

Have Instrumental Variables Brought Us Closer to Truth?

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Background

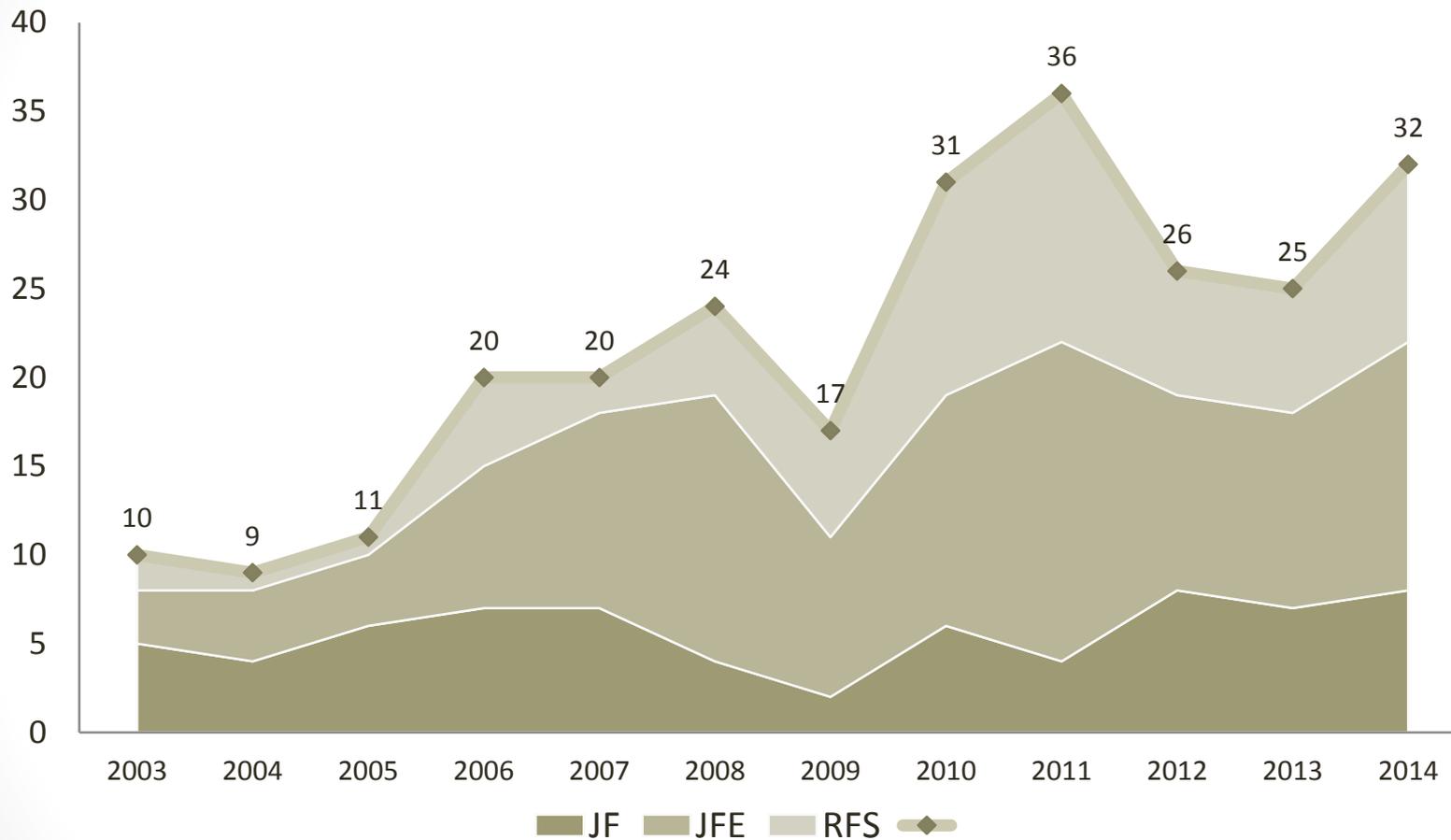
- It is not about my work, but work by people in the profession.
- It is an informal collection of discussions with Alon Brav during the past few years.
- The finance scholarship has moved toward great stress on “identification” of causal effects.
- The instrumental variable approach (including its variants) remains a gold standard for studies based on observational data for credible causal inferences via “as-if random” treatment.
- We are in full agreement with the end and the means. The discussion herein explores whether the means has been aligned with the end.

