Contracts, Bargaining, and Theories of the Firm

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Course Overview

1. Hidden information and self-selection
   - Optimal contracting/mechanism design
     - with a single informed party
     - with multiple informed parties
   - Signalling hidden information
   - Competitive screening with hidden information
2. Hidden action: moral hazard
3. Bargaining
4. Theories of the firm (only briefly)

Hidden Information and Self-Selection: Introduction

In many transactions, one or more parties has *private information* about *relevant* characteristic.

Examples (bilateral transactions, one side knows more than other):

- used car market—sellers better informed about quality
- insurance market—buyers better informed about probability of illness or loss or about risk aversion
- labor market—workers better informed about ability or willingness to work hard
- within a firm—workers better informed about productivity at specific tasks
- government regulation of natural monopolists—monopolist better informed about costs
- redistributive taxation—individuals better informed about abilities, hence earning power

Hidden Information and Self-Selection: Introduction

- In many transactions, one or more parties has *private information* about *relevant* characteristic.
- In such settings, **if**, instead, information were symmetrically distributed, terms of transaction would vary with information.
- If information is asymmetrically distributed, can the terms of trade vary with the information?
  - Difficulty: If uninformed party asks informed party to reveal information, informed party may not have incentives to do so truthfully.
- Markets with hidden information may break down ("unravel")
  - Illustrated by Akerlof's model of the market for 'lemons' (QJE, 1970)

Used car market (stylized example)

- Assumptions:
  - $\frac{1}{2}$ of used cars are *bad*; $\frac{1}{2}$ are *good*
  - sellers can observe quality; buyers cannot
  - buyers value good cars ar 6; bad cars at 2
  - sellers value good cars at 5; bad cars at 1
  - all agents are risk neutral
- For comparison:
  - If *both* parties could observe quality, good cars would sell for $p_G \in [5, 6]$, bad for $p_B \in [1, 2]$.
  - If *no one* could observe quality, all cars would sell for $p \in [3, 4]$.
- When buyers cannot observe quality, all cars must sell for the *same* price.
  - For sellers of good cars to be willing to offer them for sale, need $p \geq 5$.
  - For buyers to be willing to buy a car of unknown quality, need $p \leq 4$.
  - Hence there is no price such that all types of cars will be traded.
- Market equilibrium: only bad cars offered for sale, $p \in [1, 2]$.
  - market "unravels"; good cars withdrawn
  - equilibrium inefficient; gains from trade in good cars are not realized

Used car market (stylized example)

To understand what makes unraveling of markets with hidden information most likely, modify the assumptions about valuations of sellers and buyers:

- Variant 1: Larger gap in valuations btw. buyers and sellers
  - buyers value good cars ar 8; bad cars at 4
  - sellers value good cars at 5; bad cars at 1
  - now market equilibrium has all cars traded at $p \in [5, 6]$.
  - Variant 1 shows that unraveling is more likely, the smaller the gap in average valuations of buyers and sellers.

- Variant 2: Smaller difference in quality btw. good and bad cars
  - buyers value good cars ar 4.5; bad cars at 3.5
  - sellers value good cars at 3.5; bad cars at 2.5
  - now market equilibrium has all cars traded at $p \in [3.5, 4]$.
  - Variant 2 shows that unraveling is more likely, the larger the difference in quality btw. good and bad cars.

Market unraveling and adverse selection under hidden information

- What happens when there are many different levels of quality?
  - Market equilibrium will involve all qualities *below* some critical level being traded, while all qualities *above* that level are withdrawn. This critical level determines the extent of market "unraveling", and hence the extent of inefficiency due to hidden information.
  - The example and variants above show some of the factors that affect the extent of "unraveling" in equilibrium.
- When unraveling occurs, markets with hidden information result in "adverse selection"
  - Used car market: when sellers of good cars withdraw them from market, buyers get an "adverse selection" out of whole population of cars.
  - Insurance markets: if buyers with better health status are less likely to purchase a particular policy, sellers of that policy face an "adverse selection" from population of potential buyers.

