ECON 3113 Microeconomic Theory I
Lecture 12: Adverse Selection

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Introduction: Symmetric Information

- Consider a simple 2nd-hand car transaction.
  - You value it at \$50k.
  - I value it at \$80k.
  - If I acquire the car from you at a price of \$70k, both of us are better off.
- The trade is a Pareto-improvement:
  - Initial allocation: You own the car and I own the \$70k
  - Post-trade allocation: I own the car and you own the \$70k.
  - Both you and me enjoy a higher payoff after trade. You gain \$20k and I gain \$10k.
- Symmetric information: Everyone involved share common knowledge about the transaction.

Introduction: Symmetric Information

- In a seller-market, the price may be closer to \$80k. In a buyer-market, the price may be closer to \$50k.
- First Fundamental Theorem of Welfare Economics: In a world with symmetric information and little transaction cost, all Pareto-improving trades will take place.
- The eventual allocation is Pareto-efficient: no further reallocation of goods/resources can be mutually beneficial.
  - All goods with marginal cost below marginal willingness to pay are produced.
  - All goods end up in the hand of people valuing them the most.
  - All goods are produced by the least costly firms.

Introduction: Asymmetric Information

- Things get trickier if information is not perfect. Imperfect information can be due to
  - You know how much you value the car, but I don't.
  - I know how much I value the car; but you don't.
  - You know the quality of the car, but I don't.
  - You know how well you have been taking care of the car, but I don't.
  - I know the other options I have, but you don't.
  - .....
- **Information asymmetry**: one party of the transaction has relevant information that others do not.

Introduction: Information asymmetry is everywhere

- Sellers know more about the quality of its products than buyers.
- Buyers know more about their willingness to pay than sellers.
- Insurees know more about their health condition than insurance companies.
- Borrowers know more about their projects' prospect than lenders.
- Firm management know more about the company's prospect than investors.
- Doctors know better about whether the drug/treatment is needed than patients.
- Politicians know more about their own agenda than voters.
- Guys know more about their own faithfulness than their partner.

Introduction: Asymmetric Information

- Volkswagan's dirty scandal

- Subprime mortage crisis

Introduction

- The study of asymmetric information is traditionally classified into two areas:

1. Hidden characteristics: **adverse selection**
   - a party of transaction has superior information on an unobserved characteristics relevant to other parties.
2. Hidden action: **moral hazard**
   - a party of transaction can take an unobservable action relevant to other parties.

- Today, we focus on adverse selection and study
  - its potential effects on bargaining outcomes;
  - how its effects can be mitigated (more on this in the next lecture).

Adverse Selection: Lemons Market

- The seminal lemons model is due to George Akerlof (1970). The classic example is the used-car market.
- There are many sellers and even more buyers in the market; all of them risk-neutral.
- Each seller owns one car, which has either high quality (**peach**), or low quality (**lemon**).
  - Peaches and lemons have identical appearance;
  - Lemons tend to have many hidden problems.
- The proportions of peaches and lemons are half-half.
- Each buyer wants at most one car.

Adverse Selection: Lemons Market

- Specifically, let's say there are 2000 sellers; 1000 of them are peaches and lemons respectively.
- Say there are 10000 buyers.
  - Sellers have all the bargaining power over buyers.
- The value (willingness to pay) that each agent places on each type of car:

