

## Lecture 3 - Innovation

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## Innovation and Market Structure

# Innovation as a margin of competition

Innovation is the **dynamic** margin of competition: firms try to change the game by shifting **costs** and **demand**.

## Why IO cares

- ▶ Innovation changes **prices, mark-ups, and welfare** today
- ▶ Innovation changes **market structure** tomorrow (entry/exit, dominance, concentration)
- ▶ Policy trade-off: **static efficiency** (low prices) vs **dynamic efficiency** (strong incentives)

# Types of innovation (and what we model today)

## **Process innovation** (this lecture's workhorse case)

- ▶ Lowers marginal (or average) cost, e.g. a better production method
- ▶ Think: a shift from  $c_0$  to  $c_1 < c_0$

## **Product innovation**

- ▶ Raises willingness to pay, expands demand, or creates new varieties
- ▶ Often analysed with differentiated products and quality ladders (later in the course)

**Stages (high level):** Research → Development → Adoption

## Learning objectives

- ▶ Compute the **private value** of a process innovation under different market structures
- ▶ Define **drastic vs non-drastic** innovations and explain the **replacement effect**  
(**arrowEconomicWelfareAllocation1972?**)
- ▶ Understand how **free entry + endogenous R&D** link innovation to **concentration**  
(**dasguptaIndustrialStructureNature1980?**)

### **i** Today: roadmap

1. Benchmark model: value under **monopoly**, **perfect competition**, and **social planner**
2. **Drastic vs non-drastic** innovations and the **replacement effect**
3. Innovation with **oligopoly** and **entry threat**
4. **Concentration** and **R&D**  
(**dasguptaIndustrialStructureNature1980?**)

## Discussion: Why does innovation matter for growth?

Before the Industrial Revolution (~1760–1840), global GDP per capita was roughly flat for centuries. Since then, it has grown exponentially.

### **i** Question for you

- ▶ What role did innovation (new production methods, machinery, transport) play in this transformation?
- ▶ Why might market structure affect the *rate* of innovation — and therefore long-run growth?
- ▶ Should we expect monopolies or competitive markets to innovate more? (We'll answer this formally in a moment.)

# Market structure and innovation: a two-way relationship

## **Market structure → innovation**

- ▶ Competition affects profits, appropriability, and the gain from becoming “better” than rivals

## **Innovation → market structure**

- ▶ Cost/demand shifts affect entry, market shares, and concentration (and can create dominance)

# Measuring incentives: willingness to pay (WTP)

- ▶ **Firm WTP**: the max lump-sum payment that leaves profits unchanged  $\Rightarrow WTP = \Delta\pi$
- ▶ **Planner WTP**: the max lump-sum payment that leaves welfare unchanged  $\Rightarrow WTP = \Delta W$

In what follows we compute WTP for: **Monopoly** (before/after), **perfect competition** (before; exclusive rights after), and the **social planner**.



Benchmarks: Value of a Process Innovation

# Setup: linear demand + cost-reducing innovation

## Inverse demand

$$P(Q) = A - Q$$

## Technology

- ▶ Constant marginal cost  $c \in \{c_0, c_1\}$
- ▶ Process innovation reduces marginal cost from  $c_0$  to  $c_1$  with  $c_1 < c_0 < A$

### **i** Goal

Compute the value of moving from  $c_0$  to  $c_1$  under different market structures.

# Monopoly benchmark: problem and solution

## Problem

$$\max_Q (A - Q - c)Q$$

## Solution

$$Q^m(c) = \frac{A - c}{2}, \quad P^m(c) = \frac{A + c}{2}, \quad \pi^m(c) = \frac{(A - c)^2}{4}$$

# Monopoly WTP for innovation

## WTP for the innovation

$$\Delta\pi^m = \pi^m(c_1) - \pi^m(c_0) = \frac{(A - c_1)^2 - (A - c_0)^2}{4}$$

### **i** Interpretation

$\Delta\pi^m$  is the monopolist's value of *exclusive* access to the lower cost  $c_1$  (it is incremental because the firm already earns rents at  $c_0$ ).

