# Computational and Applied Mathematics & Statistics Student Seminar

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## Principal-Agent Hypothesis Testing

TUESDAY,
February 28, 2023
12:30 PM
Jones Laboratory,
Room 303

## ABSTRACT

Consider the relationship between a regulator (the principal) and a pharmaceutical company (the agent). The pharmaceutical company wishes to sell a product to make a profit, and the FDA wishes to ensure that only efficacious drugs are released to the public. The efficacy of the drug is not known to the FDA, so the pharmaceutical company must run a costly trial to prove efficacy to the FDA. Critically, the statistical protocol used to establish efficacy affects the behavior of a strategic, self-interested pharmaceutical company; a lower standard of statistical evidence incentivizes the pharmaceutical company to run more trials for drugs that are less likely to be effective, since the drug may pass the trial by chance, resulting in large profits. The interaction between the statistical protocol and the incentives of the pharmaceutical company is crucial to understanding this system and designing protocols with high social utility. In this work, we discuss how the principal and agent can enter into a contract with payoffs based on statistical evidence. When there is stronger evidence for the quality of the product, the principal allows the agent to make a larger profit. We show how to design contracts that are robust to an agent's strategic actions, and derive the optimal contract in the presence of strategic behavior.

Preprint: https://arxiv.org/abs/2205.06812