操作変数法の理解へ：計量生物と計量経済の邂逅[1]

(Toward understanding the Instrumental Variables Method in Biometrics and Econometrics)

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鍵言葉 (Key Words): 統計的因果推論, 臨床試験, 政策評価, Noncompliance, ATE, LATE, 操作変数法, 構造方程式, 識別性, TSLS, LIML, Mendelian Randomization, 遺伝子疫学

要約 : 因果関係 (causality) は統計科学を含め諸科学にとっては基本的かつ重要な分析対象である。計量生物と計量経済の分野ではこの間、統計的因果推論 (statistical causal inference) が盛んに応用されている。本稿ではまず Rubin (1974) に始まる反実仮想 (counter-factual) モデルと Angrist, Imbens and Rubin (1996, 略して AIR) による操作変数法 (instrumental variables method) の応用の意味を説明する。次に計量経済学における同時方程式と構造方程式 (structural equation) を簡単な例を用いて説明し、構造方程式を用いた統計的因果関係の解釈を述べ、その統計的推定法を議論する。構造方程式の推定では OLS 法 (最小二乗法) は一致性を持たないので、操作変数法 (IV 法) としての Wald 法、LIML(制限情報最尤法, 分散比最小法)、TSLS(2 段階最小二乗法)、GMM(一般化積率法) などの長所と短所を説明する。また、計量生物と計量経済などにおける統計的因果分析のさらなる課題を展望する。

最後に遺伝子疫学における MR(Mendelian Randomization, メンデル・ランダム化解析) における最近の展開についても議論する。

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