# Perfect competition benchmark (innovation creates rents)

**Before innovation (all firms at MC  $c_0$ ):**

- ▶ Competitive price:  $P_0^{pc} = c_0$
- ▶ Firm profit:  $\pi = 0$

**After innovation (innovator has exclusive use / patent):**

- ▶ **Drastic:** innovator behaves as a monopolist with cost  $c_1$
- ▶ **Non-drastic:** innovator is constrained by the competitive fringe at cost  $c_0$  (limit pricing)

# Innovation WTP under perfect competition

## Innovator profit / WTP

$$\Delta\pi^{pc} = \begin{cases} \pi^m(c_1) & \text{(drastic)} \\ (c_0 - c_1)(A - c_0) & \text{(non-drastic, } p = c_0) \end{cases}$$

**Why the non-drastic formula?** If the innovator sets  $p = c_0$ , quantity is  $Q = A - c_0$ , so profits are  $(p - c_1)Q = (c_0 - c_1)(A - c_0)$ .

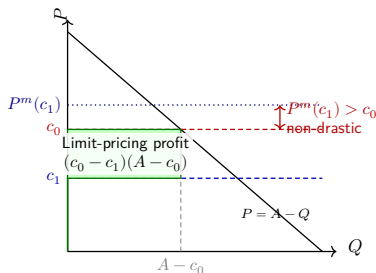
# Drastic vs non-drastic innovation condition

$$\text{Drastic: } P^m(c_1) < c_0 \Leftrightarrow \frac{A + c_1}{2} < c_0 \Leftrightarrow A + c_1 < 2c_0$$

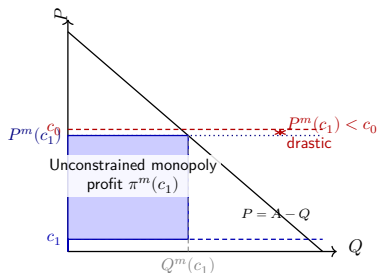
$$\text{Non-drastic: } P^m(c_1) \geq c_0 \Leftrightarrow \frac{A + c_1}{2} \geq c_0 \Leftrightarrow A + c_1 \geq 2c_0$$

Boundary case:  $P^m(c_1) = c_0$  (equivalently  $A + c_1 = 2c_0$ ).

(a) Non-drastic



(b) Drastic



## Numeric check: drastic or non-drastic?

Use the same values as panel (a):  $A = 18$ ,  $c_0 = 10$ , and  $c_1 = 6$ .

- ▶ **Drastic condition:**  $A + c_1 = 24 > 2c_0 = 20 \rightarrow$  **non-drastic**
- ▶ Innovator limit-prices at  $p = c_0 = 10$ , sells  $Q = A - c_0 = 8$
- ▶ Competitive innovator profit:  $(c_0 - c_1)(A - c_0) = 4 \times 8 = 32$
- ▶ Recall monopoly WTP:  $\Delta\pi^m = \frac{(12)^2 - (8)^2}{4} = \frac{144 - 64}{4} = 20$

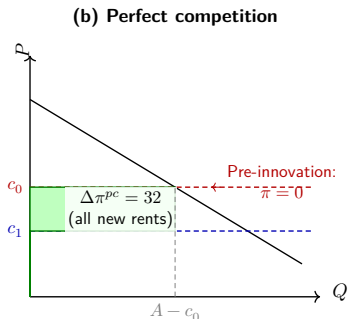
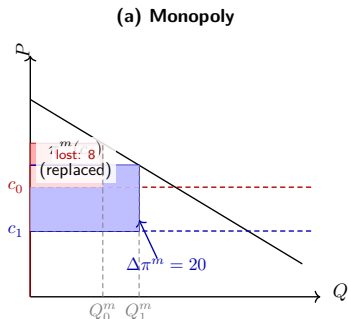
### **i** Replacement effect preview

The competitive innovator earns  $32 > 20$  (the monopolist's WTP). The monopolist gains less because it already earns  $\pi^m(c_0) = 16$  before innovating — it is partly **replacing** existing rents.



# Replacement effect: visual comparison

- ▶ Left panel: the incumbent monopolist already earns  $\pi^m(c_0)$  before innovating.
- ▶ Innovation raises monopoly profit only by the increment  $\pi^m(c_1) - \pi^m(c_0)$ .
- ▶ Right panel: under competitive pre-innovation conditions, the innovation mostly **creates** rents.



