Introduction to Information Economics

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Motivation

- Implicit assumption in welfare theorems — product characteristics are perfectly observable to everyone
- But information often is either lacking or is asymmetric.
- Examples:
  - Firm and worker's ability
  - Market for used cars
- How does lack of perfect information change things?
- Do markets with extremely asymmetric info reach a Pareto-optimal equilibrium? Do they even manage to exist?
- Is there scope for welfare-improving interventions?

Introduction to Information Economics

Information Economics is generally concerned with efficient allocation of resources when there is:

- There is hidden information (*adverse selection*):
  - The efficient allocation depends on some random variable
  - Information about the realization of that random variable is dispersed among society
  - Individuals have private motives to act on that information that may diverge from social goals.
- There are hidden actions (*moral hazard*):
  - Agents must be incentivized to take efficient actions
  - But their actions are imperfectly observed
  - So contracts have limited effectiveness

SWT vs. Information Economics

Contrast with the idea behind the Second Welfare Theorem

- In either framework we ask how to "decentralize" an objective.
- And we ask which objectives can be decentralized.
- The SWT
  - Imagines that the planner knows the objective.
  - Endows the planner with the power to distribute resources.
  - Considers "market forces" as a constraint.
  - Proves that efficient allocations can be decentralized.
- The spirit of information economics is
  - The planner needs information from agents to learn the objective.
  - The planner has the power to distribute resources.
  - Institutions like markets are tools, not constraints.
  - Typically only "second-best" allocations can be decentralized.

Rest of This Lecture

1. Simple model of adverse selection
2. Implications. Why do we care?
3. Application: Insurance market (Einav and Finkelstein, 2011 JEP)

The Market for Lemons (Akerlof, 1970)

- Buyer and Seller
- Seller possesses a single indivisible object which is worth
  - θ to the seller
  - $3\theta/2$ to the buyer
- Only seller knows θ, buyer has no private information
- θ is distributed uniformly on $[0, 1]$.
- If they trade at price p then payoffs are:
  - $3\theta/2 - p$ for the buyer.
  - $p - \theta$ for the seller
- Reservation values are zero.

The Market for Lemons

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- What actually happens?

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  - Thus, the only equilibrium outcome is no trade.
- Result: Asymmetric information kills welfare-enhancing trade!

Why Do We Care?