The question:

Have Instrumental Variables Brought Us
Closer to Truth?

The increasing popularity of Ivs*

(261 papers in “Big Three”)



*: Exclude shock-based studies without instrumented treatment variables.

Why instrumental variables?

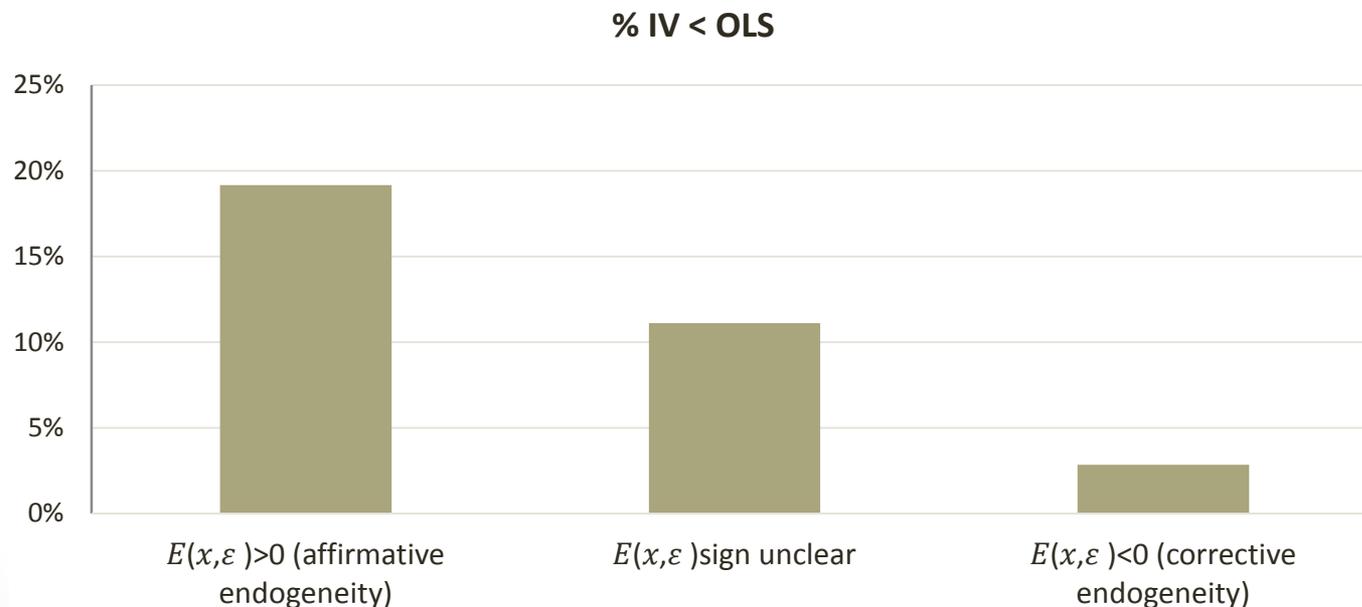
- In the simplest model:

$$y_i = \beta x_i + \gamma \text{Control}_i + \varepsilon_i$$

- We resort to IV because $E(x_i \varepsilon_i) \neq 0$, and so the OLS estimate contains a bias b_{OLS} .
- Usually researchers have a prior as whether b_{OLS} is positive or negative, depending on the sign of $E(x_i \varepsilon_i)$.
- Out of the 261 papers:
 - 66% were identified as “affirmative endogeneity:” $b_{ols} > 0$.
Example: Red wine and cardiovascular health.
 - 16% as “corrective endogeneity:” $b_{ols} < 0$. Example: Public school teacher attention and student performance.
 - The rest 18% were *a priori* unclear.