## Replacement effect (**arrow** Economic Welfare Allocation 1972?)

- ▶ The key object is the **incremental** value of innovation.
- ▶ Competitive benchmark: pre-innovation profits are approximately zero, so  $\Delta\pi^{pc} \approx \pi_{\text{after}}^{pc}$ .
- ▶ Monopoly benchmark: pre-innovation profits are positive, so  $\Delta\pi^m = \pi_{\text{after}}^m - \pi^m(c_0)$ .
- ▶ This gap in incremental value is the **replacement effect**.

## Drastic benchmark: one-line wedge

If innovation is drastic and grants exclusive rights:

$$\Delta\pi^{pc} = \pi^m(c_1), \quad \Delta\pi^m = \pi^m(c_1) - \pi^m(c_0)$$

$$\Delta\pi^{pc} - \Delta\pi^m = \pi^m(c_0) > 0$$

- ▶ The wedge equals pre-innovation monopoly rents,  $\pi^m(c_0)$ .
- ▶ The replacement effect is strongest when baseline monopoly rents are high.

## Replacement effect: intuition

### ! Takeaway

Holding everything else fixed, an incumbent monopolist has **weaker** incentives to innovate than a competitive industry because it is “replacing” its own pre-innovation rents.

# Appropriability and imitation

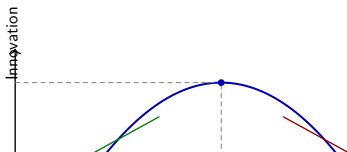
- ▶ If the innovation cannot be protected (instant diffusion / perfect imitation), competition drives price to  $c_1$  and the innovator's WTP is zero.
- ▶ Most IO policy questions start from imperfect but positive appropriability (patents, secrecy, lead time).

## Empirical example: competition and innovation

- ▶ Low competition: firms have little pressure to “escape.”
- ▶ Intermediate competition: innovation incentives are strongest for neck-and-neck firms.
- ▶ Very high competition: post-innovation rents are compressed, reducing innovation incentives.

### i Inverted-U evidence (QJE)

(**Aghion, Competition, Innovation, Inverted U, 2005?**) document an **inverted-U** relationship between product-market competition and innovation (patents/citations) in UK firms, consistent with “escape competition” incentives for neck-and-neck firms and a **replacement effect** for laggards.



## Social Value of Innovation

## Social planner: value of a cost reduction

After the private-value benchmarks, we now switch to the **social objective**.

**Efficient output** (price equals marginal cost)

$$Q^{sp}(c) = A - c$$

**Total surplus (welfare):**

$$W(c) = \int_0^{A-c} (A - Q - c) dQ = \frac{(A - c)^2}{2}$$

### **i** Interpretation

In this linear example,  $\Delta W = 2 \Delta \pi^m$ : the planner values the output expansion that the monopolist does not internalise.



# Social planner WTP for innovation

**Max WTP for innovation (social planner):**

$$\Delta W = W(c_1) - W(c_0) = \frac{(A - c_1)^2 - (A - c_0)^2}{2}$$

- ▶ This is the full increase in total surplus from lowering marginal cost.
- ▶ In the linear benchmark, it is exactly twice the monopoly incremental profit.

## Putting the benchmarks side-by-side

Environment	What the innovator captures	WTP / value
Monopoly (incumbent)	Incremental rents	$\Delta\pi^m = \pi^m(c_1) - \pi^m(c_0)$
Perfect competition (pre) + exclusive rights (post)	Mostly created rents	$\Delta\pi^{pc} = \pi^m(c_1)$ if drastic; otherwise limit pricing profit
Social planner	Full surplus gain	$\Delta W = W(c_1) - W(c_0)$

### ! Policy interpretation

Private incentives and social value need not align:  $\Delta W$  **can exceed**  $\Delta\pi$ , but market power created by IPRs also generates static distortions. This is the basic patents trade-off.

## Empirical example: private vs social returns

- ▶ Measured producer gains capture only part of innovation's value.
- ▶ Consumer surplus from quality improvements can be very large.
- ▶ This gap motivates policy tools that raise private appropriability.

### **i** Welfare gains from product innovation (JPE)

(**trajtenbergWelfareAnalysisProduct1989?**) estimates consumer and producer surplus gains from quality improvements in computed tomography (CT) scanners, illustrating that the **social value** of innovation can greatly exceed the innovator's private returns.