- This toy model delivers a powerful insight into markets with asymmetric information
- Helps explain why some markets underserve some population or fail to exist completely:
  - Why do some people get rejected by insurance companies? (Hendren, ECMA 2013)
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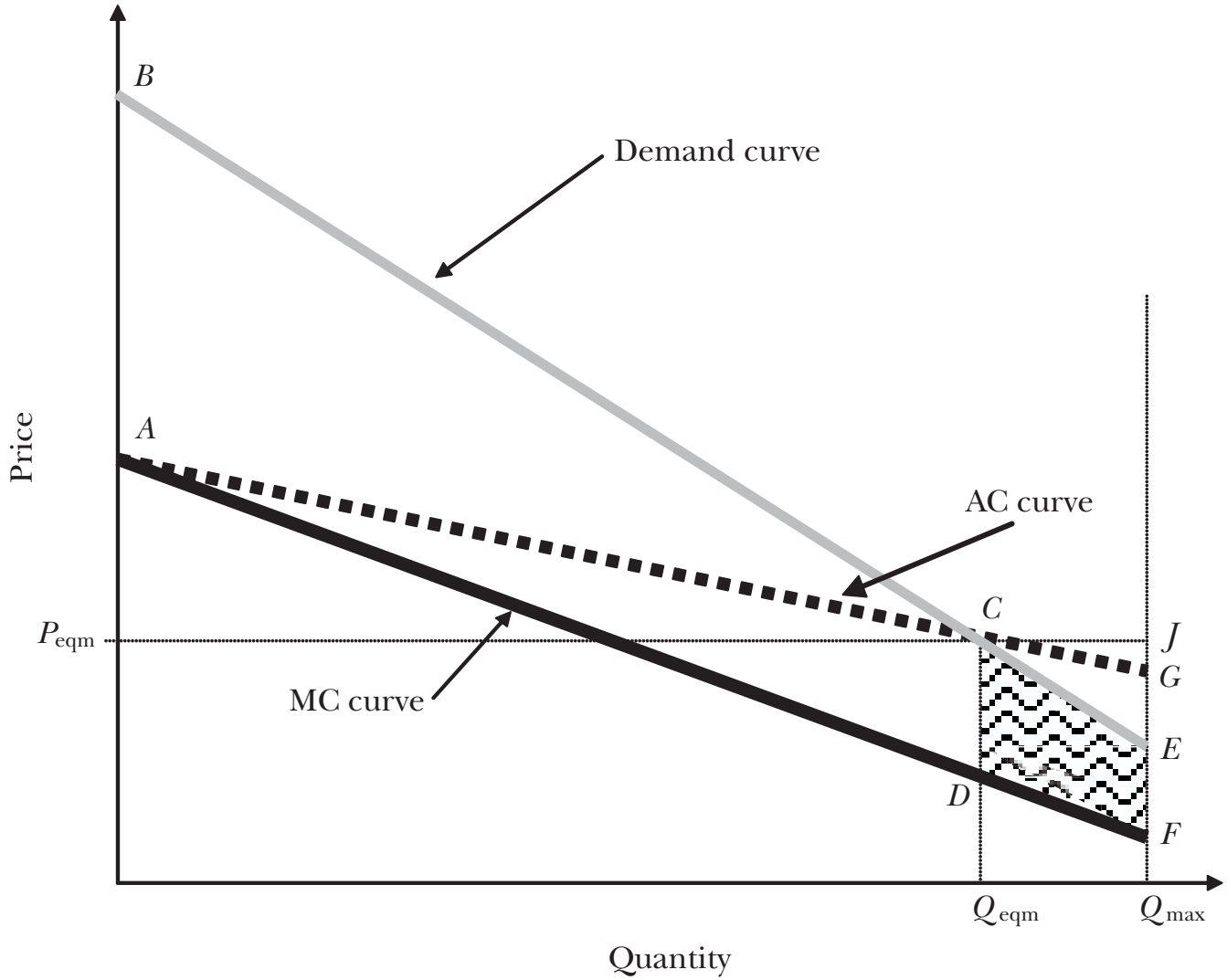
- Helps explain the weird features of markets with asymmetric info:
  - Why do cars lose up to 50% of value next day after purchase? (Akerlof, QJE 1970)
  - Why a trusted intermediary helps the market for trust-intensive products (e.g., Uber, AirBnB, etc.)?

Application: Insurance Market (Einav and Finkelstein, 2011)

- Let's now apply the adverse selection insight to insurance market
- Set-up:
  - Perfectly competitive, risk-neutral firms offer an insurance contract
  - Risk-averse individuals differ only in their privately-known probability (θ) of incurring a loss
- We skip derivations (this week's HW) and go to the aggregates:
  - Demand — cumulative distribution of individuals' willingness-to-pay (WTP) for the contract
  - MC — expected cost of a marginal consumer to the insurance company
  - AC — average expected cost of all consumers willing to buy the contract to the insurance company

Adverse Selection in Insurance Markets



Adverse Selection in Insurance Markets: Notes to Figure 1

- Note that MC curve is *downward* sloping
  - This pattern is driven entirely by demand-side adverse selection — those who want insurance the most are the sickest!
  - This is a defining feature of selection markets. Very different from a traditional set-up where $MC \uparrow$ as $Q \uparrow$.