	Peach	Lemon
Seller	v	3000
Buyer	8000	4000

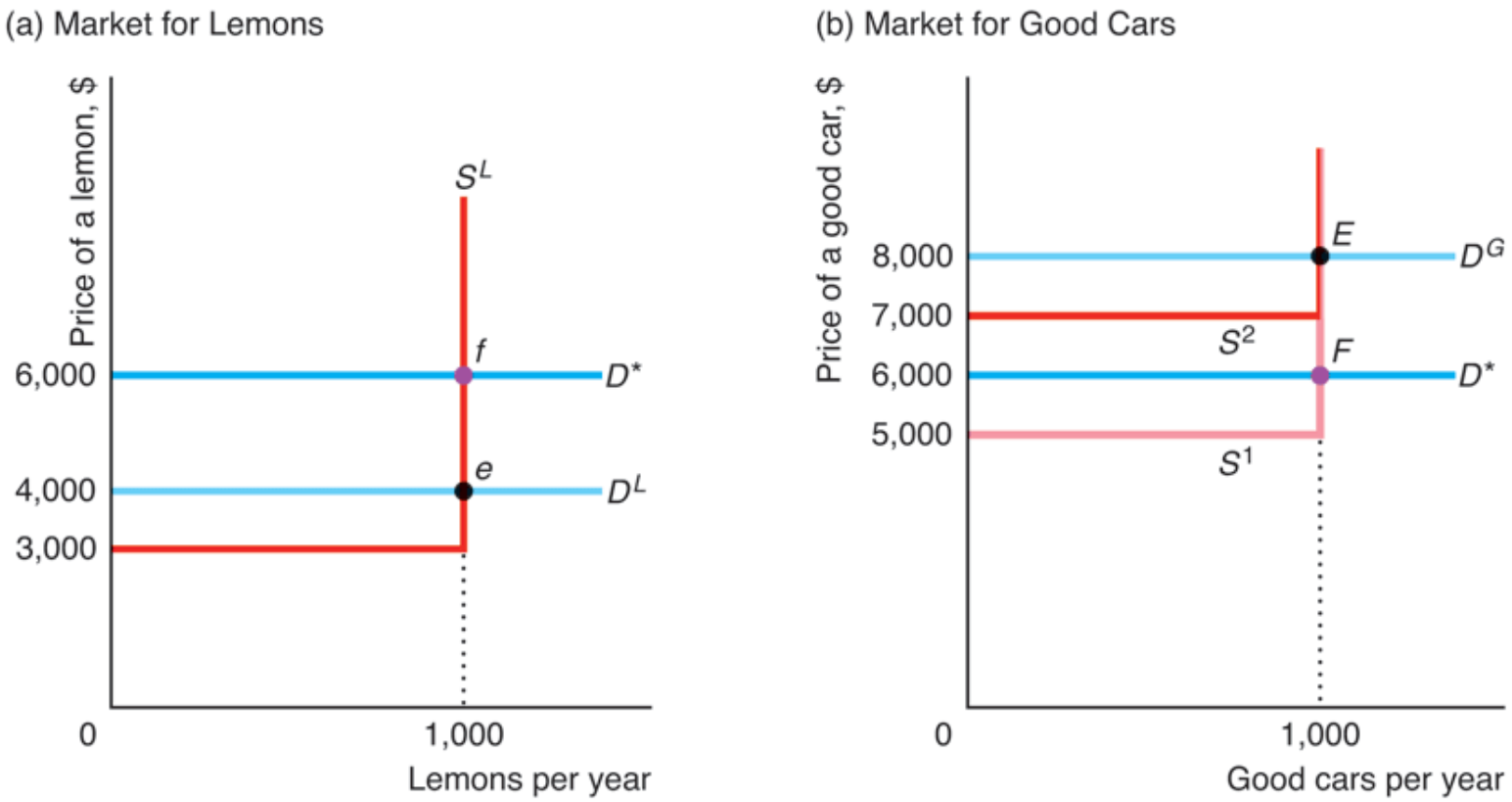
Below we consider two values of v: 5000 or 7000.

Lemons Market

- We are primarily interested in the scenario of asymmetric information: only sellers know car quality, but buyers do not.
- For comparison purpose, we first consider two benchmark cases of symmetric information.
- We say a market outcome is **efficient** if all goods end up in the hands of people who value them the most.
- We say a market outcome is **inefficient** if some goods **fail to** end up in the hands of people who value them the most.