## Quick numeric check (optional)

Using the same calibration as earlier ( $A = 18$ ,  $c_0 = 10$ ,  $c_1 = 6$ ):

- ▶ Monopoly:  $\pi^m(c_0) = 16$ ,  $\pi^m(c_1) = 36$ , so  $\Delta\pi^m = 20$
- ▶ Planner:  $W(c_0) = 32$ ,  $W(c_1) = 72$ , so  $\Delta W = 40$  (twice the monopoly gain)

### **i** Discussion question

In what sense is this “too little” innovation from a welfare perspective? What policy instruments could close the gap?

## Innovation with Rivals and Entry

# Incentives to innovate with rivals: intuition first

We now move from benchmark environments to **strategic interaction** with rivals and entry threat.

Innovation incentives are not monotone in “competition intensity.”

- ▶ They depend on market structure ( $n$ , differentiation, price vs quantity competition).
- ▶ They depend on technology and institutions (protectability, spillovers).

## **i** Rule of thumb

More rivals reduce baseline profits (discouraging innovation), but can raise the value of becoming the low-cost firm (encouraging innovation).

## Number of rivals: Cournot intuition

In linear Cournot, R&D incentives can follow an **inverse-U** as  $n$  rises:

- ▶ **Competition effect:** more firms compress profits for everyone.
- ▶ **Competitive advantage effect:** a cost lead is more valuable when many higher-cost rivals remain.

Which force dominates is an empirical question and can vary by industry.

# Entry threat framework: incumbent vs entrant

Consider an incumbent monopolist facing a potential entrant:

- ▶ Innovation lowers marginal cost from  $c_0$  to  $c_1 < c_0$ .
- ▶ The entrant can profitably enter only if it obtains the innovation.
- ▶ Let  $\pi^d(c_i, c_j)$  be firm  $i$ 's duopoly profit when own cost is  $c_i$  and rival cost is  $c_j$ .

Timing:

1. Firms compete for innovation (patent auction / R&D race).
2. Innovation is allocated to the higher-valuation firm.
3. Entry decision and product-market competition occur after allocation.



# Who values innovation more?

Payoff logic by winner:

- ▶ If the **incumbent** wins: market stays monopoly, payoff  $\pi^m(c_1)$ .
- ▶ If the **entrant** wins: entry occurs, payoffs become  $\pi^d(c_0, c_1)$  for the incumbent and  $\pi^d(c_1, c_0)$  for the entrant.

So per-period valuations are:

$$V_I = \pi^m(c_1) - \pi^d(c_0, c_1), \quad V_E = \pi^d(c_1, c_0)$$

## Entry threat: pre-emption condition (gilbertPreemptivePatentingPersistence1982?)

The incumbent has stronger innovation incentives when:

$$V_I > V_E \Leftrightarrow \pi^m(c_1) > \pi^d(c_1, c_0) + \pi^d(c_0, c_1)$$

This is more likely when products are close substitutes, so entry would sharply reduce incumbent profits.

### ! Interpretation

For incumbents, innovation has a **dual payoff**: efficiency gain (lower cost) plus market-structure protection (detering entry). That is the pre-emption channel.

## Discussion: when does pre-emption fail?

### **i** Discussion question

Under what market conditions might an entrant have stronger innovation incentives than the incumbent? What features would reverse the pre-emption result?

## Answer: when entrant incentives dominate

Entrant incentives are stronger when:

$$V_E > V_I \quad \Leftrightarrow \quad \pi^d(c_1, c_0) + \pi^d(c_0, c_1) > \pi^m(c_1)$$

- ▶ **Weak business-stealing effect:** products are more differentiated, so entry hurts the incumbent less.
- ▶ **Low market-structure protection value:** moving from duopoly to monopoly is not worth much to the incumbent.
- ▶ **High entrant upside from innovation:** entrant post-entry profits  $\pi^d(c_1, c_0)$  are large (e.g., efficient entry, strong demand segment).
- ▶ **Large incumbent replacement effect:** the incumbent already has substantial rents without innovating, so incremental gains are limited.
- ▶ **Weaker appropriability for incumbents** (strong spillovers/imitation): innovation is less effective as an entry-deterrence tool.