The possibility of self-selection under hidden information

- In many markets/transactions, participants find ways to mitigate the undesirable consequences of hidden information, by enabling privately-informed individuals to **self-select**, i.e. to **credibly** reveal their private information.
- Key idea: transactions need not all occur at same price; price can vary with some other observable component of the transaction.
  - So terms of transaction are two-dimensional, not one-dimensional.
- Examples
  - used car market: price can vary with terms of warranty offered by seller
  - insurance market: premium can be lower if customer accepts restrictions on benefits paid
  - labor market: wage can vary with worker's educational qualifications
  - regulation: price charged by firm can vary with lump-sum subsidy received

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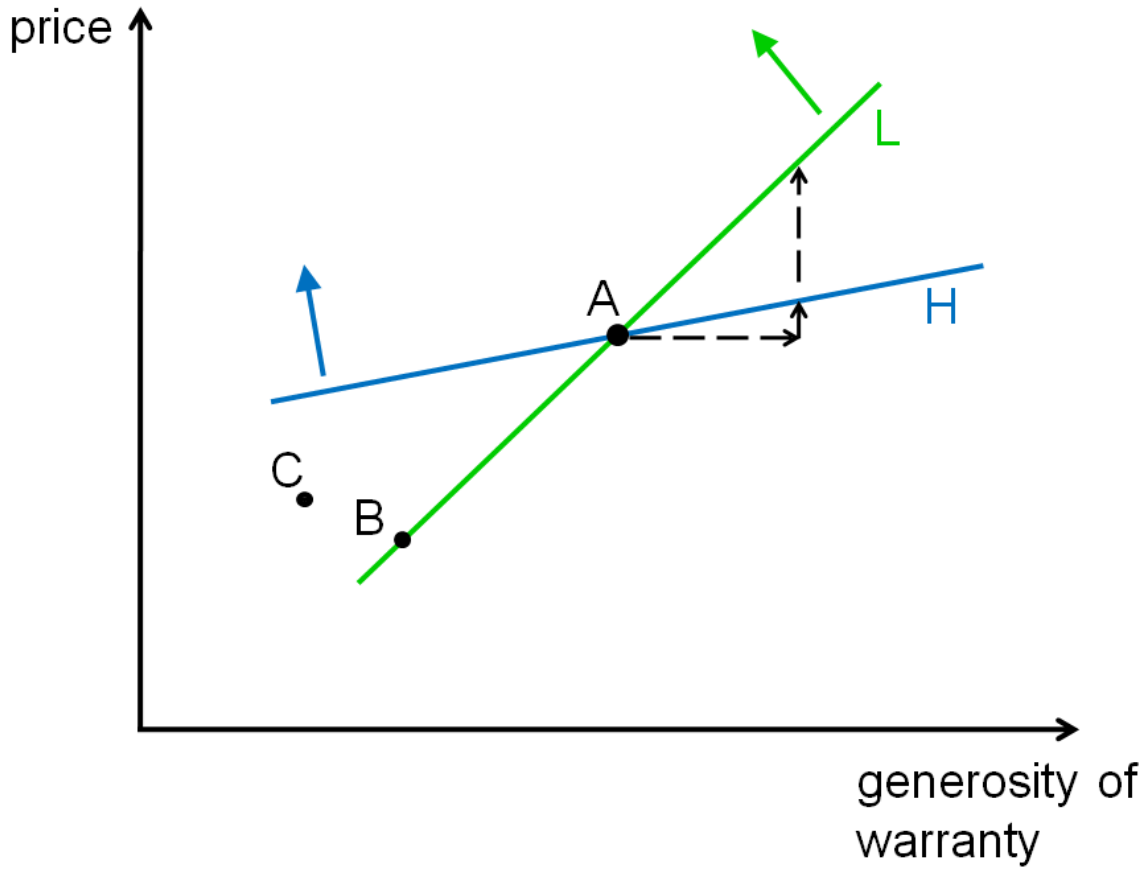
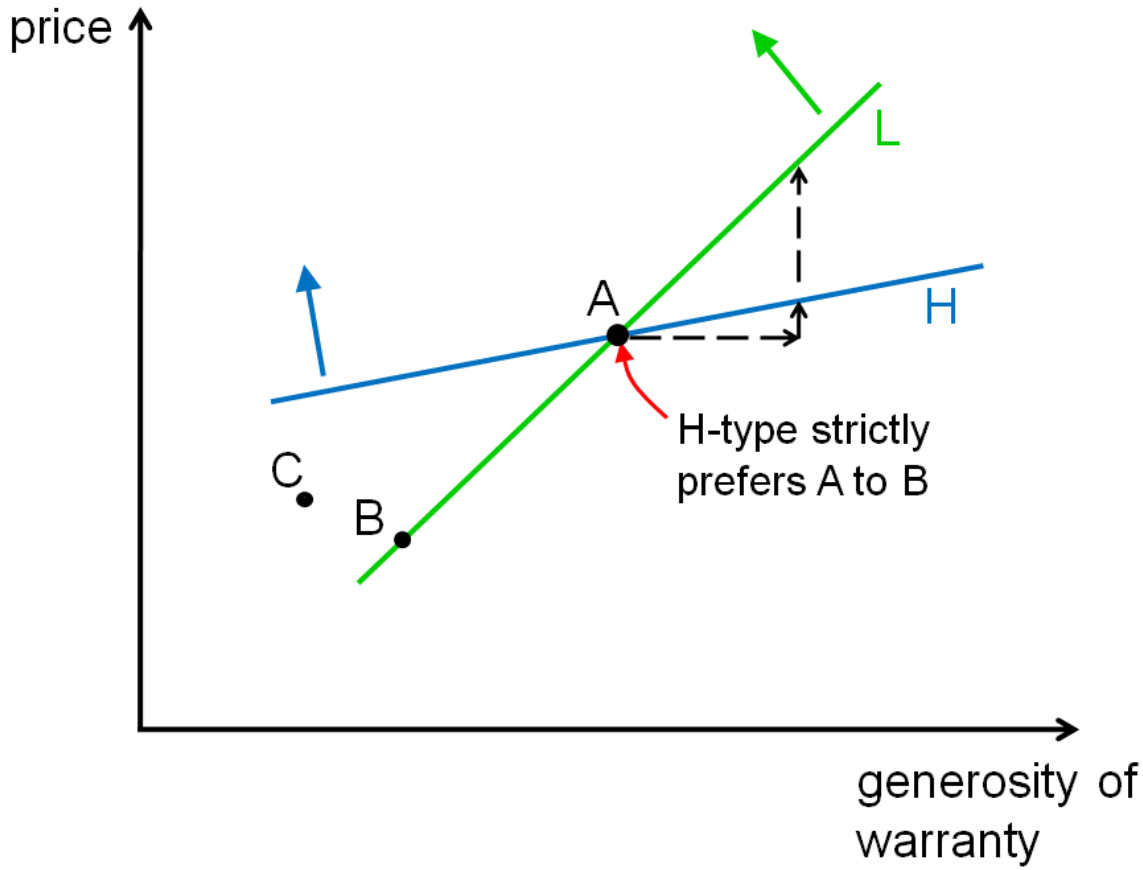
- Key idea: transactions need not all occur at same price; price can vary with some other observable component of the transaction.
  - So terms of transaction are two-dimensional, not one-dimensional.
- Typically, individuals with different privately-observed characteristics ("of different types") will have different preferences over two-dimensional options.
  - This is so, even though they all have same preferences over price alone.
  - Graphically, their indifference curves with respect to two-dimensional options will have different slopes.

