Endogeneity explanation for Consumer Heterogeneity and Paid Search effectiveness: a large scale field experiment:

The authors, Blake et al, say that typical consumers who click on the adlinks had purchase intentions so would have found a way to the ebay website regardless of adverts. The CPC model means that ad spend increases as these consumers go to purchase, hence ad spend rises along with sales, leading to the endogeneity of the independent variable, spend. Strictly speaking this is known as backwards causation, and causes E(|) . Naively regressing sales on ad spending in OLS will result in biased estimates of the true effect of ad spend.

OLS:

IV: The endogeneity of log(spend) is alleviated by estimating it using IVs.

First stage regression:

Second stage:

DnD: Differences in Differences regression can used to estimate the effect of the treatment effect of turning adverts on:

ROI explanation for Consumer Heterogeneity and Paid Search effectiveness: a large scale field experiment:

ROI was calculated as:

Where Us revenues given ad spend =$2880.64m, and spend on Us search adds =$51m. is the estimate of from turning on Ads, (i.e. the variable of interest in the DnD regression). To obtain a comparable measure for OLS and IV, their coefficients are multiplied by the coefficient in the first stage IV equation.