An estimator of a jump discontinuity in regression based on generated observations

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Abstract. We propose a new class of estimators for a jump discontinuity on nonparametric regression. While there is a vast literature in econometrics that addresses this issue (e.g., Hahn et al., 2001; Porter, 2003; Imbens and Lemieux, 2008; Cattaneo and Escanciano, 2017), the main approach in these studies is to use local polynomial (linear) estimators on both sides of the discontinuity to produce an estimator for the jump that has desirable boundary properties. Our approach extends the regression with generated observations from both sides of the discontinuity using a theorem of Hestenes (1941). The extended regressions' generated observations are estimated and used to construct an estimator for the jump discontinuity that solves the boundary problems normally associated with classical kernel estimators. We provide asymptotic characterizations for the jump estimators, including bias and variance orders, and asymptotic distributions after suitable centering and normalization (the current version only provides the right side estimator and its asymptotic characterization). Monte Carlo simulations show that our estimator for the right side end point can outperform that based on local polynomial (linear) regression.

Keywords: regression discontinuity designs; estimation of jump discontinuities; Hestenes' extension; boundary bias.

JEL codes: C13, C14.