

# Markets and Organizations

TSE M1 – Semester 1, Session 3

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## How well do markets perform?

- ◆ We've seen that "political" markets can reveal information in the possession of those who trade in them
- ◆ How useful is this for understanding stock markets?
- ◆ The problem really arises if the information in question is costly to collect
- ◆ Indeed, there may be a "free-rider" problem which markets may make worse
- ◆ What can we conclude for the overall informational advantages of market versus administrative transactions?

## The model of Grossman & Stiglitz (1976)

- ◆ There are two assets, one safe and one risky, with the return to the risky security given by

$$r = \eta + \varepsilon$$

where  $\eta$  is observable at a cost

- ◆ Let  $X_I = X_I(p, \eta)$  be the demand for the risky asset by informed traders
- ◆ Then, for any supply  $X_S$ , the equilibrium price will be given by

$$\lambda[X_I(p, \eta)] + (1 + \lambda)[X_U(p)] = X_S$$

## A problem:

- ◆ Uninformed traders can use the equation determining the equilibrium price to infer the value of  $\eta$  for each observed price
- ◆ So they will never need to pay to observe the value of  $\eta$
- ◆ So nobody will become informed
- ◆ Then how can the price reveal any information?

## Two solutions:

- ◆ Some people may observe  $\eta$  without cost
- ◆ Alternatively, there may be randomness in the supply
- ◆ Then we can rewrite the return to the risky asset as
$$r = t(p, X_s) + \varepsilon$$
- ◆ Then there will be a distribution of  $r$  for any given value of  $p$
- ◆ Informed traders will do better, just enough to offset the cost of the information

## Auctions

- ◆ Auctions have historically been used to sell many things.....

## The auction of the Roman empire by the Praetorian Guard, AD 193

- ◆ The Guards had just murdered the Emperor Pertinax, and feared that from his successor Sulpicianus “they might not receive a just price for so valuable a commodity”
- ◆ Edward Gibbon recounts (in *The Decline and Fall of the Roman Empire*), what happened next:

◆ “This infamous offer...reached at length the ears of Didius Julianus, a wealthy senator...The vain old man hastened to the Praetorian camp, where Sulpicianus was still in treaty with the guards, and began to bid against him from the foot of the rampart. The unworthy negotiation was transacted by faithful emissaries, who passed alternately from one candidate to the other, and acquainted each of them with the offers of his rival. Sulpicianus had already promised a donative of five thousand drachms (above one hundred and sixty pounds) to each soldier; when Julian, eager for the prize, rose at once to the sum of six thousand two hundred and fifty drachms, or upwards of two hundred pounds sterling. The gates of the camp were instantly thrown open to the purchaser; he was declared emperor, and received an oath of allegiance from the soldiers, who retained humanity enough to stipulate that he should pardon and forget the competition of Sulpicianus”

## The Winner's Curse.....

- ◆ Perhaps Didius Julianus should have been more careful (though Gibbon records that he "passed a sleepless night")
- ◆ In the end, he ruled only two months before he was overthrown and executed by Septimius Severus
- ◆ What did other aspiring emperors know that he should have known?
- ◆ More on this later....

## Auctions

- ◆ Auctions have historically been used to sell many things
- ◆ Auctions differ according to
  - Whether they are open or sealed-bid
  - The payment rule – usually first or second-price
  - Whether the goods sold have private or common values
- ◆ Consider a second-price, sealed bid private value auction
- ◆ Bidding your true value is a dominant strategy – why?

## Now consider a first-price auction

- ◆ You might expect prices paid to be higher
- ◆ But consider an open ascending auction
- ◆ A surprise: the winner and the price paid are the same as under the sealed-bid, second price auction!
- ◆ Two very different sets of rules yield the same result – and induce the participants to reveal information that will show which of them values the good most

## A sealed-bid first-price auction is a bit different

- ◆ It involves a compromise
  - Bidding higher increases the chance of winning
  - But makes you pay more if you do
- ◆ In the case of an object whose value  $v$  is uniformly distributed between 0 and €100, the equilibrium strategy is to offer  $\frac{(n-1)v}{n}$ , where  $n$  is the number of participants
- ◆ So for large  $n$ , competition forces bidders to reveal something close to their true valuation