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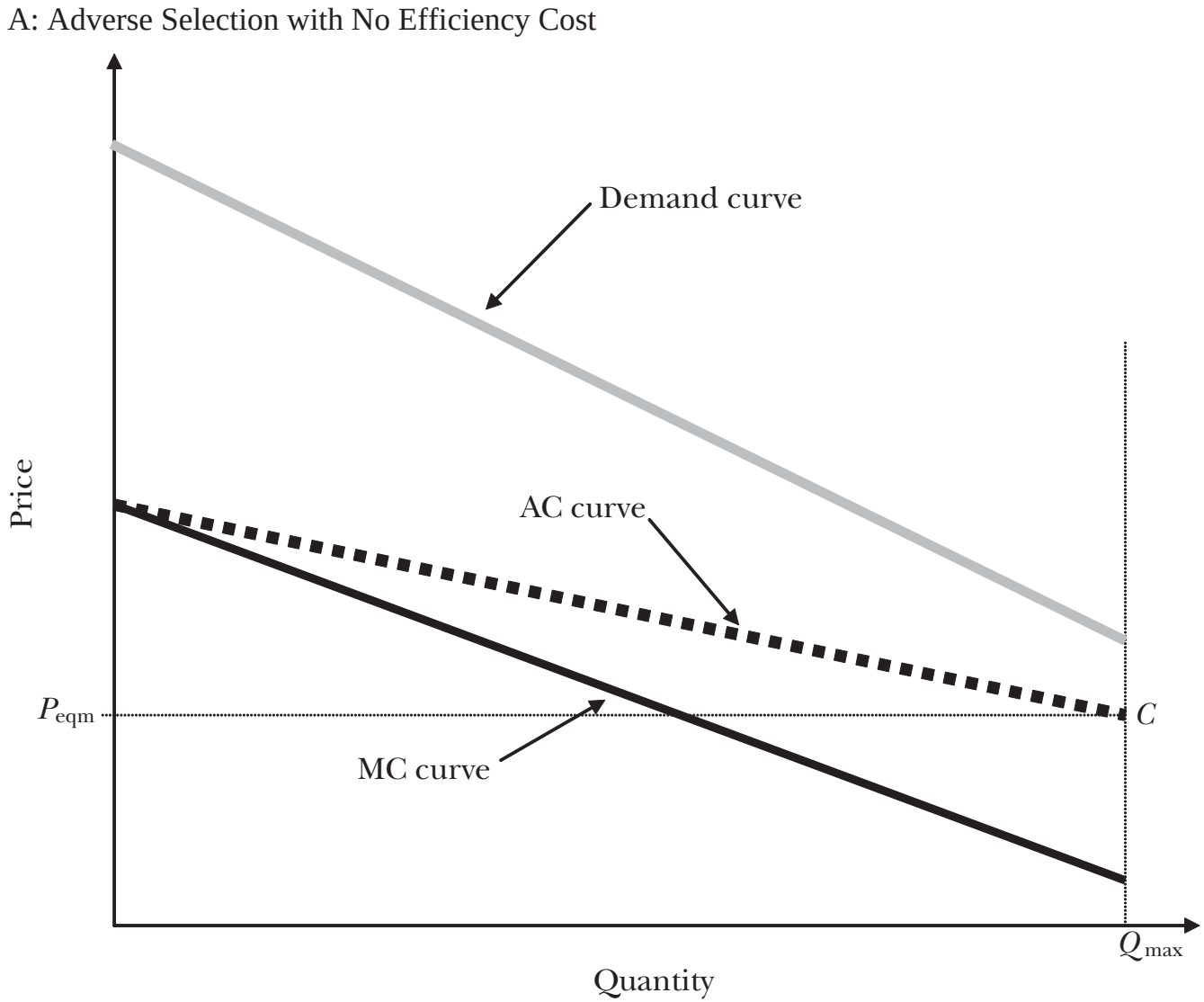
- $WTP > MC$, so it's efficient for everyone to get insured
  - Demand curve is above MC due to agents' risk aversion
- But firms can't price discriminate and have to charge one price
  - Competitive equilibrium: $p = AC$ (why?)
  - Result $\Longrightarrow$ C is the equilibrium
  - People are underinsured, welfare loss is the shaded area

