EIO Intro: Fast, Intuitive Study Notes

Mental model, core equations, and identification checklist

Core mental model

Empirical Industrial Organization (EIO) is "reverse-engineering" a market from data. A high-level workflow is:

1. **Question:** define a concrete empirical or policy question (e.g., merger effects, entry regulation, pricing power).
2. **Model:** specify a parsimonious economic environment (demand, costs, conduct, and entry).
3. **Equilibrium logic:** combine equilibrium conditions with revealed preference to recover latent objects (e.g., demand shocks, marginal costs, fixed costs).
4. **Identification:** address endogeneity using instruments, natural experiments, and/or credible covariance restrictions.
5. **Estimation and counterfactuals:** estimate primitives, then evaluate counterfactual policies (e.g., how a cost shock changes prices, output, welfare, and market structure).

High-ROI study plan (45–90 minutes)

Pass 1 (10–15 min): Memorize the four building blocks

Most introductory EIO applications (including the cement-style example) are organized around:

- **Demand:** mapping from prices to quantities (plus demand shifters).
- **Costs:** variable cost technology (marginal cost) and **fixed costs**.
- **Conduct:** the strategic interaction determining markups (e.g., Cournot or Bertrand).
- **Entry:** the determination of the number of firms, typically via a zero-profit or free-entry condition.

If you can state these four blocks clearly, you have the model skeleton.

Pass 2 (20–30 min): Internalize the equilibrium "engine"

In a homogeneous-good Cournot model with free entry, three relationships do most of the work:

(i) Inverse demand

$$P = A - BQ,$$

where A shifts market demand and B governs the slope (and hence the elasticity, locally).

(ii) Cournot first-order condition (MR = MC)

The firm-level condition links markups to demand curvature and competition intensity. Intuitively, *holding N fixed*, per-firm output $q(N)$ is:

- increasing in market demand (higher A),
- decreasing in marginal cost (higher MC),
- decreasing in the toughness of competition (higher N and/or steeper demand, larger B).

(iii) Entry / zero-profit condition

The entry condition pins down N and connects **fixed costs** to market structure. A useful takeaway is:

> **Fixed costs do not affect the marginal production decision conditional on N, but they do affect N.**

Therefore, fixed costs matter primarily through industry structure and equilibrium firm size.

One-line summary: the Cournot condition determines "optimal firm scale given N," while the entry condition determines N.

Pass 3 (15–30 min): Identification as a search for credible variation

A central econometric issue is that **price is endogenous in demand estimation**: prices respond to both cost conditions and unobserved demand shocks. Similarly, quantities (or per-firm output) are endogenous in cost estimation.

Common identification routes include:

- **Randomized variation (benchmark):** exogenous cost shifters that move prices without shifting demand.
- **Exclusion restrictions / IV:** input prices or cost shifters as instruments, under the assumption they affect supply but are orthogonal to demand shocks.
- **Natural experiments:** policy changes or shocks that shift costs; typically paired with fixed effects and transparent assumptions.
- **Covariance restrictions:** moment conditions that rely on assumed orthogonality between shocks across equations.

Unifying principle: find variation that shifts **supply/costs** (thus prices) while remaining plausibly independent of **unobserved demand determinants**.

Why structural models?

Reduced-form relationships can be informative, but structural models are essential for **counterfactual analysis**:

$$\text{demand} + \text{costs} + \text{conduct} + \text{entry} \;\Rightarrow\; \text{predictions under policies not observed in the data.}$$

This is the core reason EIO emphasizes primitives and equilibrium.

A testable intuition: market size and industry structure

In oligopoly models with fixed costs:

- larger markets typically support **more firms** and different equilibrium firm-size patterns;
- the mapping from **market size** to **firm size** is informative about fixed costs and the curvature of variable costs (e.g., how quickly marginal cost rises with output).

This contrasts with settings where market size does not translate into market power in the same way (e.g., perfect competition, some monopolistic competition benchmarks).

Exam-ready checklist

- **Objective:** answer an empirical/policy question (mergers, entry, pricing, regulation).
- **Model primitives:** demand, costs, conduct, entry.
- **Equilibrium objects:** solve for P, Q, N (and firm size q).
- **Reduced form vs structural:** reduced form maps exogenous shifters to outcomes; structural recovers primitives and behavior.
- **Key econometric challenge:** endogeneity of price/quantity $\Rightarrow$ identification strategy required.
- **Deliverable:** counterfactual predictions (prices, quantities, welfare, entry/exit).

Self-test (5 minutes)

1. If fixed costs increase, what happens to N and to equilibrium output per firm? Explain using the entry condition.
2. If marginal costs decrease, what happens to equilibrium prices and consumer welfare? Explain using demand and the conduct condition.
3. Why is price endogenous in a demand regression? Give a one-sentence explanation.
4. Propose one valid instrument for price in demand estimation and state the key exclusion assumption.