Used car market



Sellers of high-quality cars find offering an improvement in warranty terms less costly than sellers of low quality cars.

Used car market



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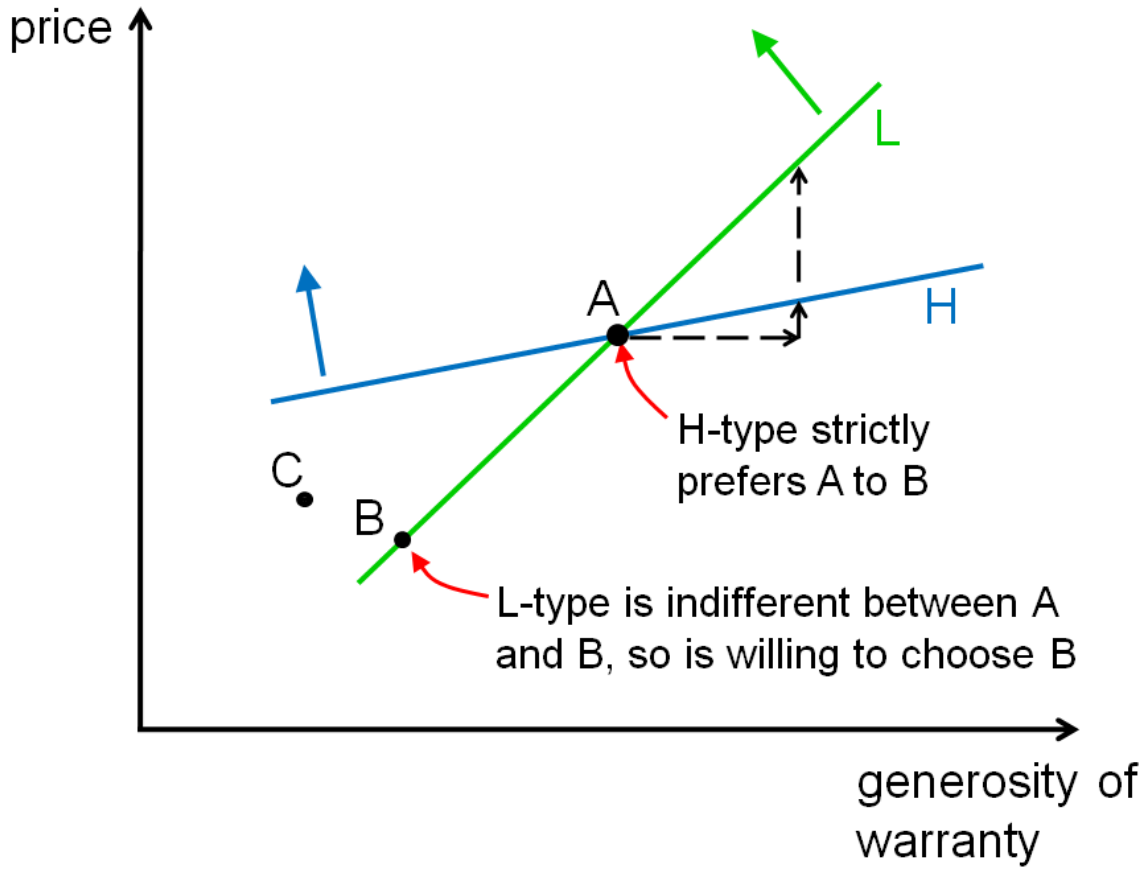

