Prices and Market Efficiency

The Role of Prices as Signals and Value Creators

Land Use Patterns

- Why is certain land used for particular activities?
  - Von Thunen (1826) noticed that crop patterns around towns formed concentric circles
- Basic trade-off between transportation costs and yield per acre.
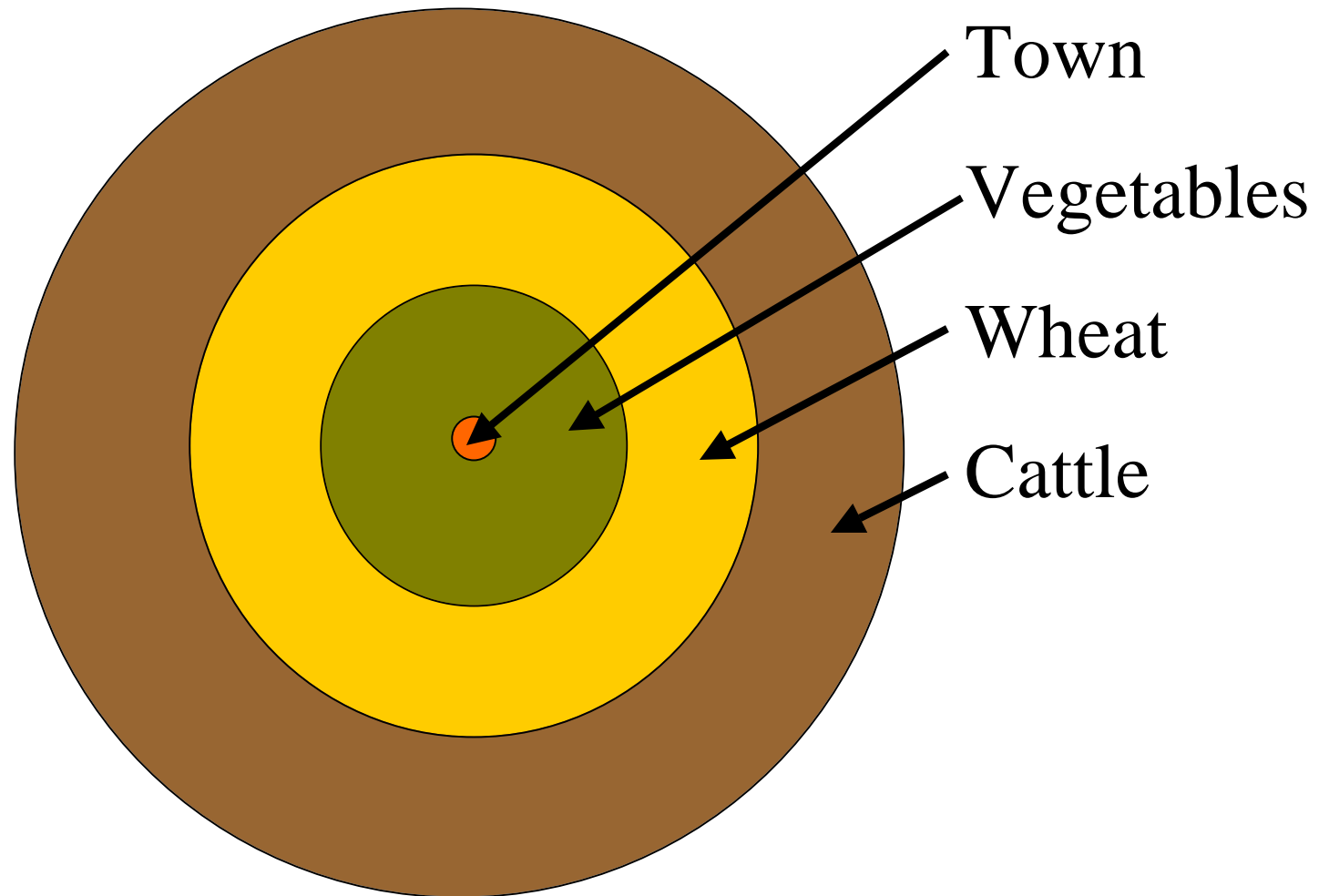
Set-up (20 units each)

Crop	Yield per acre
Vegetables	20
Wheat	10
Cattle	5

Planned Outcome

- Assume:
  - transport cost is $0.10 per unit per acre
  - each product sells for $1 per unit
- How would a planner allocate land?
  - Minimise cost by ensuring that highest yield products are closest to city
  - First acre, vegetables; next two acres, wheat; and final four acres, cattle

Planned Outcome

Market Outcome

- What is the maximum each supplier will bid for land one acre closer to the city? (This is the *bid-rent curve*)
    - Vegetables: $20 - $2 – ($20 - $4) = $2
    - Wheat: $10 - $1 – ($10 - $2) = $1
    - Cattle: $5 - $0.50 – ($5 - $1) = $0.50
- Therefore, vegetable producers will out-bid others and wheat farmers will out-bid graziers for land closer to the town.

