

PART 1

Market information

This part of the experiment consists of a simulated stock market. You will participate in 12 market rounds. At the beginning of each market round, you will see an introductory page that provides some useful information, as in the example below.

Commented [1]: to decide

Market round 1

In this market round, the assets have the following payoffs:

Asset A		
Payoff	300	20
Chance	45%	55%

Asset B		
Payoff	200	80
Chance	65%	35%

Asset C	
Payoff	100
Chance	100%

You will start this market round with the following endowments:

Cash	Asset A	Asset B	Asset C
1000	2	80	0

After you and the other participants have clicked on the 'Next' button, the market round will start.

Next

During each market round, you can buy and sell three assets, called A, B and C. [change asset names to X Y Z] Each unit of an asset will pay out some amount of money (*payoff*) if you hold it at the end of the market round. The payoff of each asset can take different values. In the example below, the payoff to a unit of asset A equals 300 with 45% chance and 20 with 55% chance. The payoff to a unit of asset B equals 200 with 65% chance and 80 with 35% chance. The payoff to a unit of asset C is 100 for sure (100% chance). The actual payoffs will be determined by the computer at the end of the market round using the chances.

At the beginning of each market round you are given some units of assets A, B and C. You are also given some amount of cash, which can be used to buy more units of the assets. The initial page of each market round reports the amounts of asset units and cash available to you, called endowments. In this example, you start the round with 1000 units of cash, 2 units of asset A, 80 units of asset B and 0 units of asset C. In each market round, you start with new endowments. Assets and cash that you have accumulated in the previous market round are not carried over to the next market round and so do not affect endowments.

Market interface

After all participants have clicked on the ‘Next’ button, you will see a market interface. The figure below shows you an example of the market interface you will use to trade in the market. We will explain all the elements of the interface.

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset	A	B	C
Available	2	80	0
Settled	2	80	0
Requested	-	-	-
Offered	-	-	-

Settled Cash: 1000
Available Cash: 1000

Asset A

Payoff	300	20
Chance	45%	55%

Asset B

Payoff	200	80
Chance	65%	35%

Asset C

Payoff	100
Chance	100%

Time Remaining: 5:46

Time limit

Each round lasts 7 minutes. The time remaining in the round is shown in the highlighted box:

Asset A

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset B

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset C

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset	A	B	C
Available	2	80	0
Settled	2	80	0
Requested	-	-	-
Offered	-	-	-

Settled Cash: 1000
Available Cash: 1000

Asset A

Payoff	300	20
Chance	45%	55%

Asset B

Payoff	200	80
Chance	65%	35%

Asset C

Payoff	100
Chance	100%

Time Remaining: 5:46

Assets payoffs

Information about the asset payoffs is summarized in the highlighted box. This is the same information that is given to you in the introductory page of this market round.

Asset A

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset B

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset C

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset	A	B	C
Available	2	80	0
Settled	2	80	0
Requested	-	-	-
Offered	-	-	-

Settled Cash: 1000
Available Cash: 1000

Asset A

Payoff	300	20
Chance	45%	55%

Asset B

Payoff	200	80
Chance	65%	35%

Asset C

Payoff	100
Chance	100%

Time Remaining: 5:46

Available assets and cash balance

The amounts of asset units and cash available to you at each point in time is shown in the highlighted box. At the beginning of a market round, these values are equal to your endowments of assets and cash. This box also shows you the settled amounts of assets and cash, and the amounts of assets you requested and offered at each point in time. The difference between available and settled amounts is the following: the settled amount of assets or cash is what you currently own; the available amount of assets or cash is what you own minus what you have offered to other market participants in a transaction that is still pending. We will explain the meaning of all these terms later.

For example, you currently own 4 units of Asset A and you have just offered to sell 1 unit of Asset A so you are still waiting for other players to buy it. In that case, your available units of asset A are 3, which is one unit less than your settled units of asset A of 4. Now, consider an example in which you own 1000 in cash and you have just offered to buy 1 unit of Asset B for 200 so you are still waiting for other players to sell it to you. In that case, your available cash is 800, which is 200 less than your settled cash of 1000.