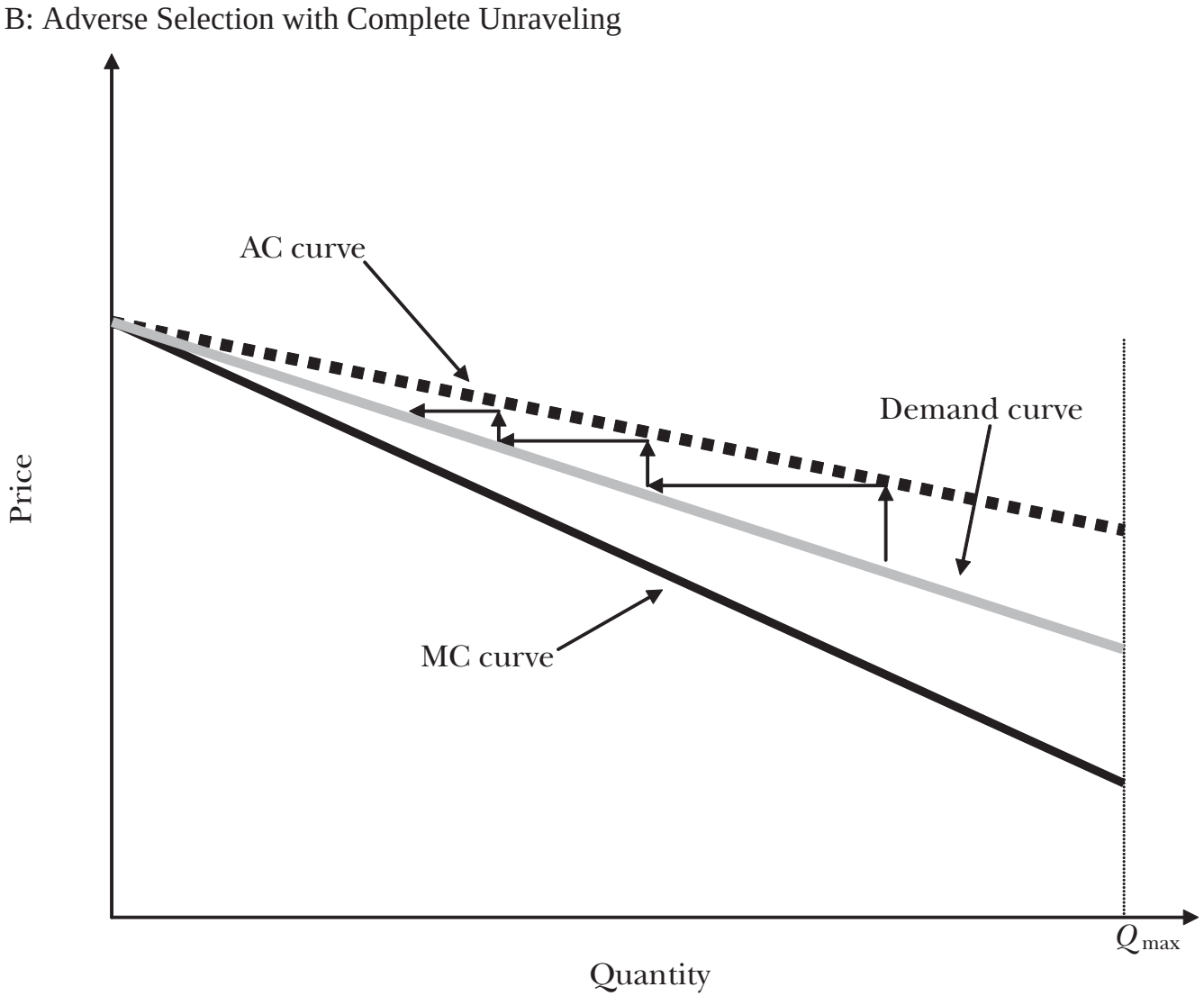
Extreme Example #1: No Welfare Loss



Adverse Selection in Insurance Markets: Notes to Figure 2A

- This is an example when efficient allocation is reached despite adverse selection
- It can arise if agents are highly risk averse (i.e., demand is much above MC) or when heterogeneity in risk is flat (i.e., MC does not rise by a lot for high-risk individuals)

Extreme Example #2: Complete Unraveling



Adverse Selection in Insurance Markets: Notes to Figure 2B

- This is an example when insurance market completely unravels and then fails to exist
- "Death spiral": if a price is set at some p but then is adjusted next period to reflect AC in the previous period, the "death spiral" is triggered and the market unravels

Government Policy

- This framework is also useful for understanding government policy
- Standard policies to prevent unravelling of insurance markets are:
  1. Force everyone to buy insurance
     - Example: Mandatory car insurance
     - Welfare benefits can vary greatly: from zero to huge values

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  3. Impose (or lift) restrictions on price discrimination
     - Example: Pre-existing medical conditions in the U.S.
     - Can help or hurt depending on parameters

Estimation?