It's all Demand and Supply

- What is demand?
- What is supply?
- When is value created?
- Can prices achieve this?

Prices as Signals

- Individuals react to prices rather than attempt to change them explicitly.
- Posted price
  - Only consumers with WTP $> p$ purchase
  - Only suppliers with OC $< p$ supply

Compulsory Seatbelts

- 1960s: safety regulations included mandatory seatbelt wearing and padded dashboards.
- What happened to the number of car accidents? Went up!
  - Less chance of being killed, so take more chances
  - Do you drive more carefully when your car is dangerous?
- What happened to number of deaths? About the same.
  - More accidents but each is less harmful
  - More pedestrian deaths

Reactive Pricing

- When is it appropriate to consider agents reacting to prices rather than taking actions to influence them?
- Relatively 'small' agents
  - World commodity markets
  - Financial markets
  - Fish market
- *But are prices enough information?*

Information Problems in Mass Markets

- Von Hayek claimed that main benefit of markets is to aggregate private information.

- Sometimes this occurs but at other terms it may not.

- There can be a problem of adverse selection ...

Example #1

Insurance companies offer individual health insurance that covers medical costs associated with pregnancy and delivery. Policy is then purchased disproportionately by women planning to have children in the near future. This is because such plans are privately known, unobserved characteristic of the buyer. Adverse selection is so severe here that such coverage is not available in the U.S. In Australia, such considerations led to nationalisation of health care under Medicare.

Example #2

Previously, new cars used to have a year warranty with the option of purchasing an extended warranty for three years. But those extensions were purchased almost exclusively by those intending to use their cars roughly, i.e., for towing or driving on bad roads in bad weather. To overcome this many companies now offer universal long term coverage increasing the price of cars to everyone by some amount.

Gresham's Law

Imagine an economy in which the currency consists of gold coins. The holder of a coin is able to shave a bit of gold from it in a way that is undetectable without careful measurement; the gold so obtained can then be used to produce new coins. Imagine that some of the coins have been shaved in this fashion, while others have not. Then someone taking a coin in trade for goods will assess positive probability that the coin being given her has been shaved, and thus less will be given for it than if it was certain not to be shaved. The holder of an unshaved coin will therefore withhold the coin from trade; only shaved coins will circulate. "Bad Money Drives Out the Good"

Adverse Selection

- A problem of pre-contractual opportunism
  - private information that the insurance customers have before they purchase the insurance contract
- If adverse selection is severe enough *markets may be thin or closed.*
  - "Lemons" problem introduced by George Akerlof.

Akerlof's 'Lemons' Problem

Assumption 1: *Heterogeneous Product Quality*

▌ Two types of used cars:

Type	Value to Buyer	Value to Seller	Number Available
Peach	$3,000	$2,500	N
Lemon	$2,000	$1,000	$2N$

Symmetric Information Market Equilibrium

- Suppose supply is fixed but the number of buyers is infinite (or fiercely competitive)

- Under complete information regarding quality, peaches sell for $3,000 and lemons for $2,000.

- Under uncertainty (neither knows quality), expected value of car to seller would be $1,500 and to buyer $2,333.33. So market clears at price of $2,333.33.

Asymmetric Information

Assumption 2: only sellers know car's quality but buyers do not.

Outcome: Peach market breaks down

- Suppose that cars are offered for sale at any price about $1,000.

