Structural Estimation: PS1

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1 Structural estimation vs reduced form estimation

There is an ongoing discussion about the approach on making economic research. On one hand, the structural approach makes reference to models in which the equations derived from individual optimization or firm optimization. On the other, the reduced form or experimental approach can be described as those models in which equations are either not derived from behavioral equations or are only implicitly a linear approximation of some other model. In recent years there is a trend towards more reduced form research, however, this may be a step backward if dominates completely the discipline.

One of the first common arguments against the structural approach is the amount and strength of the assumptions it makes. However, experimentalists forget that that the study of economic decisions even on their approach relies heavily on strong assumptions. Is not possible to do applied work in economics without assumptions (Rust,22). First, perfect liberty of agents, in the sense that they have freedom to make their own choices. Second, rationality of agents (Rust,23), meaning that they choose the most efficient means toward their ends and do not knowingly waste resources, weighting the advantages and disadvantages of the available options. Third, that they act upon incentives, making the decisions that best serves their self-interest. Fourth, incomplete information, so the agents make their rational decisions based on perceived probabilities for the different outcomes of each option.

Strong a priori assumptions are needed in order to make economic analysis, the difference is that structural estimation makes them explicit while experimental analysis rely on implicit assumptions (Keane,3). If the idea is to guide policies, it is important to understand what mechanisms are at work (Keane,4) and in that regard structural estimation delivers what is needed explicitly. Keane illustrates this with the example of the Angrist (1990) paper that concludes that military service lowers the earnings. It is not clear what is the mechanism why that happens, so it is useless and there is little to be learned from it.

Another reason to use a structural approach is that sometimes is the only approach possible. The IV method to do experimental research may not be

applicable and can become vague. There is lack of interpretability of IV estimates applies even in homogeneous coefficient models (Keane, 7). This is because many times is not easy to get rid of the correlation between explicative variables and the error term, which induces biases like the Wald estimator exaggeration effect produced in the Angrist paper (Keane, 3). One example of this is the Standard life cycle labor supply model, where all instruments get correlated to the error term because any variable that affects wages, affects human capital investment return and therefore is correlated with the error term (Keane,10). The structural approach solves this by estimating the Frisch supply function jointly with a human capital production function (or wage equation). Then, it finds values for the return to experience and the inter-temporal elasticity of substitution that together match (i) the observed wage path over the life-cycle and (ii) the observed hours path over the life-cycle. The estimate for the elasticity of substitution is around 3 vs 0.26 before (Keane, 11).

Finally, the structural approach is the way to make progress as it happens in other disciplines like the hard sciences. In order to make a systematic assembly of facts and empirical regularities, we need a pre-existing theoretical framework that gives the facts meaning, and tells us which facts we should establish. This is the approach that has made progress in other sciences, specially the *hard* ones (Keane, 15). Keane ilustrates this with a history class on the proegress made in the field of mechanics in physics.

About the this last argument, one can refute by saying that economics is not a hard science and therefore what works for the *hard* sciences may not work for economics. There is a sort of middle ground between structural and reduced form models where these are the quasi behavioral or quasi structural models which are not explicitly derived from any underlying economic theory, but at least have some sort of experimental interpretation (Rust,23). In this regard, the experimental approach may be useful when there is little or no thaory to explain a certain phenomenon and there is need of exploration of the data.