Problem Set 1

The primary objective of empirical estimation, first and foremost, is to establish causal link (or lack thereof) between variables that we are interested in observing. In doing so, we are confronted with the question of the relationship between economic theory and data that we have in hand. In particular, we are interested in seeing whether atheoretical approach (hereafter referred to as reduced-form estimation) is superior to structural estimation

Prima facie, reduced-form estimation seems to be more versatile when compared to structural estimation, particularly as the former does not rely heavily on economic theories in its approach to causal inference. Instead, as Angrist & Krueger (1999) noted, this approach relies more on quasi-experiment and emphasize the identification of causal effect from very specific situations [1]. However, Keane (2012) refuted the assertion that reduced-form estimation provides "assumption-free" causal inference. In fact, he went as far as asserting that reduced-form estimation is impossible to interpret without coming clear about the implicit assumptions embedded in quasi-experimental or instrumental-variable settings [3].

Keane (2012) put forth several excellent examples that shows the problems that come with illusion of "theory-free" causal inference in many reduced-form estimation. In the case of Vietnam draft lottery study of Angrist (1990), he pointed out that even if draft lottery was totally exogenous, several strong assumptions need to be made in order to deem draft lottery to be a valid instrument to measure the causal impact of military service to earnings, which may not be fulfilled in most cases [1] []. Keane (2012) also cited cases where absence of theory leads to ambiguity in interpreting the result of IV estimates, such as in the case of estimation of effect of maternal contact time on cognitive development. The ambiguities result from the fact that childcare uses can be affected by many unobservables that finding good instrument may not even be good enough. In short, without theories to back up the instrument, exogeneity *per se* cannot guarantee the validity of instrument or quasi-experiment.

Even worse, the problems of strong implicit assumptions in many IV and quasi-experimental settings are exacerbated by proliferation of their questionable uses by many researchers. Keane (2012) noted that natural experiments that truly arises from natural mechanisms (i.e. ones that truly yield high-quality control-treatment groups) are relatively rare and that the term "natural experiments" have been stretched to include any policy interventions that affect two groups differently, irrespective of whether those two groups are similar enough in characteristics to serve as proper control/treatment groups [3].

As reduced-form estimations rely heavily on strong implicit assumptions that are rarely made

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[1]The assumptions are (1) completed schooling is uncorrelated with draft lottery number, (2) private sector experience is determined mechanically as age minus years of military service minus years of school, and (3) draft lottery do not in itself affect behavior of people who draw low numbers (and thus become draft-eligible)

clear by researchers adversely impact the quality of researches by allowing poorly-designed IVs and quasi-experimental estimations to pass off as good researches, the relative transparency of structural estimation in its assumption may serve as remedy. In addition, building our model on formal theories allow us to advance economic theories better by providing test case for our theories; even if empirical estimation based on structural model fails to fit the data, this allows us to update the underlying theories. Without mechanism to directly testing the theory (as in the case of reduced-form estimation), it is harder to prove or disprove the prevailing economic theories.

Nevertheless, the need to provide stronger link between theory and empirical estimation does not mean treatment effects estimation as provided by quasi-experimental and IV estimations are not useful in economic research. In areas where economic theories are sparse, provide conflicting signs, or miss important mechanism, "simpler" treatment effects that are provided by quasi-experimental studies may be crucial. For example, researches on minimum wage effect using quasi-experimental settings that are spearheaded by Card and Krueger (1994) provided new insights on the mechanism precisely because the effects of minimum wage are not predicted by economic theory. As mentioned by Angrist & Krueger (1999), the insights provided by these methods need not be a substitute to structural model, stating that "the generalization of findings is often left to be tackled later, perhaps with the aid of economic theory.

References

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