Commented [2]: I have included some examples like this below where we discuss bids and asks, so maybe these examples here can be dropped?

Commented [3]: Okay.....but it does not seem that the sentences correspond to the highlighted box...

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset	A	B	C
Available	2	80	0
Settled	2	80	0
Requested	-	-	-
Offered	-	-	-

Settled Cash: 1000
Available Cash: 1000

Asset A

Payoff	300	20
Chance	45%	55%

Asset B

Payoff	200	80
Chance	65%	35%

Asset C

Payoff	100
Chance	100%

Time Remaining: 5:46

Entering bids

If you want to buy a unit of an asset, you must enter a bid. A bid is the price you are willing to pay for that unit. For example, to place a bid for asset A, you enter a number in the highlighted box and then click "Buy".

Commented [4]: Should we say "But At". And explain that you will buy the asset if someone else wants to sell at this price and is willing to accept your bid.

Commented [5]: Will change "Bid" instead of "Buy" and "Ask" instead of "sell"

Asset A

Bids

Trades

Asks

Bid Buy

Ask Sell

Asset B

Bids

Trades

Asks

Bid Buy

Ask Sell

Asset C

Bids

Trades

Asks

Bid Buy

Ask Sell

Asset	A	B	C
Available	2	80	0
Settled	2	80	0
Requested	-	-	-
Offered	-	-	-

Settled Cash: 1000
Available Cash: 1000

Asset A			
Payoff	300	20	
Chance	45%	55%	

Asset B			
Payoff	200	80	
Chance	65%	35%	

Asset C	
Payoff	100
Chance	100%

Time Remaining: 5:46

In the example below, player 1 has entered a bid of 80 for one unit of asset A. You can cancel a bid that you have previously submitted by clicking on the red cross.

Asset A

Bids

Trades

Asks

Bid 80 Buy

Ask Sell

Asset B

Bids

Trades

Asks

Bid Buy

Ask Sell

Asset C

Bids

Trades

Asks

Bid Buy

Ask Sell

Asset	A	B	C
Available	2	80	0
Settled	2	80	0
Requested	1	-	-
Offered	-	-	-

Settled Cash: 1000
Available Cash: 920

Asset A			
Payoff	300	20	
Chance	45%	55%	

Asset B			
Payoff	200	80	
Chance	65%	35%	

Asset C	
Payoff	100
Chance	100%

Time Remaining: 5:30

[need to highlight bid value in red]

Commented [6]: Following your nice interface, I would also circle/frame the bid in red.

Commented [7]: I have added a note below the figure to remind myself to do this in the final version. same for the other figures.

When you submit a bid for an asset, the number of requested units for that asset increases by 1. At the same time, your available cash decreases by the amount of the bid (80 in this example). Thus, while you are still waiting for other players to sell the asset to you, your available cash is 920, which is 80 less than your settled cash balance of 1000.

Entering asks

If you want to sell a unit of an asset, you must enter an ask. An ask is the price you are willing to accept for selling that unit. For example, to enter an ask for asset A, player 2 can enter a number in the highlighted box and then click “Sell”.

Bids

80

Trades

Asks

Bid

Buy

Ask

Sell

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset	A	B	C
Available	8	20	0
Settled	8	20	0
Requested	-	-	-
Offered	-	-	-

Settled Cash: 1000
Available Cash: 1000

Asset A			Asset B			Asset C		
Payoff	300	20	Payoff	200	80	Payoff	100	
Chance	45%	55%	Chance	65%	35%	Chance	100%	

Time Remaining: 5:19

In the example below, player 2 has entered an ask of 110 for one unit of asset A. You can cancel an ask that you have previously submitted by clicking on the red cross.

Bids

80

Trades

Asks

110

Bid

Buy

Ask

110

Sell

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset A

Available

7

20

0

Settled

8

20

0

Requested

-

-

-

Offered

1

-

-

Settled Cash: 1000

Available Cash: 1000

Asset A

Payoff

300

20

Chance

45%

55%

Asset B

Payoff

200

80

Chance

65%

35%

Asset C

Payoff

100

Chance

100%

Time Remaining: 4:59

Commented [8]: From previous comment: highlight the ask.