- All of the lemons are offered for sales but peaches only appear when price reaches $2,500

- If $1,000 < price < $2,500 buyers rationally infer car is a lemon

- If price above $2,500, car has 2/3 chance of being lemon so WTP is only $2,333.33

- Conclusion: no demand at prices above $2,000. (a) above $2,333 no demand at all; (b) below $2,500 demand only starts at $2,000.
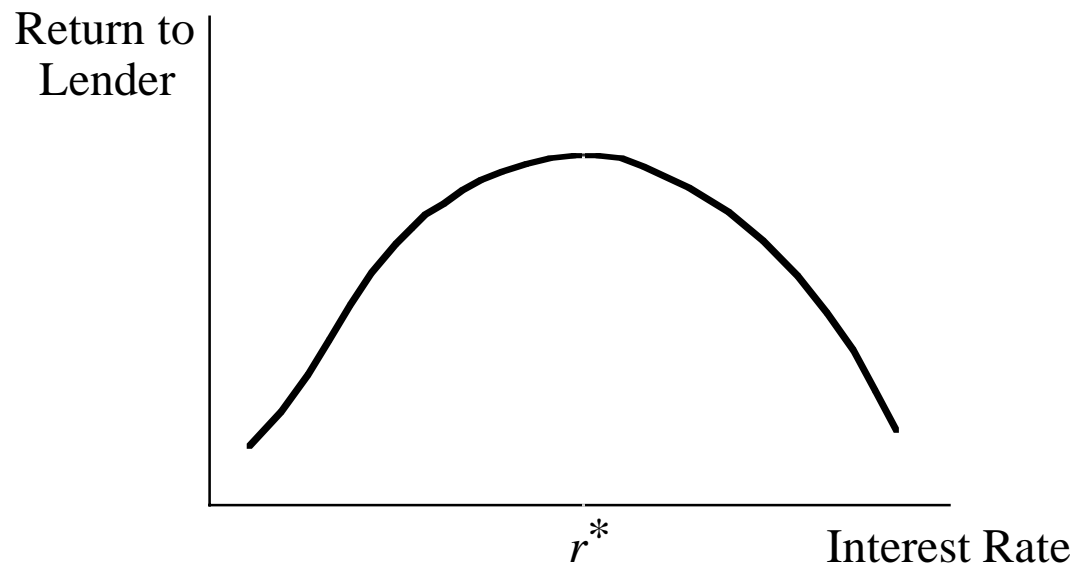
Credit Rationing

▌ Do credit markets work well with interest rates adjusting to equate the supply and demand for loans?

"If the legal rate ... was fixed so high .., the greater part of the money which was to be lent, would be lent to prodigals and profectors, who alone would be willing to give this higher interest. Sober people, who will give for the use of money no more than a part of what they are likely to make by the use of it, would not venture into the competition." Adam Smith, *Wealth of Nations*

Optimal Interest Rate

◾ Interest rate affects loan quality (riskiness). Only customers taking high risks can afford higher rates. So raising interest rates may be unprofitable.

Signaling & Self-Selection

- Incentives for agents to signal their information
- Spence's Job Market Signaling Model

Type	Productivity	Proportion
High	$50 per hour	30%
Low	$20 per hour	70%

Education as a Signal

- *H* workers want to signal their type and employers would like to know if they are overpaying *L* types

- Suppose workers can invest in education. Will be a signal if *H* workers invest but *L* do not.
  - *L* workers undertake less education than *H* workers, even if by so doing they could mislead employers.
  - Failure to obtain a given level of education should signal that a worker is not an *H* type. That is, *H* workers always choose the higher education level.

- These self-selection constraints are *credible*. Neither type wishes to signal they are of another type.

Mathematics of Self-Selection

▌ Formally, the self-selection constraints are:

(1) $\$50 - C_L \times E_H < \$20 - C_L \times E_L$

(2) $\$50 - C_H \times E_H > \$20 - C_H \times E_L$

where C_L and C_H are the costs of a unit of education for L and H respectively.

▌ (1) says that L workers do not find it worthwhile to mimic H education; (2) says H workers are better off signaling than not.

▌ Only satisfied if $C_L > C_H$

▌ *Note: educational levels may not affect productivity at all. Socially wasteful over-education*

Signaling for Career Advancement

- Why do people appear in a "rat race"?
  - Job rewards high but why the long hours?
  - Try and work hard to signal ability
  - Strongest early in career when uncertainty high
  - But if stop hard work, poor signal
  - Type of Prisoner's Dilemma

Pretending to Work

- Problem with rat race story: effort is partly observed. If want to signal ability should leave early!
- Variant: want to signal other qualities such as willingness to work hard etc.
- Scott Adams: pretending to work hard

Waiting for something   Change jobs frequently

Voice mail   Arriving and leaving

Messy desk   The internet

Arrival & Departure at meetings   Study things

Work on long range projects   Look incompetent

Strategic vacation planning

Complain constantly about workload