## Empirical example: strategic incentives and market share

### **i** Pre-emptive innovation patterns (ReStud)

(**blundellMarketShareMarket1999?**) find that higher market share and market value predict more patenting/innovations in UK manufacturing firms, consistent with **strategic** incentives (including pre-emptive innovation) in oligopolistic industries.

Endogenous R&D and Market Structure:  
(**dasguptaIndustrialStructureNature1980?**)

# Big Question

In Dasgupta-Stiglitz, firms choose R&D and entry is endogenous. The central question is: **what jointly determines innovation intensity and concentration?**

This final model puts both objects,  $x$  and  $N$ , inside one equilibrium system.

Key forces:

- ▶ **Demand conditions** (elasticity, market size)
- ▶ **R&D technology** (how effectively spending lowers cost)
- ▶ **Free entry** (how many firms can cover R&D outlays)

## Notation for this section

Symbol	Type	Meaning
$x$	Choice	R&D expenditure per firm
$c(x)$	Function	Marginal cost, with $c'(x) < 0$
$N$	Outcome	Number of active firms (endogenous)
$\varepsilon$	Parameter	Market demand elasticity
$\alpha$	Parameter	R&D cost elasticity, $\alpha = -\frac{dc(x)}{dx} \frac{x}{c}$



## Planner benchmark: why scale matters

Planner problem:

$$\max_{x, Q} V(x, Q) = U(Q) - c(x)Q - x$$

FOC for R&D:

$$-c'(x)Q = 1$$

Interpretation: the marginal benefit of R&D is proportional to output scale  $Q$ , so larger markets justify more cost-reducing innovation.

# Empirical anchor: market size and innovation

**i** Pharmaceutical innovation responds to demand

(**acemogluMarketSizeInnovation2004?**) show that larger potential markets lead to:

- ▶ more pharmaceutical innovation (new drugs / new molecular entities)
- ▶ consistent evidence that innovation incentives rise with market scale

## Industry side: firms choose output and R&D

Assume symmetric Cournot competition. Firm  $i$  solves:

$$\max_{x_i, q_i} \pi_i = [P(Q) - c(x_i)]q_i - x_i, \quad Q = q_i + q_{-i}$$

In symmetric equilibrium,  $q_i^* = Q^*/N^*$  and  $x_i^* = x^*$ .

## Two equilibrium conditions

From Cournot pricing (perceived elasticity  $N\varepsilon$ ):

$$\frac{P - c}{P} = \frac{1}{N\varepsilon} \quad \Leftrightarrow \quad P - c = \frac{P}{N\varepsilon}$$

From free entry (zero profit):

$$(P - c) \frac{Q}{N} - x = 0 \quad \Leftrightarrow \quad P - c = \frac{Nx}{Q}$$

Entry continues until operating margins exactly cover per-firm R&D spending.

## Deriving concentration in one step

Equate the two expressions for the margin:

$$\frac{P}{N\varepsilon} = \frac{Nx}{Q}$$

Use the R&D elasticity definition with the R&D FOC ( $-c'(x)q = 1$ ), which implies:

$$\frac{x}{q} = \alpha c \quad \Rightarrow \quad \frac{Nx}{Q} = \alpha c$$

where symmetry implies  $q = Q/N$ .

So:

$$\frac{P}{N\varepsilon} = \alpha c$$

Divide by  $P$  and substitute  $c/P = 1 - \frac{1}{N\varepsilon}$ :

## Core result: equilibrium concentration

$$\frac{1}{N^*} = \frac{1}{\varepsilon} \cdot \frac{\alpha}{1 + \alpha}$$

### **i** Interpretation

Concentration and innovation are jointly determined.

Higher R&D effectiveness ( $\alpha$ ) supports higher concentration, while more elastic demand ( $\varepsilon$ ) supports lower concentration.

## Numerical check

Using  $\frac{1}{N^*} = \frac{1}{\varepsilon} \cdot \frac{\alpha}{1+\alpha}$ :

- ▶ If  $\varepsilon = 2$  and  $\alpha = 1$ , then  $\frac{1}{N^*} = \frac{1}{4}$  so  $N^* = 4$ .
- ▶ If  $\varepsilon = 2$  and  $\alpha = 3$ , then  $\frac{1}{N^*} = \frac{3}{8}$  so  $N^* \approx 2.7$ .

