Essays on Information Design

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Convex Order and Moment Persuasion **Job Market Paper**

Moment persuasion reduces the choice of an information policy to an optimization over distributions of posterior means dominated by the prior in convex order. I study the extreme points of this feasible set using the irreducible-component structure of martingale transport. When the prior assigns zero mass to the union of the relative boundaries of the non-singleton components, the prior and the distribution of posterior means admit conditional convex-order decompositions with a common distribution over components. Extremality is then equivalent to affine independence of the conditional posterior-mean support in almost every component. This extends the results of Kleiner et al. (2026) to incorporate fully revealing regions and lower-dimensional pooling regions. If the prior admits a density function with respect to Lebesgue measure, the boundary negligibility condition holds when the partition arises from the subdifferential of a convex function or in two-dimensional settings whenever the union of the relative boundaries of the non-singleton components is Lebesgue measurable. Without boundary negligibility, local affine independence remains necessary but is not sufficient. I also establish an implementation result and give a two-dimensional persuasion example whose unique optimal distribution of posterior means is nonatomic, although each pooling component contains only one posterior mean.

Strong Duality in Bayesian Persuasion Revisited

I study dual attainment in Bayesian persuasion, where the sender maximizes the expected payoff over distributions of posterior beliefs with a bounded, upper semicontinuous objective. Economically, the dual problem minimizes the price of an acquisition offer for a multiproduct firm and its rights to disclose information to consumers, subject to covering the firm's immediate payoff and preventing profitable information disclosure prior to acquisition. I show that the dual optimum, namely the minimum-price function, is attained within the class of bounded, upper semicontinuous concave majorants. This strong duality result does not imply attainment by state-dependent prices; that is, the acquisition offer must be a price for the common belief over states rather than the expected value of state-dependent prices. A counterexample shows that state-dependent prices may fail to attain the value even when the primal objective is bounded and concave. For finite-dimensional moment persuasion, I prove a stronger pricing result: every finite-valued, upper semicontinuous objective admits an optimal integrable Borel convex majorant. For continuous objectives, the majorant can be chosen to be lower semicontinuous. I then characterize weakly exposed mean-preserving contractions through a tight convex majorant together with uniqueness on its contact support. Under an absolutely continuous prior, this criterion decomposes into conditional uniqueness problems on the relative interiors of the majorant's affine faces. The resulting cells are distinct from the canonical martingale irreducible components.