

# Financial Bubbles – A Stockmarket Experiment

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## Recap

### Two assets

- ▶ cash, interest rate 10%
- ▶ stock, expected dividend  $E[d] = \frac{1}{2} \cdot \$0.4 + \frac{1}{2} \cdot \$1 = \$0.7$
- ▶ redemption value of stock shares is \$7

### Your strategies?

## Net present value

- ▶ Arbitrage principle (AoAO) implies:

$$r = \frac{d_{t+1}}{p_t} + \frac{p_{t+1} - p_t}{p_t}$$

- ▶ Rearrange:

$$p_t = \frac{1}{1+r} (d_{t+1} + p_{t+1})$$

- ▶ As  $r$  is constant over time:

$$p_t = \frac{d_{t+1}}{(1+r)} + \frac{d_{t+2}}{(1+r)^2} + \dots + \frac{d_{t+N} + p_{t+N}}{(1+r)^N}$$

- ▶ Finally, replace dividends with their expectations:

$$p_t = \delta E[d_{t+1}] + \delta^2 E[d_{t+2}] + \dots + \delta^{t+i} E[d_{t+i}]$$

## Net present value in the experiment

- ▶ redemption value  $p_{20} = 7$  was set to the net present value of the stock given an infinite time horizon,  $N \rightarrow \infty$
- ▶ **aside:** the rationale is as follows

$$\begin{aligned} p_{20} &= \delta E[d_{21}] + \delta^2 E[d_{22}] + \dots + \delta^N E[d_{20+N}] \\ &= E[d] \cdot \frac{1}{1 - \delta} - E[d] \\ &= 0.7 \cdot \frac{1}{1 - 1/1.1} - 0.7 = 7 \end{aligned}$$

- ▶ the result is a constant fundamental value of the stock in every trading period of the experiment.
- ▶ for example:  $p_{19} = \frac{1}{1+0.1} \cdot [0.7 + 7] = 7$

## Research experiments

### Smith, Suchanek and Williams (1988)

- ▶ first to show price bubbles (setting: 0 USD redemption value and 0% interest rate)

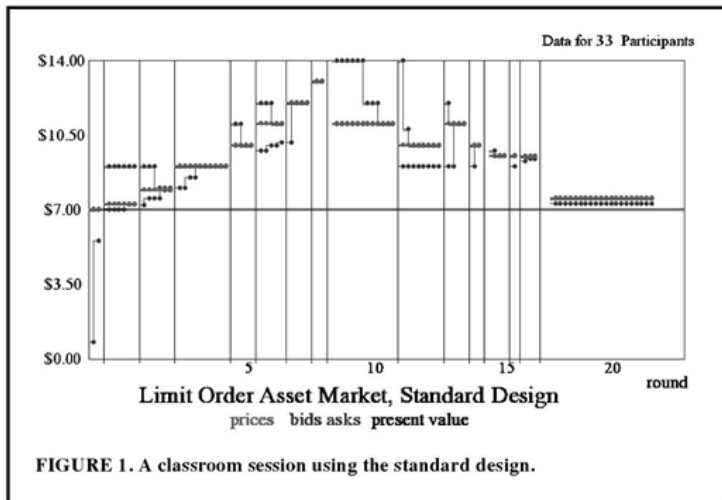
### King et al. (1993)

- ▶ repetition is most reliable way to reduce bubbles

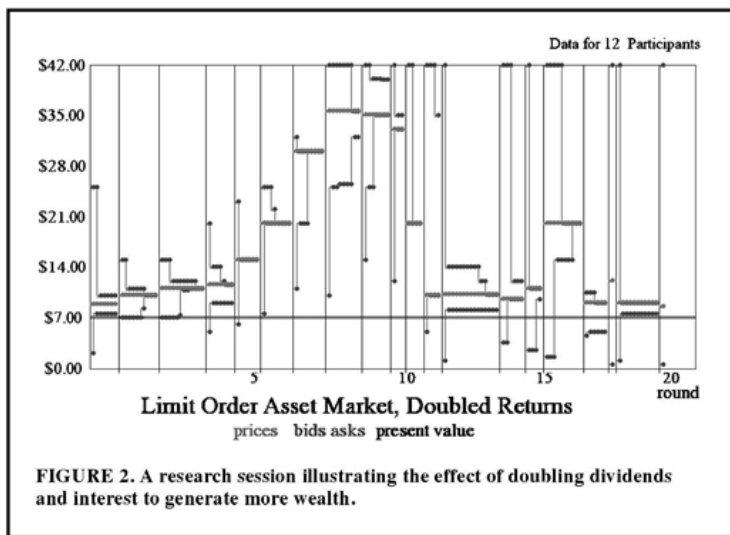
### Lei, Noussair, and Plott (2001)

- ▶ bubbles arise from "irrationality"

## Classroom experiment (1)

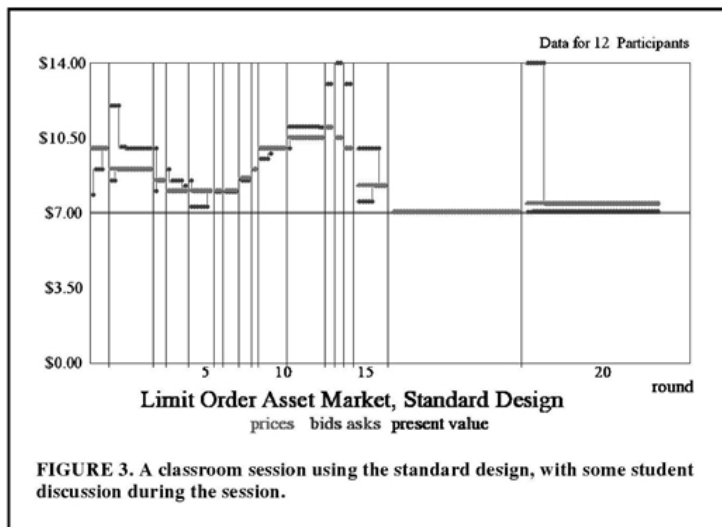


## Classroom experiment (2)





## Classroom experiment (3)



## Competing theories

### "efficient-markets" theory

- ▶ individual variations in beliefs do not affect aggregate prices

### "behavioral" theories

- ▶ noise trader approach (Schleifer and Summers, 1990)
- ▶ dividend growth model (Barsky and De Long, 1993)

$$p_t = d_t / (r - g_t),$$

where  $g_t$  is the 'permanent' rate of growth of dividends.

## Historical digression

### Tulipmania, 1636-37 in Holland

- ▶ allegedly best known example of a bubble
- ▶ Garber (1990) argues that the inflated prices actually reflected fundamentals
  - ▶ How can we know the fundamental value if we don't conduct laboratory experiments?

