

Taking Dynamics Seriously in Binary Time-Series-Cross-Sectional Designs^{*}

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Abstract

Binary outcomes are commonplace in Political Science especially when working with time-series-cross-sectional (TSCS) data. The structure of TSCS data arguably allows for model specifications to more closely resemble a researcher's theory, but the modeling choices afforded to researchers' analyzing continuous outcomes are larger than those available to researchers dealing with binary outcomes. The process of accounting for a lagged dependent variable and unit fixed effects is straightforward with continuous outcomes, but there is no option for doing so in binary outcomes models. Furthermore, the choices for accounting for a theoretically relevant lagged dependent variable in binary outcomes are between modeling temporal dependence as a non-theoretically-important quantity (cubic polynomials or splines) or using a both methodologically complicated and computationally intensive estimation strategy (ML-RIS) or one that does not provide accurate uncertainty estimates (pseudo-ML). We introduce a novel modeling strategy that now allows researchers to explicitly model the lagged dependent variable while accounting for fixed/random effects in binary outcomes models by using an expectation maximization (Polya-Gamma data augmentation) algorithm adapted to a correlated random effects model under a probit (logit) framework.

^{*}Acknowledgment

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