Introduction: structural modeling

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Structural modeling

Founding members of Cowles defined econometrics as:
"a branch of economics in which economic theory and statistical methods are fused in the analysis of numerical and institutional data."

Today: models that combine explicit economic theories with statistical models $\Rightarrow$ **structural econometrics**

Even a **linear regression** can be structural!

In **this course** we:

- review different different structural empirical methods
- show applications mostly drawn from Labor and IO
- these methods are applicable to any field in economics!

Structure of the course

Part I: Static and Continuous Choice Models

Chapter 1: Production function estimation

Chapter 2: Applications of discrete and dynamic choice models

Part II: Dynamic Discrete Choice Models

Chapter 3: Dynamic discrete choice models: full solution approaches

Chapter 4. Conditional choice probability (CCP) estimation

Part III: Games and Auctions

Chapter 5. Dynamic discrete games with incomplete information

Chapter 6. Auctions

Dynamic discrete choice structural models

The core of the course focuses on dynamic discrete choice models.

Individuals consider the effect of **today's decisions** on **tomorrow's outcomes** (unlike in the models seen in Microeconometrics).

Seminal work: Miller (1984), Wolpin (1984), Pakes (1986), Rust (1987).

Many examples in economics of **forward-looking** individuals:

- Labor: human capital/career decisions/migration.
- Macro/finance: investment decisions.
- IO: engine replacement/patents/market entry-stay-exit.
- Family economics: marriage/fertility.
- Health: smoking/going on a diet.
- Micro: social interactions.

Dynamic discrete choice structural models

We posit a **stochastic dynamic programming model** (DP).

Agents assumed to be **rational** and **forward-looking**.

Estimate **structural** parameters that describe preferences and constraints of the DP, including beliefs about uncertain future events.

Use the **revealed preference** to recover primitives.

Advantages of the structural approach:

- Closely tied with economic theory.
- Policy evaluation.
- Model structure helps in identification.

Drawbacks:

- Computational cost (less so in approaches based on Hotz and Miller, 1993).
- Identification relies on functional form assumptions.