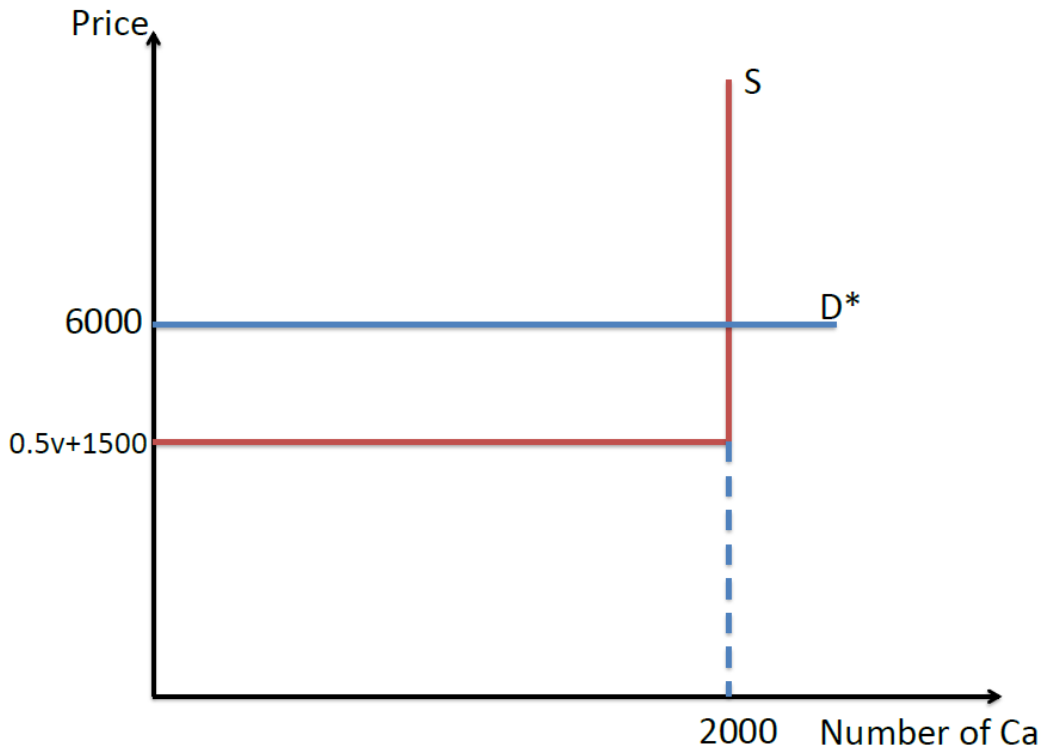
Benchmark 1: Full Information

- Suppose both buyers and sellers know the car qualities before transaction.
- All peaches are sold at 8000; all lemons are sold at 4000. (Pts e & E)
- The market outcome is efficient.



Benchmark 2: Full Ignorance

- Suppose neither buyers nor sellers know the car qualities before transaction.
- Expected value of a used car to a buyer: $\frac{1}{2}(8000) + \frac{1}{2}(4000) = 6000$.
- Expected value of a used car to a seller: $\frac{1}{2}v + \frac{1}{2}(3000) \leq \frac{1}{2}(7000) + \frac{1}{2}(3000) = 5000$.
- All cars are sold at 6000. The market outcome is again efficient.

