

# Testing Inequalities Linear in Nuisance Parameters

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## Abstract

This paper proposes a new test for inequalities that are linear in possibly partially identified nuisance parameters, called the generalized conditional chi-squared (GCC) test. The test offers a simple, tuning parameter free solution to a broad set of problems including subvector inference for linear unconditional moment (in)equality models and nonparametric instrumental variable (IV) models with shape restrictions, and inference for parameters bounded by linear programs. A challenge in these settings is to properly account for the estimation error of the unknown Jacobian matrix. Our GCC test addresses the challenge using a two-step GMM-like test statistic, ensuring uniform asymptotic validity under a stable rank condition, one that we link to the IV strength condition behind standard extremum estimators. Meanwhile, we also derive an analytical formula for the critical value that makes the computation of the test elementary.

**Keywords:** Linear Program, Moment Inequalities, Quadratic Program, Subvector Inference, Uniform Inference

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