- In principle, one can estimate slopes of D, MC, and AC curves and produce an estimate of a welfare loss on a given insurance market
- Very important if need to decide on whether to introduce certain government policy (e.g., insurance mandate)

Einav, Finkelstein, and Cullen (QJE, 2010)

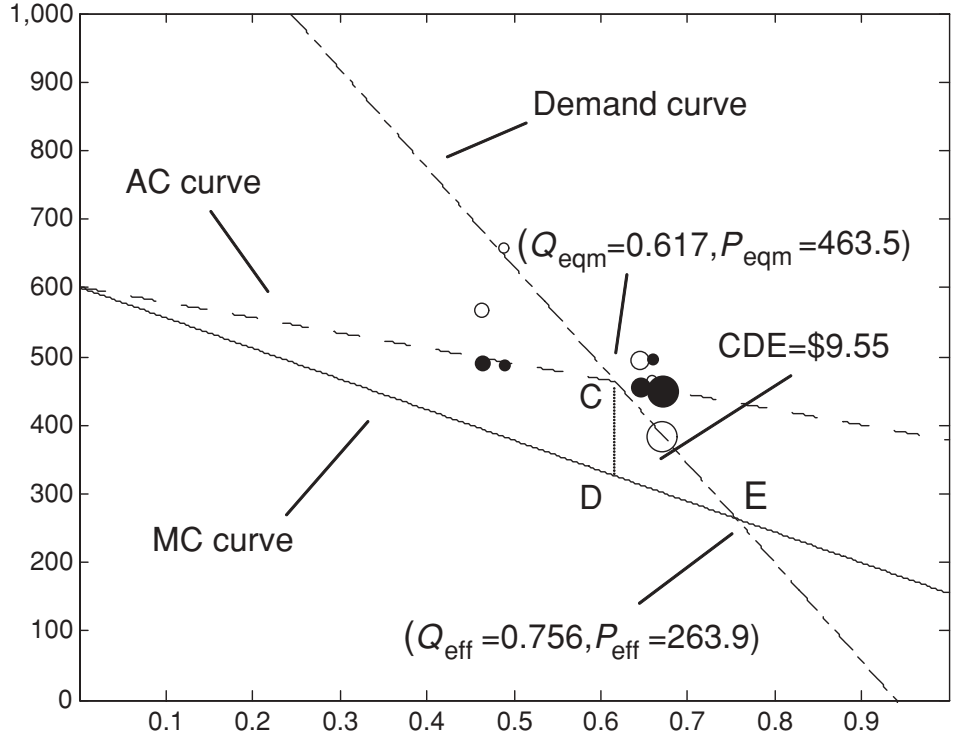

FIGURE V

Efficiency Cost of Adverse Selection—Empirical Analog

This figure is the empirical analog of the theoretical Figure I. The demand curve and AC curve are graphed using the point estimates of our baseline specification (see Table III). The MC curve is implied by the other two curves, as in equation (13). The circles represent the actual data points (see Table II, columns (3) and (4)) for demand (empty circles) and cost (filled circles). The size of each circle is proportional to the number of individuals associated with it. For readability we omit the one data point from Table II with only seven observations (although it is included in the estimation). We label points C, D, and E, which correspond to the theoretical analogs in Figure I, and report some important implied point estimates (of the equilibrium and efficient points, as well as the welfare cost of adverse selection).

- Adverse selection raises the price by $200 above efficient level
- But welfare loss is rather small — about $9.55 per employee

Lecture 1: Conclusion

- Information economics is concerned with how markets with incomplete and asymmetric information operate
- We have explored one key concept in information economics — adverse selection — in a simple model of a 'market for lemons'
- We have shown how important this concept is by applying it to insurance markets