Inference on Parameter Ratios with Applications to Weak Identification

Bertille Antoine*
Simon Fraser University

January 2008

Abstract:
In this paper, we propose a new inference method, the Modified-Wald procedure, to overcome some issues of the well-documented poor behavior of Wald tests when identification is lost at the frontier of the parameter space. We focus here on the multidimensional ratio of parameters when the denominator is close to singularity. This method is based on the Wald statistic. The key idea consists in integrating the informational content of the null hypothesis of interest in the computation of the metric. This correction, while preserving the computational tractability of the method, allows for unbounded confidence regions when needed. A standard Wald test usually provides bounded confidence regions, invalid for any given sample size because their coverage probability is zero. The only way to surmount this issue is to write confidence regions with a nonzero probability of being unbounded. A simulation exercise compares the inference properties of the Wald and Modified-Wald procedures with a bidimensional ratio. We also reconnect identification failure at the frontier to some asymptotic identification failure: as an illustration, we consider the single-equation linear IV model in cases where the identifying properties of the instruments may vary.

JEL Classification: C12, C22.

*I would like to thank Eric Renault for his constant encouragements and advises; I also thank seminar participants at CESG and CEA for useful discussions. Please address all correspondence to: Bertille Antoine, Department of Economics, Simon Fraser University, 8888 University Drive, Burnaby, BC V5A 1S6, Canada; Email: bertille_antoine@sfu.ca

Key words: Parameter ratio; Wald; Unbounded confidence region; (Near)-weak identification; Weak instruments.