## Why is this strategy optimal?

- ◆ Consider the two-person case:
- ◆ If Jack is using it he will offer half his value, so his bid is uniformly distributed between 0 and €50
- ◆ If Jill has a value of  $v$ , and offers  $\alpha v$ , she will win with a probability of  $\alpha v/50$ , and her gain if she wins is  $(1-\alpha)v$
- ◆ The expression  $(1-\alpha)v \cdot \alpha v/50$  is maximized when  $\alpha=1/2$

## The revenue equivalence theorem

- ◆ All three auction types allocate the good to the bidder with the highest valuation, and they pay the same expected value in all three cases!
- ◆ Consider the two-person case and Jill has a value of €60
- ◆ In the first-price auction she pays €30 and wins with a probability of 60%
- ◆ In the second price auction she also wins with a probability of 60%, and pays a price varying between 0 and €60 with an expected value of €30

## Auctions with common values

- ◆ Here bidders gain information from the bids of others
- ◆ Examples: drilling rights, telecoms licenses, painting bought for resale
- ◆ Problem of the winner's curse
- ◆ If you win the auction you were the most optimistic – so what did the others know that you didn't?
- ◆ This doesn't mean that winners must "lose" – they are cautious and shade their bids down as a function of the degree of uncertainty
- ◆ This means that sellers have an interest in reducing the uncertainty of bidders

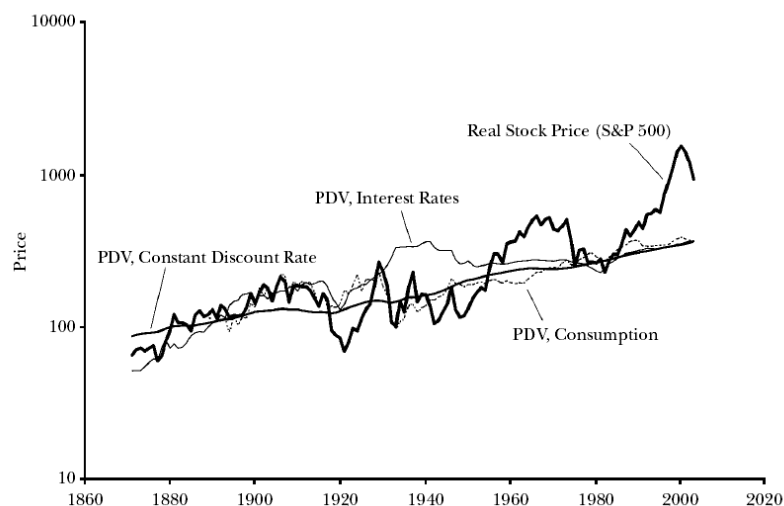
## How well do markets reveal information in practice?

- ◆ Long debate on the "efficient markets hypothesis" since three versions first formulated by Fama (1970):
  - Weak form: prices reflect information embodied in all past prices + returns
  - Semi-strong form: prices reflect all publicly available information
  - Strong form: prices reflect all publicly and privately available information
- ◆ Weak form implies that stock prices are a "random walk"
- ◆ Evidence accumulated in 1970s and 1980s in favour of the semi-strong version
- ◆ But a number of "anomalies" came to light that were taken more seriously during the 1980s and 1990s

## Some anomalies:

- ◆ Rozeff and Kinney (1976) showed returns of 3.48% in January compared to 0.42% for other months
- ◆ Basu (1977) showed companies with low initial P-E ratios had higher subsequent returns
- ◆ Reinganum (1981) documented a small-firm effect
- ◆ Shiller (1981) appeared to show prices were too volatile to be explained by volatility in fundamentals
- ◆ French (1980) showed returns lower on Mondays
- ◆ Poterba & Summers (1988) showed evidence of mean-reversion in stock prices over long periods. Fama & French (1988) argued this might be rational
- ◆ Hirshleifer & Shumway (2001) showed returns higher on sunny days

Figure 1  
Real Stock Prices and Present Values of Subsequent Real Dividends  
(annual data)



Source: Shiller, 2003

## What to make of this?

- ◆ Some anomalies tend to disappear as the market becomes more aware of them (eg the weekend effect which seems to have disappeared in the UK – Steeley 2001)
- ◆ However, others persist (eg January effect)
- ◆ Shleifer & Summers (1990), following work by Kyle and Campbell, suggest “noise trader” effects may be at work
- ◆ More recently, “behavioral finance” has grown up to model systematic deviations from efficiency, though they may not be easy for rational investors to correct in the short term (see Shiller, 2003)
- ◆ Debate continues over whether stock markets display “irrational exuberance” (Shiller, 2005)