



IDENTIFYING DIRECT CAUSAL EFFECTS UNDER UNMEASURED CONFOUNDING

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Introduction

This is the background.

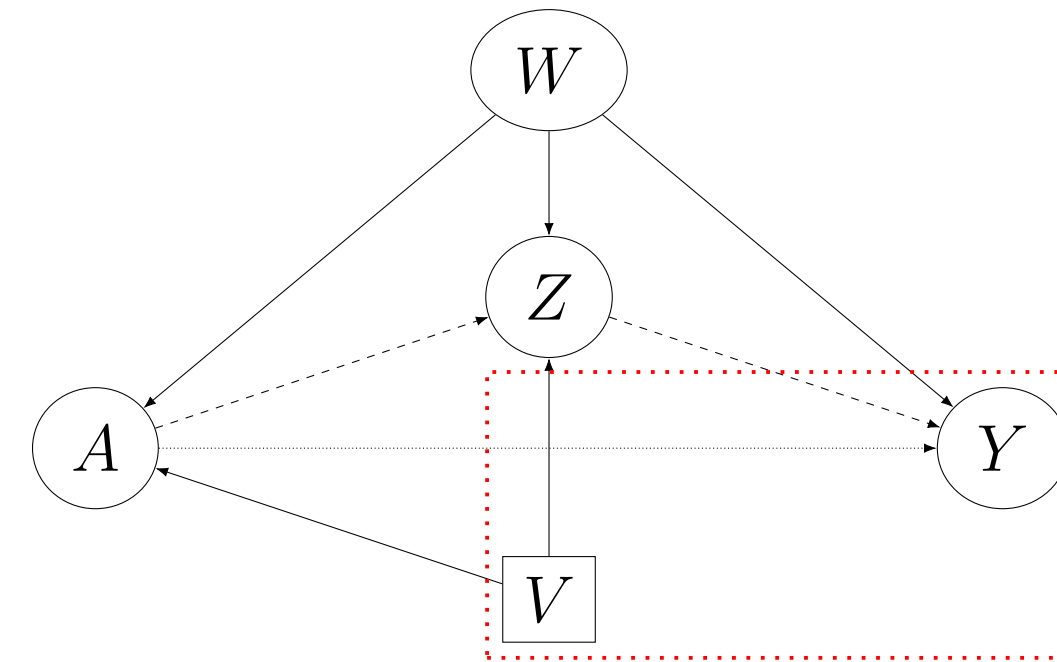
Statistical Problem

State the causal and statistical models, and estimand.

The causal target parameter is

$$\Psi^F(P_{U,X,0}) = \int_{w,z} \mathbb{E}[Y(1,z) - Y(0,z) \mid W = w] p_Z(z \mid A = 0, w) p_W(w) dz dw .$$

Identification



(A1) No unmeasured endogenous pathways:
 $f_Y(Z, A, W, V, U_Y) \equiv f_Y(Z, A, W, U_Y)$.

(A2) Conditional expectation equivalence:
 $\mathbb{E}(Y \mid Z, A = 1, W, V) \equiv \mathbb{E}(Y \mid Z, A = 1, W)$

Theorem

Under assumptions A1 and A2, $\Psi^F(P_{U,X,0})$ is identified by

$$\Psi(P_0) = \mathbb{E}_{P_0} \mathbb{E}_{P_0} \{ \mathbb{E}_{P_0}(Y \mid W, A = 1, Z) - \mathbb{E}_{P_0}(Y \mid W, A = 0, Z) \mid A = 0, W \} .$$

Inference

Statistical inference is possible using standard methods.

Simulation Results

Here are the results of our simulation study.

Conclusions

Here are the important takeaways.

References

List of references.

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Thank you for paying my bills.

** indicates shared first-authorship*