

Orthogonality versus Parametric Identification: Traditional Instrumental Variables Methods versus Parametric Models

A. James O'Malley¹, Sharon-Lise T. Normand^{1,2} and Richard G. Frank^{1,3}

¹ Department of Health Care Policy, Harvard Medical School, Boston, MA, USA

² Department of Biostatistics, Harvard School of Public Health, Boston, MA, USA

³ National Bureau of Economic Research, Cambridge, MA, USA

With the introduction of costly new medications often comes a claim that the new therapies will offset all or part of their costs by reducing other areas of health utilization. However, because a variety of mechanisms that are not observed are likely to be associated with the therapy a patient receives, direct comparisons of the costs between new and old therapies are unlikely to be valid. We provide a statistical framework based on instrumental variables methods for validating the above claim and illustrate it in the case of treatment for schizophrenia, in which we compare newer antipsychotic medications to traditional (older) drugs. The data are analyzed using standard instrumental variables estimators that do not make parametric assumptions and also using a parametric model that relies on bivariate normality. We find surprisingly large differences in the results between the methods. To investigate the differences, we performed a series of simulation experiments in which the control condition generates data that emulates the actual data. The results of these experiments yielded several interesting properties of the methods and allowed rules of thumb for implementing them in practice to be established.