

# **What is structural estimation?**

## **Applied Microeconomics**

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# The goal

Reduced-form work identifies an **effect** (a LATE, an ATT, a regression coefficient) under as few assumptions as possible.

Structural work has a different target: the **parameters of an economic model of choice**.

- preferences (risk aversion, discounting, ...)
- constraints (budget sets, borrowing limits, ...)
- beliefs and information

Once you have those, you can ask what the agent would do *under a policy you have never observed*.

# Why it matters: risk and timing have a price

A reduced-form estimate gives you a *mean* effect. If markets are incomplete and agents are prudent, the mean is not the whole story:

- a higher-variance income stream is *worth less* per dollar of expected income
- a steeper income profile is *worth less* if you cannot borrow against it
- taxes and transfers attenuate the gross return but also insure it

So the *welfare-relevant* return can differ sharply from the gross return. Pinning down that gap needs a life-cycle model with precautionary saving, and the model is only as credible as the moments you feed it.

# A different bargain with the data

|               | Reduced-form / IV                                  | Structural                                             |
|---------------|----------------------------------------------------|--------------------------------------------------------|
| Identified by | a research design (an instrument, a discontinuity) | a model + functional-form & distributional assumptions |
| Delivers      | one credibly-identified effect                     | a full set of parameters → counterfactuals, welfare    |
| Robust to     | mis-specification of the model                     | weak instruments, design failures                      |
| Vulnerable to | "that is only one number, for one margin"          | "that answer is only as good as the assumptions"       |

Neither dominates. They answer **different questions**, and trade different assumptions to get there.

# What a structural model usually needs

To write down "what the agent would choose", you typically need:

- a **dynamic decision problem**: savings, labour supply, schooling, and so on, where today's choice changes tomorrow's state. Solved by **dynamic programming**.
- an explicit stand on **expectations**: what does the agent know, and what do they believe about the future? Rational expectations is the common default, but it *is* an assumption.
- distributional assumptions on the **unobservables** (shocks, latent types) the data never show you directly.

None of these are testable from the reduced-form moments alone. That is the cost.

# How the parameters get pinned down

Given the model, the parameters are chosen so that the model **reproduces features of the data**:

- maximum likelihood: match the full likelihood
- GMM / simulated method of moments: match selected moments
- minimum distance: match a vector of reduced-form estimates

The recurring pattern: **reduced-form estimates become the targets**, and the structural step asks *which parameters could have generated them*.

# The honest trade-off

- The standard criticism, *"more assumptions, less robust"*, is true but incomplete.
- The objects structural work is after (willingness to pay, the welfare cost of risk, behaviour under a counterfactual policy) are **simply not in the reduced-form moments**.
- So the choice is not "robust answer vs fragile answer".
- It is: answer a different question, under stated assumptions — or do not answer it at all.
- This week's paper sits exactly on that interface: a careful reduced-form step, feeding a structural model. Keep this distinction in mind as you read it.