### **i** Discussion question

If policy raises R&D effectiveness ( $\alpha$ ), the model predicts **more concentration** (lower  $N^*$ ).

When is that welfare-improving once we account for both dynamic gains and static mark-up losses?

# Comparative statics and trade-offs

With  $P(Q) = \sigma Q^{-\varepsilon}$  and  $c(x) = \beta x^{-\alpha}$ :

- ▶ Here,  $\sigma > 0$  is a demand-level (market-size) shifter.
- ▶  $\frac{\partial(1/N^*)}{\partial \alpha} > 0$ : more effective R&D tends to increase concentration.
- ▶  $\frac{\partial(1/N^*)}{\partial \varepsilon} < 0$ : more elastic demand tends to reduce concentration.
- ▶  $\frac{\partial x^*}{\partial \sigma} > 0$ : larger markets raise R&D effort.
- ▶ Typically,  $x^*(N+1) < x^*(N)$  but  $Q^*(N+1) > Q^*(N)$ : more firms improve static efficiency yet can weaken per-firm innovation incentives.

This is the core dynamic-static tension in endogenous market-structure models.



## Addendum: Welfare Standards in Competition Policy (Consumer vs Total Surplus)

# Why IO students should care

Competition policy is applied IO: every merger/abuse case implicitly answers:

- ▶ **What counts as harm?** (prices? quality? innovation? rivals?)
- ▶ **Whose welfare counts?** consumers only, or consumers + producers?
- ▶ **How are trade-offs treated?** (efficiency vs market power; static vs dynamic)

This lecture: the *welfare standard* choice and what it implies for enforcement design, using four anchors:

- ▶ Kaplow (2011) normative welfare economics + distribution separation
- ▶ Neven & Röller : political economy of the welfare standard
- ▶ Farrell & Katz: institutional/process critique of the “welfare standard debate”
- ▶ Williamson (1972): the classic *efficiency–market power* trade-off formalization

## Kaplow's choosing a welfare standard

- ▶ **Consumer welfare / consumer surplus (CS):** weight consumers; producer gains may not offset consumer losses.
- ▶ **Total welfare (TW):** CS + producer surplus (PS); standard Kaldor–Hicks social surplus.

Kaplow's two core issues:

1. **Distribution:** does CS better protect poorer consumers?
2. **Policy design:** if distribution matters, should it be handled by *competition law* or by *tax/transfer*?

## Kaplow's central claim

The canonical welfare-econ logic in Kaplow:

- ▶ If society cares about distribution, it is (usually) **more efficient to address it through the tax/transfer system** rather than by distorting product-market rules case-by-case.
- ▶ Therefore, a switch from TW to CS *to pursue distributional goals* is typically a second-best instrument.

Implication:

- ▶ A TW standard is often normatively preferred **unless** taxes/transfers are unavailable or severely constrained.

# Practical reading of Kaplow for IO

For applied IO (mergers/abuse):

- ▶ Under **TW**, an efficiency gain can offset a price increase if the *net surplus* rises.
- ▶ Under **CS**, you often need **pass-through**: efficiencies must prevent consumers from being harmed.

This difference is *huge* in cost-reduction mergers, vertical restraints, and platform settings where PS can increase even when short-run prices rise.

## Neven and Röller (2005) merger control

Political economy problem: **common-agency**

- ▶ Merging firms and rivals can **lobby/influence** the agency.
- ▶ Consumers are often **diffuse** and (in many designs) are modeled as *not lobbying*.

**Question:** Which welfare standard (CS vs TW) yields better outcomes when enforcement is politically influenced?

## Main result (intuition)

A CS standard can be *strategically robust* in some political environments because:

- ▶ TW gives more “credit” to producer gains (incl. gains captured by concentrated interests), which can amplify lobbying distortions.
- ▶ If firms/rivals are the effective political actors, a CS standard can act as a **commitment device** against rent-seeking that masquerades as “efficiency”.

Bottom line: *even if TW is normatively attractive*, CS may dominate when institutions are captured or non-transparent.