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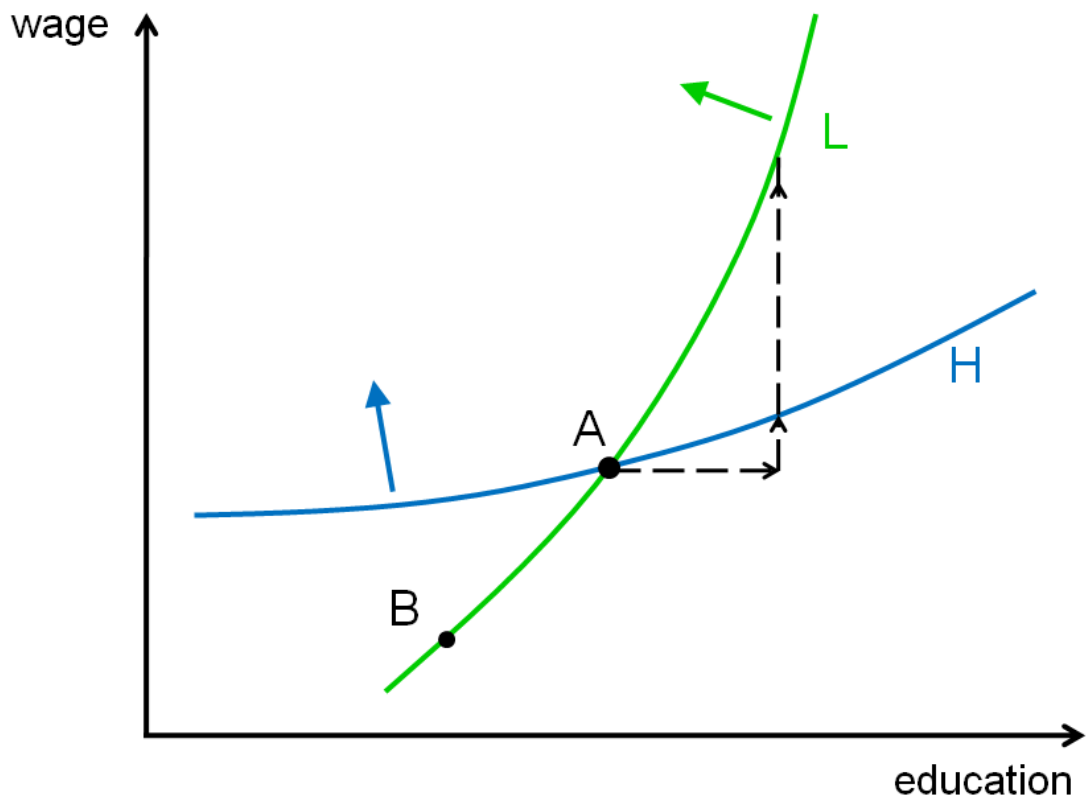
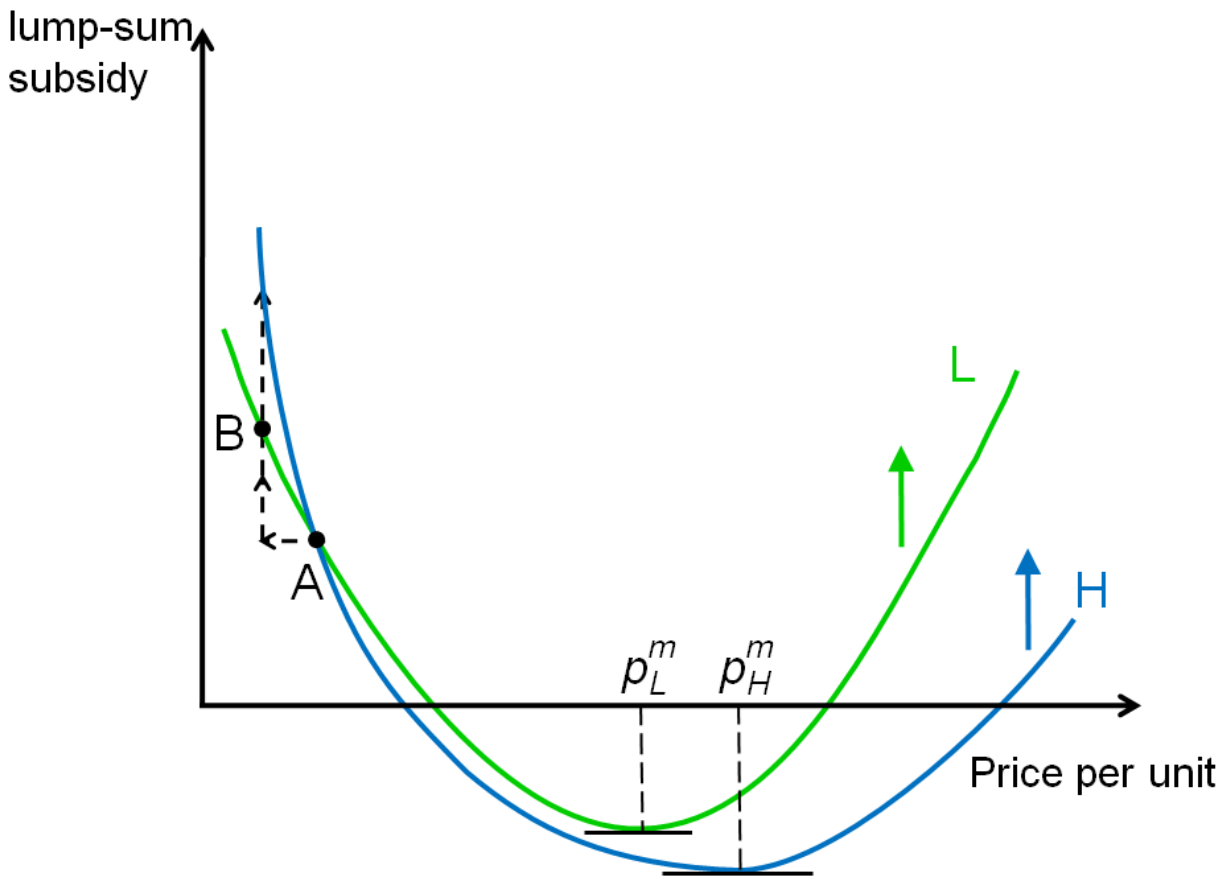
Labor market



Workers of high ability find an increase in educational qualifications less costly (in terms of effort) than workers of low ability.

Regulation



At prices less than p_L^m, a firm with low marginal costs finds a given reduction in price less costly than a firm with high marginal costs.

