Moral Hazard with Counterfeit Signals (Extended Abstract)

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In many moral hazard problems, an agent may manipulate the information that the principal observes. This type of fraud has attracted widespread attention in executive performance pay manipulation and public medical insurance fraud. However, fraud is possible but conspicuously absent in many other markets. For example, websites may defraud advertisers by inserting fake clicks on advertisements. Unemployed workers may circumvent government incentives by organizing fake job interviews. Security firms may cover up break-ins that occur on their watch. These types of fraud only occur rarely. But this does not imply that fraud is innocuous in these cases, as the mere possibility of fraud may impose severe hidden costs. For example, consider the extreme case that fraud is costless and produces perfect counterfeits. Regardless of the contract that the principal offers, the agent prefers to mimic exerting effort. Anticipating this, the principal does not offer any contract to the agent. Therefore there is a complete market failure even though no fraud is committed. More generally, incentives may be distorted substantially by the agent being able to commit fraud. The question of the paper is, how does the possibility of fraud affect the design of incentives in moral hazard problems?

In the model, a risk-neutral principal and a risk-averse agent face a dynamic moral hazard problem. The agent's effort choice in the first period is unobserved, but it determines the distribution of signals realized in the subsequent periods. However, these signals are also not observed by the principal. Rather, the agent is able to suppress some types of signal, and replace them with a counterfeit signal drawn from an exogenous counterfeit distribution. The principal pays the agent each period, based on the signals she has observed to date. The agent has a dynamic programming problem to determine which signals to suppress conditional on the history of signal realizations. The principal has an optimal contract design problem, to choose the optimal payment policy to implement a target effort and fraud policy.

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The first result characterizes the fraud policies in optimal contracts. Fraud may be costly for the agent to commit, and may be risky for the agent if there is a chance of getting caught. The first result establishes that "no fraud" is an optimal fraud policy, and that no optimal fraud policy involves any risky or costly fraud. In these cases, the principal may simulate fraud more efficiently than the agent can commit it. To simulate fraud, the principal draws a simulated counterfeit signal from the counterfeit signal distribution, and pays the agent as if she had observed the simulated signal. In other words, the principal may simulate fraud by paying the agent a lottery. If fraud is costly, the principal deducts the costs from the payments, and hence recovers these costs. If fraud is costless, the principal may improve on the lottery: she may recover the risk premium of the lottery by paying the agent the certainty equivalent. The resulting payment policy deters fraud if it does not improve the agent's ability to distort signals.

The second result characterizes optimal payment policies to deter fraud. As in standard moral hazard models, each signal contains news about the agent's effort. There are two additional attributes of signals. First, if a signal is outside the support of the counterfeit signal distribution, then it is unsuspicious. On the other hand, a signal assigned a higher probability under this distribution is more suspicious, ceteris paribus. Second, a signal may be suppressible or unsuppressible. The second result answers the question: how do these three attributes of signals affect payments? First, measures of how good the news is, and how suspicious the news is, are constructed from the signal separately. This means that better news is rewarded more, and more suspicious news is rewarded less, ceteris paribus. However, the payment policy is lenient on bad news that is suppressible. This dampens the incentive to suppress bad news. The lenience of the principal after sufficiently bad suppressible news involves disregarding the severity of the news; therefore optimal contracts may be incomplete.