PS1 - MACS 40200 Structural Estimation

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1 Response to Keane (2010) and Rust (2010)

Statistician George Box famously claimed: "All models are wrong but some are useful." This approach, in particular to social science, suggests that using a combined approach to estimation, i.e. one that includes *both* structural and reduced form estimation approaches where each is appropriate, is ideal. Of course, individual researchers specialize in structural versus reduced form tacks to estimation. Nonetheless, research contexts in Economics and related fields call for different approaches to modelling and estimation *useful* in advancing collective knowledge on a topic given data available. To argue this, I will first summarize the main points of Keane (2010) and Rust (2010) as relevant, then show how their argumentation actually is complimentary to my point.

Keane posits that the main cited advantage to quasi-experimental empirical economics over structural economics - that of fewer or less extreme a priori assumptions when engaging in estimation - is unfounded. Namely, this 'atheoretical' practice of economics has similar levels of a priori assumptions, but they are mostly unstated. He also claims that structural economics have fallen out of favor in most of the profession due to these purportedly excessive assumptions. This argument relies primarily on the following observations: first, that use of even very good instruments only is useful when accompanied by strong assumptions, second, that interpretation must occur prior to estimation, and third, that most instruments being used are invalid. In particular, he notes on page 5 that "randomization alone does not guarantee exogeneity". This point, which is really saying something about both *exogeneity* and *exclusion restrictions*, underlies both his first and third claim. While, substantively, he is not wrong, this point is overstated. Many of the cited examples (DID without parallel trends, weak instruments, incomplete consideration of a natural experiment) are not fundamentally problems with experimentalist Economics, but instead problems with poorly performed or written research.

Keane's point on unstated assumptions is well-taken - surely reduced form research has fallen into a pattern of insufficiently examining the underlying assumptions when stating their strategy for estimation or interpreting results. Structural approaches are equally guitly in a similar manner: sloppily written structural empirical papers also frequently fail to robustly examine all of the theoretical conditions[1] necessary for interpreting their results. It is for this reason that I argue that we need both (better) structural and reduced form approaches.

Rust, on the whole, agrees with Keane, but does present a more tempered view that accounts for

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[1]Here, I mean theoretical in the economic sense, not the statistical or parametric sense (though frequently these too are under-cited).

some of the shortcomings in Keane's argumentation. He also notes that in certain subfields, in particular Industrial Organization, structural estimation remains part of the status quo. Rust's argument acknowledges that advances in nonparametric and semiparametric estimation can be useful in certain contexts, and that many of the examples Keane uses are bad because they are poorly conducted research, not because of the faults of experimentalist economics. Rust cites the idea from Box, suggesting that: "...some false models provide better approximations to reality than others, and hopefully over time our theories and models will become more realistic and provide better approximations to actual behavior and economic outcomes. Thus, approximation theory would be a more appropriate conceptual apparatus for analysis of structural estimation than traditional statistical estimation and hypothesis testing."

This is to say: when we can, estimating structural models provides more fruitful evidence for or against specific predictions of economic theory. However, contexts that lack sufficient variation to estimate a full structural model still contain valuable information, and we can use reduced form methods (well) to uncover relationships of interest. Even in contexts where we eventually do estimate a structural model (e.g. discrete choice demand estimation), reduced form approaches can provide complimentary evidence (e.g. hedonic pricing regressions can summarize variation in product attributes).