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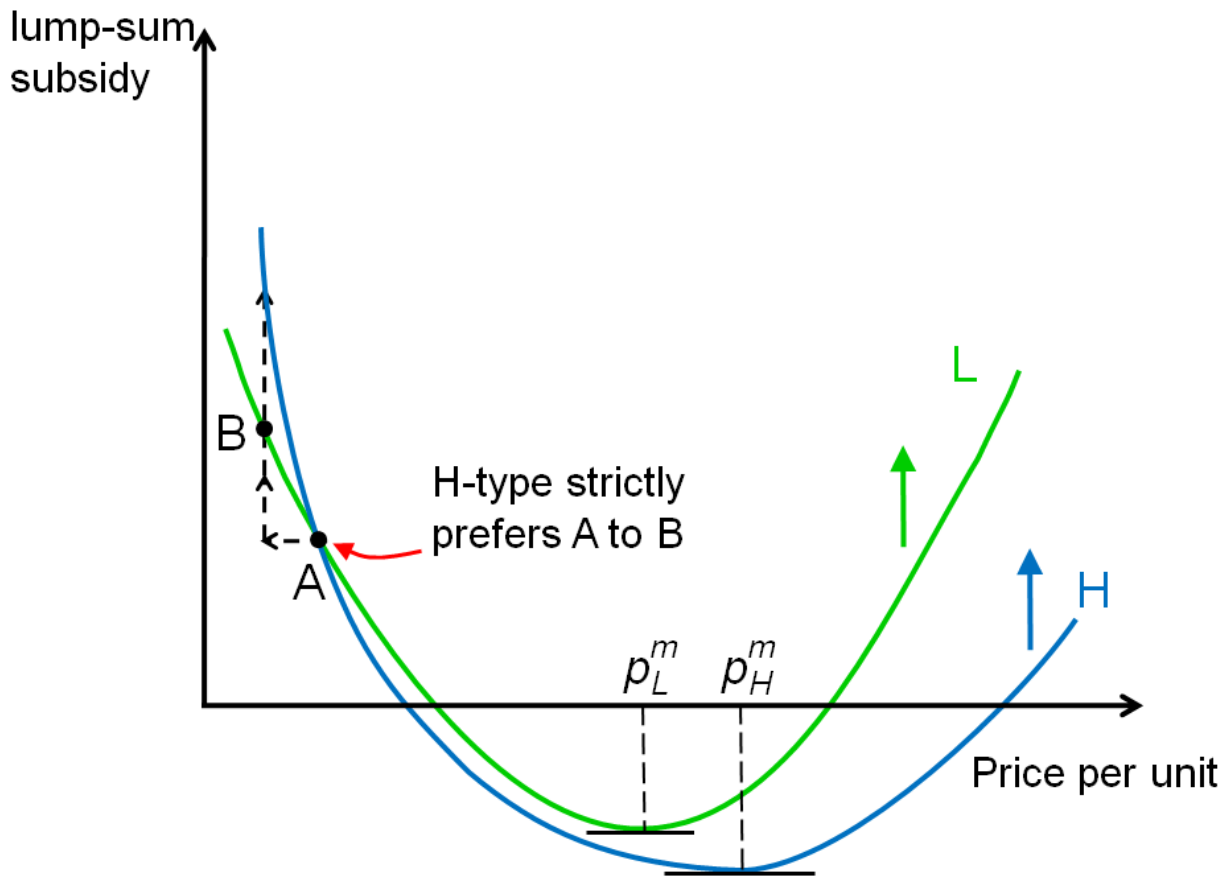