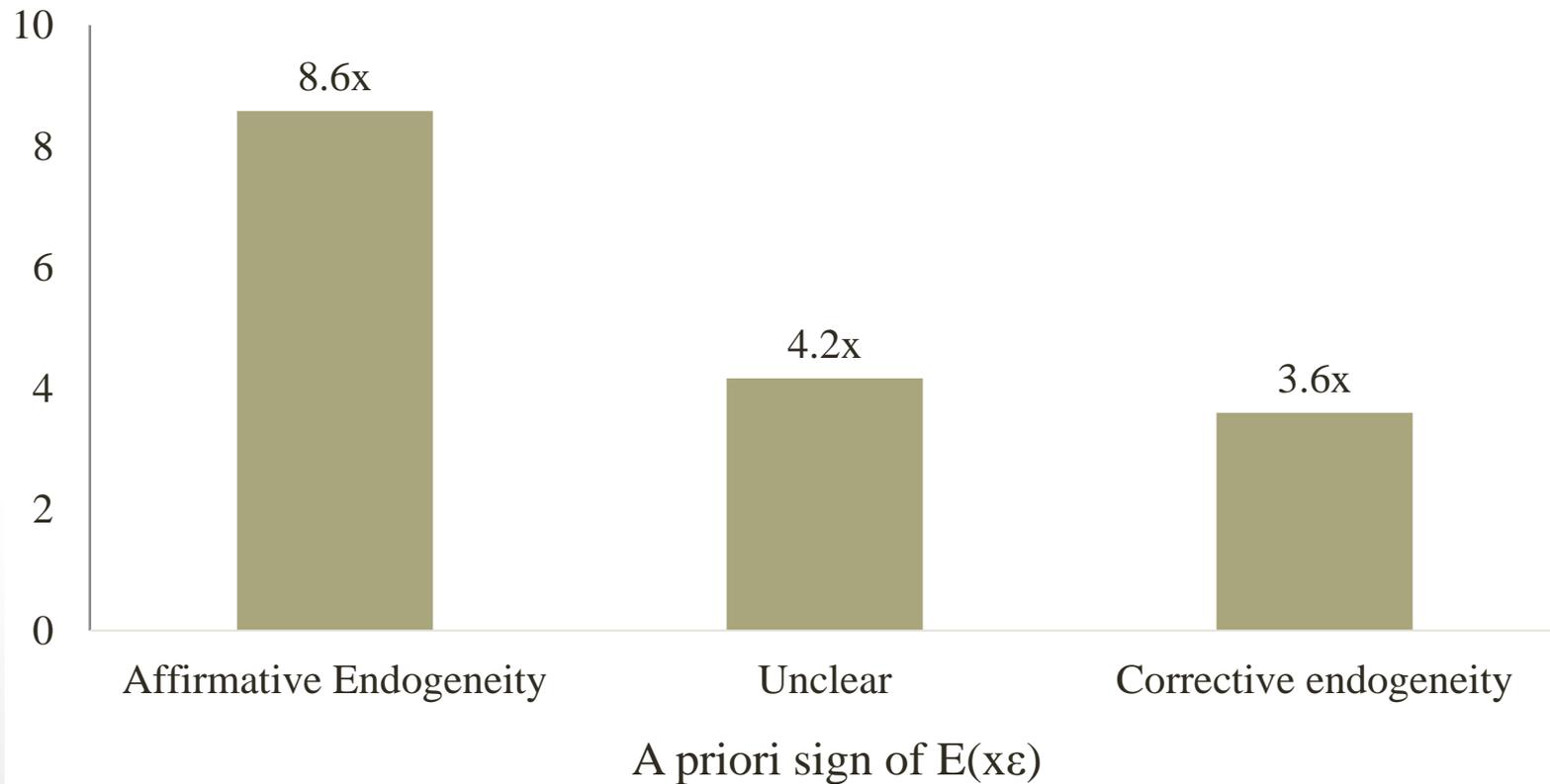
Is the cure closer to the truth?

- If we trust the IV estimate more than the OLS estimate, it would make sense for the former to be closer to the truth than the latter.



As if OLS contains an attenuation bias?

(Winsorized) Average IV Coef/OLS Coef



Against the odds

- In search for truth, more often than not we seem to settle for estimates that are more likely to be farther away from the truth.
- It does not necessarily imply a problem for an individual paper:
 - An estimate is a random variable; therefore any realization is admissible.
 - An IV estimate, properly adopted, identifies the local average treatment effect (LATE); therefore any location of a subpopulation is permissible.
- It does expose a potential general problem that published results, as a group, are not unbiased relative to the average treatment effect (ATE), presumably the ultimate and collective goal for the identification-conscientious scholars.

