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# CONSISTENT ESTIMATION WITH MANY MOMENT INEQUALITIES

KONRAD MENZEL

**ABSTRACT.** In this paper, we consider estimation of the identified set when the number of moment inequalities is large relative to sample size, possibly infinite. Many applications in the recent literature on partially identified problems have this feature, including dynamic games, set-identified IV models, and parameters defined by a continuum of moment inequalities, in particular conditional moment inequalities. We provide a generic consistency result for criterion-based estimators using an increasing number of unconditional moment inequalities. We then develop more specific results for set estimation subject to conditional moment inequalities: we first derive the fastest possible rate for estimating the sharp identification region under smoothness conditions on the conditional moment functions. We also give rate conditions for inference under local alternatives.

**JEL Classification:** C12, C13, C14, C15

**Keywords:** Moment Inequalities, Many Weak Moments, Partial Identification, Conditional Moment Inequalities, Set Estimation

## 1. INTRODUCTION

We consider estimation of the identified set for a partially identified parameter when the number of moment inequalities is large relative to sample size. This situation is commonly found in applications in the recent literature on partial identification - prominent examples include estimation with conditional moment inequalities, instrumental variables models with missing or interval measured data, and estimation of games with rich strategy spaces.

One central feature of estimation problems that are subject to moment inequalities is that ignoring relevant inequality constraints usually alters the shape of the resulting identification region. This stands in contrast to typical problems with equality restrictions where it is generally possible to restrict attention to a finite number of moment conditions without losing point identification,<sup>1</sup> and the question whether or not to impose all available moment

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<sup>1</sup>Dominguez and Lobato (2004) discuss cases in which an infinite number of moment equalities is needed for point identification.

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