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"The geometry of relative arbitrage."

Abstract: Suppose we do not impose any stochastic models on how stock prices will evolve in the future. Is it possible, by active trading, to do better than a market index (say, S&P 500)? We will show the following surprising fact in both discrete and continuous time. If we restrict ourselves to portfolios that are functions of the current stock prices, there is exactly one class of trading strategies that achieves this goal. Remarkably, these strategies are produced as solutions of Monge-Kantorovich optimal transport problem on the multidimensional unit simplex with a cost function that can be described as the log partition function. For continuous time semimartingale models these portfolios include the Functionally Generated Portfolios discovered by Bob Fernholz. Based on joint work with Leonard Wong.