## Farrell and Katz (2006) “antitrust is not straightforwardly welfarist”

Argue the CS vs TW debate misses two big points:

1. Antitrust often **protects a process** (e.g., competition) rather than maximizing a welfare function directly.
2. Enforcement is built on **administrability, presumptions, and error costs**, not full-information welfare maximization.

They emphasize that legal rules must be operational under uncertainty:

- ▶ burdens of proof,
- ▶ evidentiary screens,
- ▶ per se vs rule-of-reason structure,
- ▶ predictability and deterrence.



## “Error costs” and why standards matter less than rules

Even if you pick CS or TW, what courts/agencies *do* is mediated by:

- ▶ **Screens** (market definition, market power, foreclosure shares)
- ▶ **Safe harbors**
- ▶ **Presumptions** (e.g., certain concentration thresholds)
- ▶ **Type I vs Type II errors** (false positives vs false negatives)
- ▶ The welfare standard debate is often a proxy for deeper disagreements about how to manage uncertainty, litigation cost, and institutional competence.

# IO takeaway: welfare standard vs decision procedure

In IO terms: - Welfare standard = objective function. - Decision procedure = constrained optimization with limited observables.

So the “real” question in many jurisdictions: - Which standard yields **better implementable rules** under information and political constraints?

# Williamson (1968): the trade-off diagram, formalized

Core contribution:

- ▶ A merger can create **cost savings** (efficiency rectangle) but also increase **market power** causing **deadweight loss** and **transfers**.

In the simplest partial equilibrium picture:

- ▶ Price rises from competition toward monopoly
- ▶ Output falls
- ▶ Consumers lose (transfer + DWL)
- ▶ Producers gain (transfer)
- ▶ Efficiencies may offset DWL and can even raise TW.

Implementation in real policy

## EU Commission: “consumers will not be worse off” (efficiencies in merger control)

In the EU Horizontal Merger Guidelines, the benchmark for efficiencies is explicitly consumer-facing:

- ▶ The relevant benchmark is that **consumers will not be worse off** as a result of the merger (efficiencies must benefit consumers in the relevant markets, in a timely and verifiable way).

This is the practical embodiment of a CS-style constraint.

**Operational implication (what gets litigated):** - quantification and verifiability of efficiencies, - timing (short/medium run), - *pass-through* and competitive constraints.

## EU enforcement priorities: “most harmful to consumers”

The Commission's effects-based language in Article 102 enforcement priorities is framed in terms of conduct “most harmful to consumers,” consistent with consumer-harm screens.

Interpretation for IO:

- ▶ Evidence is organized around price/quality/choice/innovation harms to customers, not around a fully aggregated surplus calculus.

## Canada: efficiencies “trade-off” logic (historical centerpiece)

Canada is the canonical example where merger review historically embedded a stronger **total welfare** logic via an efficiencies trade-off approach in agency guidance:

- ▶ The Bureau’s Merger Enforcement Guidelines (2011) discuss efficiencies and their role in assessment.

**Operational implication:** - parties invest heavily in measuring cost savings and productive efficiencies, - the analysis is closer to a Williamson-style TW balancing exercise, - distributional concerns are less directly built into the test than in a strict CS regime.

## Australia: “public benefit” / society-wide welfare language

Australia's merger guidelines and authorization practice explicitly frame the objective in broad welfare terms (“welfare of Australians”, “society as a whole”, best use of resources):

- ▶ This is naturally aligned with **total welfare** / **net public benefit** balancing.

Operational implication: - broader categories of benefits can enter (beyond short-run consumer prices), - the authority can explicitly weigh economy-wide resource allocation effects.



# Summary and next week

## Summary

- ▶ Innovation value depends on the objective:  $\Delta\pi$  (**private**) versus  $\Delta W$  (**social**)
- ▶ Replacement effect: pre-innovation rents reduce the incumbent's incremental gain from innovation
- ▶ With entry threat, innovation can be worth more because it changes **market structure** (monopoly vs duopoly)
- ▶ In oligopoly, incentives reflect competing forces (competition effect vs competitive advantage effect)

## Next week: patents and IPRs

- ▶ Patents as incentives: monopoly rights vs. dynamic efficiency
- ▶ Patent races and timing
- ▶ Disclosure, licensing, and welfare
- ▶ Horizontal and vertical innovation (brief)

## References

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