

# EIO (Ch.1–Ch.9): The Coherent Logic

*Why the sequence is consistent: primitives  $\rightarrow$  equilibrium  $\rightarrow$  counterfactual equilibrium*

## The key line (the invariant)

The entire arc of Chapters 1–9 is a single inferential pipeline:

$$\begin{array}{ccc} \underbrace{\text{Primitives}} & + & \underbrace{\text{Equilibrium behavior}} \\ \text{preferences, technology/costs, information, constraints} & & \text{demand, competition, entry, dynamics} \\ \Rightarrow & & \Rightarrow \\ \underbrace{\text{Observed outcomes}} & & \underbrace{\text{Counterfactual outcomes}} \\ \text{prices, quantities, shares, entry/exit, networks} & & \text{policy / merger / regulation / innovation} \end{array} .$$

The sequence is coherent because each chapter supplies (i) a missing primitive or (ii) a missing equilibrium restriction that makes those primitives identifiable from data, so that counterfactual equilibria become credible.

## Chapters 1–9 as “missing pieces” of the same machine

1. **Chapter 1 (Big picture).** EIO is the strategy: use economic structure and data to recover primitives, then simulate counterfactuals. *Role:* defines the pipeline and the goal (policy-relevant prediction).
2. **Chapter 2 (Demand).** Recover **preferences** and **substitution patterns** from  $(p, x, s)$ . *Role:* delivers demand derivatives (elasticities / Jacobians), which are the key inputs for markups and merger diversion.
3. **Chapter 3 (Production / Productivity).** Recover **technology** and **cost heterogeneity** (TFP) from  $(y, \text{inputs})$ , addressing simultaneity and selection. *Role:* supplies cost-side primitives that discipline marginal costs and firm heterogeneity.
4. **Chapter 4 (Competition / Conduct).** Combine **demand** with **equilibrium FOCs** to map outcomes into **markups** and **marginal costs**, and (with additional variation) infer **conduct**. *Role:* the core bridge: demand slopes + FOCs  $\Rightarrow$  markups  $\Rightarrow$  marginal costs.
5. **Chapter 5 (Entry).** Use entry/zero-profit inequalities to recover **fixed and entry costs** and the **competition effect** of additional rivals. *Role:* completes the cost structure (fixed + variable) and makes market structure an equilibrium outcome.
6. **Chapter 6 (Dynamics: foundations).** Introduce **states** and **continuation values**; show why static models misread behavior when actions shift future states (durables, inventories, investment, adjustment). *Role:* explains when equilibrium must be dynamic and provides the Bellman framework.
7. **Chapter 7 (Dynamic consumer demand).** Model intertemporal substitution (inventory / installed base) using household panels; use inclusive values and state reduction to make estimation feasible. *Role:* repairs demand identification when timing (stockpiling/waiting) is central.

8. **Chapter 8 (Dynamic games: methods).** Add strategic interaction to dynamics: MPE, CCPs, valuation, estimation (ML/MPEC vs two-step CCP vs NPL vs inequalities), heterogeneity, dimensionality, equilibrium selection. *Role:* supplies the machinery to estimate dynamic equilibria with many firms.
9. **Chapter 9 (Dynamic games: applications).** Apply the full pipeline to regulation, networks, and innovation: estimate primitives, solve equilibrium, and compute counterfactual equilibria and welfare. *Role:* demonstrates that the pipeline is operational and policy-relevant.

## Why the coherence is high (one-sentence explanation)

Each chapter answers the same question at a higher level of realism:

*What primitive is missing, and what equilibrium restriction lets us recover it from data so we can predict a new equilibrium under a counterfactual?*

## Ultra-concise summary (single sentence)

Empirical IO is the disciplined recovery of demand and cost primitives plus the equilibrium mapping, enabling credible counterfactual equilibria under mergers, regulation, entry changes, and innovation incentives.