

# A Cp Criterion for Semiparametric Causal Inference

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**Abstract:** For marginal structural models, which play an important role in causal inference, we consider a model selection problem within a semiparametric framework using inverse-probability-weighted estimation or doubly robust estimation. In this framework, the modelling target is a potential outcome that may be missing, so there is no classical information criterion. We define a mean squared error for treating the potential outcome and derive an asymptotic unbiased estimator as a Cp criterion using an ignorable treatment assignment condition. Simulation shows that the proposed criterion outperforms a conventional one by providing smaller squared errors and higher frequencies of selecting the true model in all the settings considered. Moreover, in a real-data analysis we found a clear difference between the two criteria.