazard with hidden information" (Arrow (1985), Hart and Holmstrom (1987), Rasmusen (1989)). In such an agency problem the action is the agent's strategy, i. e. a mapping from a set of information signals to a set of decisions. Several authors have noted that the problem of moral hazard with differential information may be analyzed by means of regular agency models with multidimensional actions (Gjesdal (1982), Hart and Holmstrom(1987), Holmstrom and Milgrom (1987), (1992)). However, the problem has a

[14] The terms "outsourcing", "spot contracting" and "relational contracting" follow the terminology of Baker, Gibbons and Murphy (2002). The alternative to outsourcing is integrated production where the principal covers (but does not necessarily observe) the cost of production, and the agent is uninformed.