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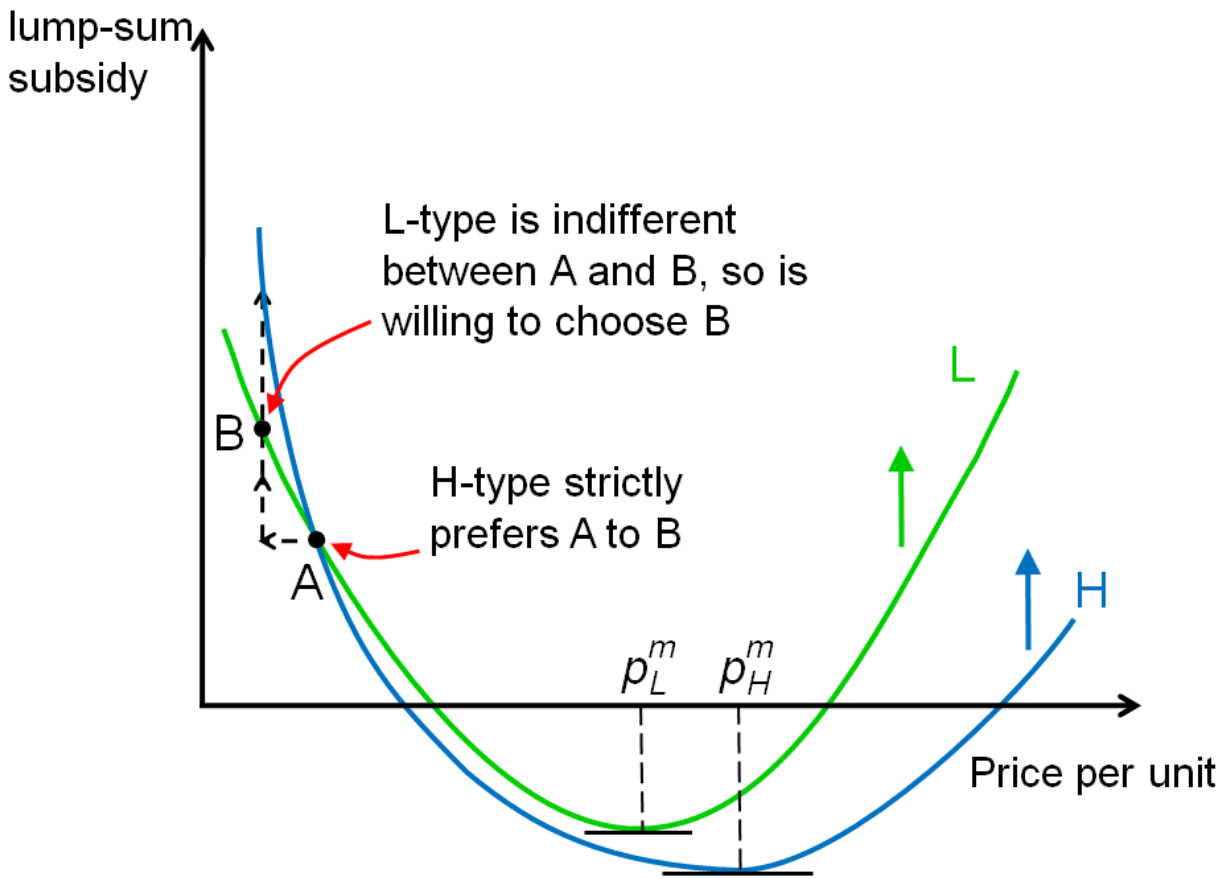

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Game-theoretic analysis

The natural extensive-form game for studying a market/transaction with hidden information depends on the setting:

1. **Optimal contracting (mechanism design, monopolistic screening):** first, uninformed party commits to contract offering a menu of choices; then, privately-informed party chooses most attractive option
   - *exs:* regulation, taxation, price discrimination, incentive schemes
   - optimal contracting analysis can be extended to deal with several interacting, privately-informed parties; *exs:* auctions, bilateral exchange, public-goods provision, dispute mediation
2. **Signalling:** first, privately-informed party chooses signal; then, uninformed party(ies) choose(s) response
   - *exs:* education in labor market, warranties in product markets, limit-pricing by incumbents in product markets, entrepreneur's choice of debt vs. equity in capital markets
3. **Market Screening:** first, competing uninformed parties make offers; then, privately-informed parties choose between offers
   - *exs:* insurance policies; loan contracts; multi-part tariffs (e.g. for mobile phones)

Game-theoretic analysis

For all three classes of models of hidden information:

- Self-selection may arise in equilibrium, so terms of transactions can vary with types.
- But even when self-selection arises, outcomes will typically be *inefficient* relative to outcomes under full information:
  - *ex:* high-ability workers may over-invest in education to signal ability
  - *ex:* regulated price for high-cost firms may be above marginal cost
  - *ex:* insurance policies for low-risk buyers may provide inefficiently small amounts of coverage
  - What determines the nature and extent of the inefficiency?
- Also, under market screening, equilibrium may not exist, so markets with hidden information may be unstable.
  - What determines whether or not equilibrium exists?