Chapter 4 Summary: Market Design

Diagnose failures, compare mechanisms, and improve institutions (Agarwal & Budish, 2021)

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Why Market Design? (and why IO should care)

- Real markets are **rule-based institutions**, not just abstract supply–demand diagrams.
- Market design studies how **rules shape actions, incentives, information, and allocations**.
- Two key links to **Industrial Organization (IO)**:
  - **Market failures**: identify sources, then engineer fixes.
  - **Institutional detail**: small implementation choices can have large welfare effects.
- Design issues can matter even without classic market power (and can also **interact** with market power).

A practical taxonomy of market design problems

- **Matching vs. Allocation**:
  - Matching: two sides are agents (workers–firms, students–schools).
  - Allocation: one side is objects (housing units, courses, kidneys).
- **Transferable vs. Non-transferable utility**:
  - With a numeraire (wages/prices) vs. no (or fixed) transfers.
  - "No transfers" includes settings with money but **wages fixed outside the mechanism**.
- **Single-unit vs. Multi-unit demand**: one-to-one, many-to-one, combinatorial bundles.
- **Endowments / property rights**: initial ownership, priorities, outside options.

Canonical environments (workhorse models)

- **One-to-one matching (no transfers)**: Gale–Shapley baseline.
- **Many-to-one matching**: hospitals/schools with capacities; requires "responsive" preferences.
- **Matching with transfers**: Becker-style transferable utility (surplus split by transfers).
- **Single-unit assignment**: agents choose among objects; can be ordinal or cardinal.
- **House allocation / kidney exchange**: endowments matter; trading cycles deliver gains.
- **School choice**: priorities may be treated as preferences or as policy constraints.

Design takeaway

Pick the model that matches the **institutional constraints** (capacity, transfers, priorities, timing).

Core mechanisms: what they do (and why we use them)

Deferred Acceptance (DA)

- Multi-round "propose–hold–reject".
- Stable (or **no justified envy** in school choice priorities view).
- **Strategy-proof** for the proposing side.
- Many-to-one variant handles capacities.

Top Trading Cycles (TTC)

- For endowments (houses, kidneys).
- Clears cycles recursively.
- **Strategy-proof** and **ex-post Pareto efficient**.
- Can violate stability/priority notions in some settings.

- Other common tools: **Immediate Acceptance (Boston)**, **Random Serial Dictatorship (RSD)**, **Hylland–Zeckhauser (HZ) pseudomarket**.

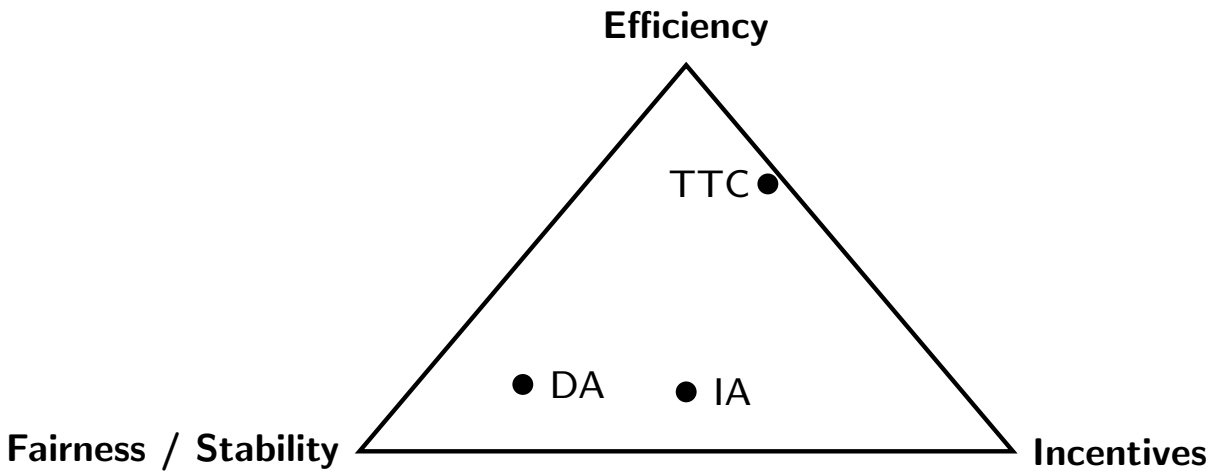
Diagnosing Market Failures (what can go wrong)

- **Coordination failures**: decentralized offers/waitlists create congestion and inefficiency.
- **Incentive problems**: strategic misreporting under non-strategy-proof rules (e.g., Boston mechanism).
- **Rent-Seeking**: In **high-frequency trading** the processing of orders often leads to arbitrage opportunities contingent on speed, leading to a **rent seeking competition** without clear societal benefits.
- **Design interacts with market power**:
  - Market power can be exercised **through** the mechanism's rules.
  - Powerful participants may **resist reforms** if they profit from inefficiencies.
  - If agents have an **incentive to participate in a market**, it can increase revenue more than an optimal auctioning process, meaning **securing participation** can be more important than design.
- Bottom line: a bad mechanism can generate inefficiency **even absent imperfect competition**.

Evaluating and Comparing Designs (trade-offs)

Mechanism	Efficiency	Stability/Fairness	Strat.-proof
DA	○	✓	✓
TTC	✓	○/×	✓
IA (Boston)	○	×	×
RSD	○	○	✓
HZ	✓(ex-ante)	○	○ (SP-L)

✓ strong ○ context-dependent × weak



You rarely get all three.
Design is choosing a principled compromise.

Implementation details can change outcomes

- **Priorities and tie-breaking** (common in school choice):
  - coarse priorities $\Rightarrow$ many ties;
  - single vs multiple tie-breakers can affect perceived fairness and welfare.
- **Cutoff / price-like structure**:
  - DA admits a **cutoff** interpretation (threshold scores determine feasible choice sets).
  - Helps connect matching to **price theory** and supports empirical work.
- Practical principle: specify the mechanism **down to the last rule** (timing, messages, constraints).

Empirical agenda: estimate preferences, run counterfactuals

- Structural empirics parallels IO discrete choice:
  - random utility models using rank lists, observed matches, or both;
  - handle strategic reporting (harder under non-strategy-proof mechanisms).
- Goal: quantify **trade-offs** and predict effects of alternative designs.
- Typical workflow:
  1. model environment + mechanism constraints;
  2. estimate preferences / priority structure;
  3. simulate counterfactual mechanisms/policies and welfare impacts.

Key takeaways

1. Market design studies **how rules allocate scarce resources** (often without prices).
2. IO connection: diagnosing failures + fixing them requires **institutional detail**.
3. Canonical mechanisms (DA, TTC, etc.) come with **sharp property trade-offs**.
4. Empirics is essential: preference estimation + counterfactuals guide real reforms.

Reference: Agarwal, N. & Budish, E. (2021), "Market Design", NBER WP 29367.