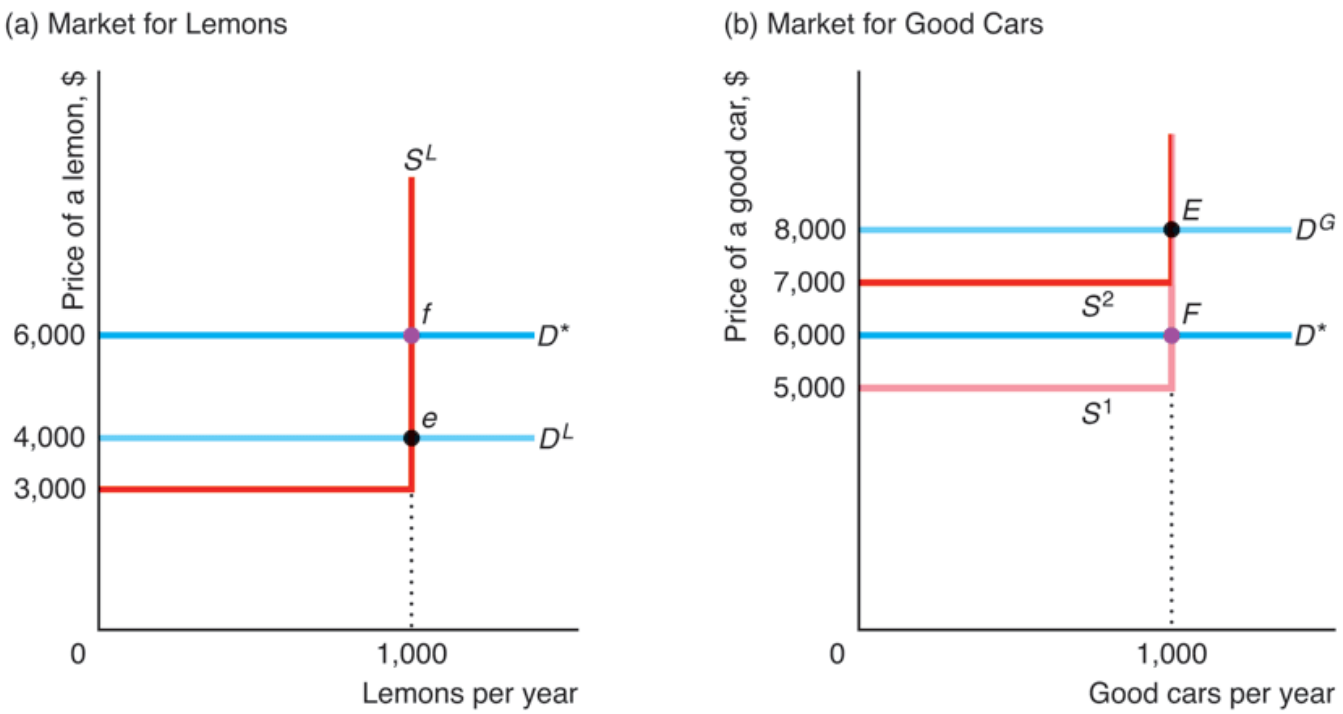


Lemons Market: Asymmetric Information

- Now consider asymmetric information: sellers know the quality of her car, but buyers don't.
- As car's quality is not observable to buyers at the time of transaction, price cannot vary with quality.
  - If peaches can be sold at a higher price, all sellers would claim they have a peach.
- Lemons sellers can get *at least* 4000, so they always sell.
- Question remains whether peach sellers are willing to sell, i.e., whether the market price is above or below v.
  - If they do, market outcome is socially optimal; otherwise, it is not.
- In the most optimistic scenario, buyers expect both types of sellers are selling, so buyers' expected value is 6000.

Lemons Market: Asymmetric Information

- First suppose $v = 5000$.
- Supply curves of lemons and peaches are S^L and S^1 respectively.
- Suppose both types of sellers are willing to sell, then the demand curve is D^*.