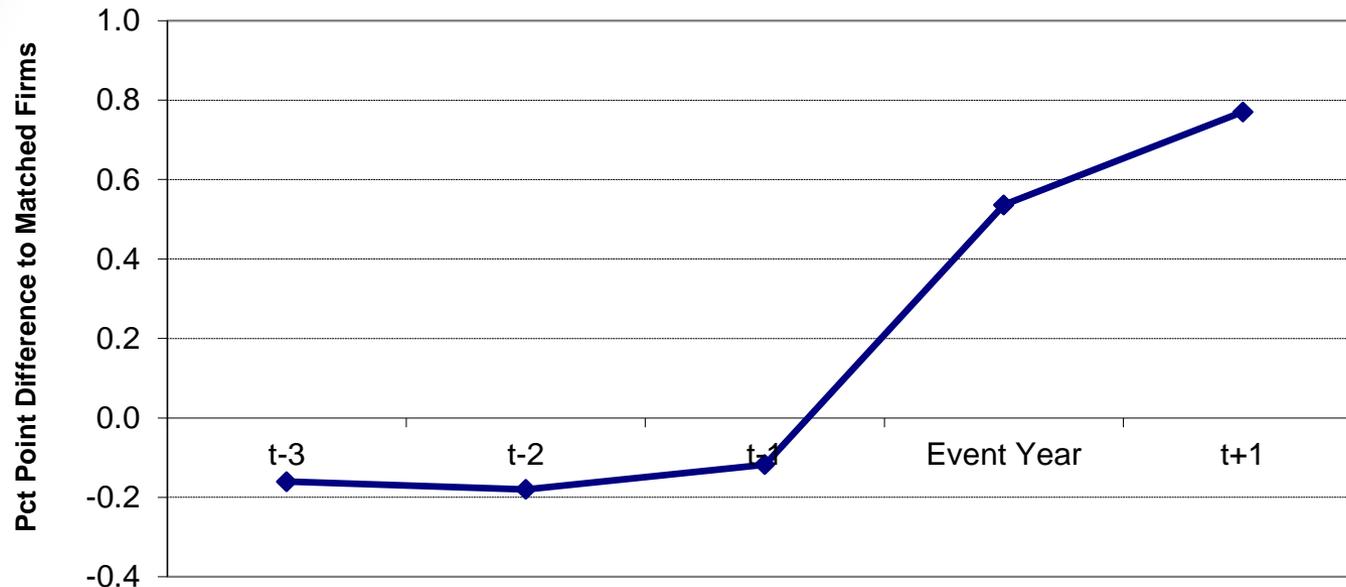
Possible sources of the collective bias

- “Does not matter” papers are hard to publish—for good reasons.
 - Much larger coefficients are required to offset the blown-up standard errors from instrumentation.
- “Thin layer” (either in data support or in first-stage predictive power) instrumentation amplifies the estimation error.
 - Valid instruments necessarily come from outside the system, hence the overlapped layer is expectedly thin.
- The “compliers,” agents whose actions are manipulated by the instrument in the intended direction, are an unrepresentative subsample of the population.
 - Still, “encouraged-to-do” is expected to be closer to “randomly-chosen-to-do” than “choose-to-do.”

Suggestions?

- No doubt, better LATE than NEVER.
- A more thorough discussion of the relative magnitude of the IV vs. OLS estimates, and how it is related to the nature of the endogeneity.
- Be more acceptive of “no-result” papers based on convincing designs and impeccable execution; and of papers that re-visit a studied topic with likely orthogonal estimation errors.
- Be more open to non-IV/shock based identification as at least a supplement.
 - “Identification at infinity:” Beauty and success.
 - Address specific alternative hypotheses that are supported by economic theories or institutional facts: Gender gap and prejudice.
 - Look into the black box from x to y .

“Do activists increase firm payouts”



- Two approaches to establish causality:
 - Following steps of every engagement and confrontation; and eventually make a judgmental call.
 - Following a few activists who move for exogenous personal reasons and the few companies next door; and let the data tell.