**Title:** The Impact of Sampling Error on Pay for Performance

**Abstract:** This paper investigates the impact of sampling error on performance-based payment schemes, which are becoming increasingly prevalent in healthcare. Typically, such schemes monitor provider performance on one or more dimensions of quality (e.g., readmission rate) and penalize providers that perform worse than an endogenous benchmark (e.g., the national average). The use of an endogenous benchmark forces providers to compete against each other (e.g., no provider wants to perform worse than the national average) and this competition should create incentives for providers to improve quality. Nevertheless, the fact that performance measurements are subject to sampling error results in some providers being penalized for bad luck. We show that the statistical estimators used to measure performance have a profound impact on equilibrium outcomes. If the payer uses within estimators (e.g., sample means, fixed effects estimators) the first-best investment in quality can be sustained as a unique equilibrium outcome. Conversely, if the payer deploys one of the standard variance-reduction techniques often used in practice (e.g., shrinking within-estimators, random effects models) then the equilibrium outcome becomes asymmetric – all providers exert less effort compared to first best and providers' quality becomes decreasing in sample size. We test and find support for our predictions using publicly available data on pay-for-performance schemes implemented in the United States, and discuss further implications. This is joint work with Cem Aydin and Tolga Tezcan.

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