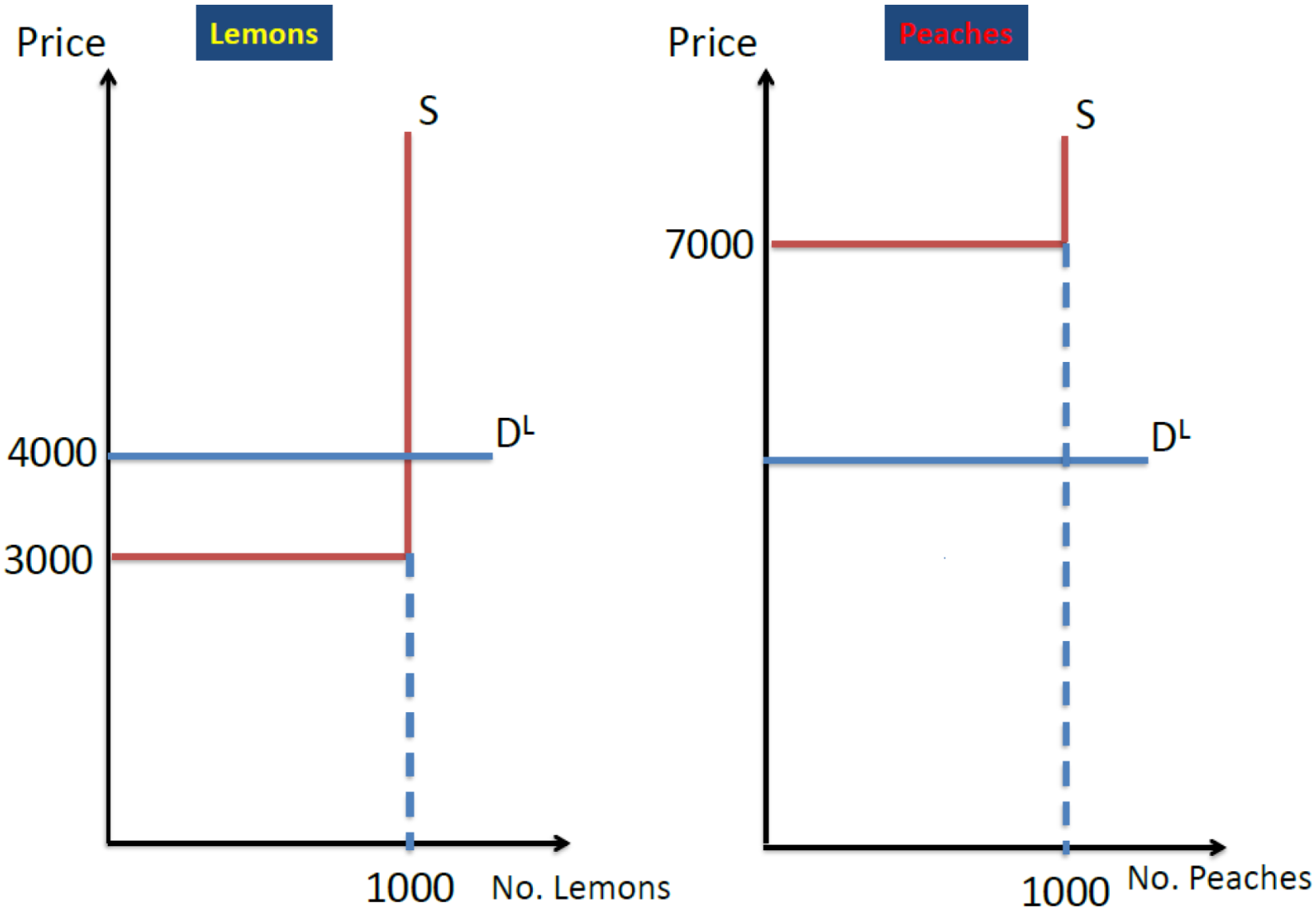
Lemons Market: Asymmetric Information

- Both lemons and peaches sellers are happy to sell at 6000. (Pts f & F).
- We indeed have an equilibrium at price 6000, and all cars are transacted.
- The market outcome is efficient.
- Asymmetric information *does not necessarily cause inefficiency problem*.

Lemons Market: Asymmetric Information

- Now suppose $v = 7000$. Is there an equilibrium in which peaches are transacted?
- Suppose so. The demand curve is D^*, so the market price is 6000.
- At this price, *peach sellers are better off by keeping their cars instead!*
- Buyers understand this and is willing to pay only 4000.

