

## Financial market game

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### Summary

The purpose of this laboratory is to understand how financial markets (namely stock exchanges) work. You will be able to exchange shares for cash.

### Objectives and motivation

This activity has a single objective:

Objective: Understanding how stock exchanges work

According to our experience, even people with scientific degrees do not know the difference between bonds and shares, not to mention the mechanism of the double auction. Using a simple game is an effective way for understanding these concepts.

### Structure of the game

Players will find themselves before a blackboard (*the Book*) with the words *Bid* and *Ask*. Each player will receive 100 shares with initial price of 10 euros each as well as 1000 euros in cash. Therefore, the initial wealth of all players will be equal to 2000 euros.

Every participant will be identified by a numerical label and the game master will draw a number among the labels. The selected player will have the following choices:

- place a bid offer for one share (an offer to buy one share at a given price);
- place an ask offer for one share (an offer to sell one share at a given price);
- accept an existing offer and buy or sell a share; in this case a *trade* will take place;
- do nothing.

Remark 1: in this game, it is possible to place orders only for one share (the quantity that can be offered, requested or traded is one share).

Remark 2: if the Book is empty (this is the case of the first player), only three actions will be possible:

- place a bid offer for one share (an offer to buy one share at a given price);
- place an ask offer for one share (an offer to sell one share at a given price);
- do nothing.

Remark 3: offers cannot be withdrawn.

Remark 4: the *tick* (minimum allowed price difference) is 1 euro.

The game will be repeated until all the players are called. At the end of the period (after calling all players), an interest of 1% will be paid on cash in the hands of each player.

On the blackboard, the game master will order bids from the *best bid* (higher bid) in decreasing order and asks from the *best ask* (lower ask) in increasing order. A typical

Book could be as follows, after several draws.

Bid		Ask	
10	23	11	30
10	03	11	28
09	12	12	20
09	02		

The meaning of this book is that player 23 wishes to buy at 10, player 3 as well, but the decision came after the order of player 23 and this offer goes into a queue. Player 12 wishes to buy at 9 euro and player 2 as well. This completes the description of the demand side. The supply side is the following: player 30 wishes to sell at 11, and also player 28. Player 20 wants to sell at 12.

Now, suppose that player 15 is drawn and that 15 decides to sell one share to 23 at 10 euros accepting the bid. After this event the book becomes:

Bid		Ask	
10	03	11	30
09	12	11	28
09	02	12	20

Player 23 adds one share to his/her portfolio and his/her shares become 101, whereas player 15 sells a share passing at 99. Cash in the hands of player 15 becomes  $1000+10 = 1010$  euros. After this, player 2 is selected and decides to do nothing. Then, 29 is drawn who places an ask at 11. The book becomes:

Bid		Ask	
10	03	11	30
09	12	11	28
09	02	11	29
		12	20

At the end of the game, denoting by  $p(1)$  the last traded share price, the final wealth of player  $i$  will be

$$C_i(1) = p(1) N_i(1) + B_i(1) (1+0.01)$$

where  $N_i(1)$  is the number of shares of player  $i$  at the end of the first period,  $B_i(1)$  is his/her cash. In our case,  $N_i(1)$  will be equal to 99 (if the player sold a share), 100 (if the

player decided to do nothing or was unable to buy and sell) or 101 (if the player bought a share). The purpose of this game is to end with a wealth higher than other players.

### Exercise

What is the situation in the example described above for the selected players after the last move discussed? Do they have the same wealth?.