Lemons Market: Asymmetric Information



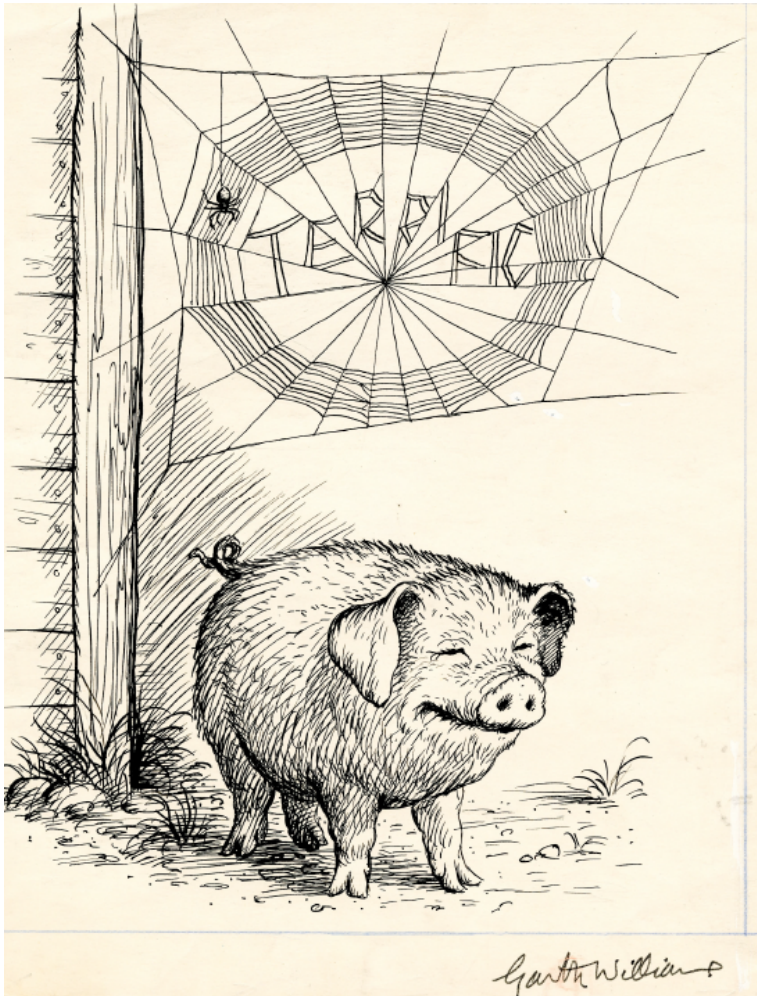
Lemons Market: Asymmetric Information

- In the only market equilibrium, price is 4000. Only lemons are sold. Peaches are kept by sellers.
- The outcome is **inefficient**: peaches are kept by sellers, who value them less than buyers.
- **Asymmetric information can cause an inefficiency problem.**

What Goes Wrong in the Lemons Market? Information Asymmetry

- Buyers don't know the car quality, but perhaps the seller can tell them?
- *Talk is cheap*: every seller is going to claim his/her car is a peach!
- Peach sellers have no credible way to convince buyers that they are selling a peach.
- Possible solutions to overcome information asymmetry
  - expert testing/certification;
  - reputation;
  - signaling

An example of certification



What Goes Wrong in the Lemons Market? Negative Externality

- Lemon sellers impose a *negative externality* on peach sellers.
  - Harmful behaviors not penalized
- When a lemon seller decides to put it up on the market, it lowers the buyers' belief about the average car quality;
- This in turn lowers buyers' willingness to pay for a car, and hurts peach sellers.
  - In the case $v = 5000$, peach sellers are hurt by getting a lower price.
  - In the case $v = 7000$, peach sellers are hurt by not able to sell!
- A possible solution is *product liability laws*: forcing sellers to compensate buyers for defective products.

Is it an artificial story?

- What if buyers are not risk-neutral?
- What if the proportion is not half-half?
- What if there are more than two types of cars?
- What if sellers can choose product quality?
- What if buyers bargain prices with sellers?

Other "Lemons Markets"

- Health insurance
- Labour market
- Capital market
- Asset market
- Real estate market
- Market for "experience goods"
  - restaurants, doctors, lawyers, investment advisors,....

Summary

- Asymmetric information is another **source of market failure**: it prevents efficient trade from taking place.
- In the lemons market, bad products (when they are sufficiently abundant) can drive good products out of the market.
- Possible solutions include making information more symmetric, or punishing lemons production/sale.