[need to highlight ask value in red]

When you submit an ask, the number of offered units increases by 1 and your available number of asset units decreases by 1. In the example above, while player 2 is still waiting for other players to buy the asset she offered, her available units of asset A are 7, which is one unit less than her settled units of asset A of 8.

You can submit multiple bids and asks. In the example below, player 2 submits a new ask for asset B.

Bids

80

Trades

Asks

110

Bid

Buy

Ask

110

Sell

Bids

Trades

Asks

Bid

Buy

Ask

Sell

Asset A

Available

7

19

0

Settled

8

20

0

Requested

-

-

-

Offered

1

1

-

Settled Cash: 1000

Available Cash: 1000

Asset A

Payoff

300

20

Chance

45%

55%

Asset B

Payoff

200

80

Chance

65%

35%

Asset C

Payoff

100

Chance

100%

Time Remaining: 4:43

Commented [9]: Idem: highlight ask and bid

[need to highlight bid value in red]

Trading

You can see the bids and asks of other players for each asset. Continuing with the previous example, player 1 can see the asks of player 2 as shown below. [show case with multiple bids/asks for an asset and explain how they are sorted]

Bids

80

Ask

110

Bid

80

Buy

Ask

Sell

Bids

Ask

90

Bid

Buy

Ask

Sell

Bids

Ask

Bid

Buy

Ask

Sell

Asset	A	B	C
Available	2	80	0
Settled	2	80	0
Requested	1	-	-
Offered	-	-	-

Settled Cash: 1000
Available Cash: 920

Asset A	Payoff	300	20
	Chance	45%	55%

Asset B	Payoff	200	80
	Chance	65%	35%

Asset C	Payoff	100
	Chance	100%

Time Remaining: 4:37

[highlight bids and asks, maybe use different colors for different players or labels]

In this example, the highest bid for asset A is 80, but the lowest ask for asset A is 110. As long as the ask price is higher than the bid price no transaction will happen. If the bid of player 1 had been higher than or equal to the ask of player 2, then player 1 would have automatically bought one unit of Asset A from player 2.

Assume that player 1 is willing to pay the price asked by player 2 for one unit of asset B (90). Then, there are two ways for player 1 to buy asset B from player 2:

- 1. First, player 1 can enter a bid for asset B of 90.
- 2. Second, player 1 can double-click on the 90 ask. In this case, player 1 will be asked to confirm that she wants to buy one unit of asset B at that price.

In both cases, the transaction will be carried out: player 1 will buy one unit of asset B from player 2 at a price of 90.

Commented [10]: idem

Commented [11]: It might be useful to consider a case with several bids and asks so people understand how they are orders (descending and ascending orders).

Commented [12]: will do it in the next draft

Commented [13]: Should we also have the example in which you want to sell.

Commented [14]: I have added a paragraph below (highlighted in blue) with a description of such an example.

Selling an asset works in a similar way. Assume that player X is willing to sell one A unit at the price asked by player 1 (80). Then, there are two ways for player X to buy asset A from player 1:

1. First, player X can enter an ask for asset A of 80.
2. Second, player X can double-click on the 80 bid. In this case, player X will be asked to confirm that she wants to buy one unit of asset B at that price.

In both cases, the transaction will be carried out: player X will sell one unit of asset A to player 1 at a price of 80.

More generally, a trade occurs whenever a player enters a bid greater than or equal to the lowest ask, or a player enters an ask lower than or equal to the highest bid, or when a player double-clicks on a current ask or bid. When the highest bid is greater than the lowest ask, then the transaction is carried out automatically at the ask price.

Trades are recorded in the middle-column of the respective asset panel. Players who participated in the trade will see a letter next to the transaction price: a B if they bought and an S if they sold. The figure below shows the screen of player 1 who bought one unit of B.

Asset	A	B	C
Available	2	81	0
Settled	2	81	0
Requested	1	-	-
Offered	-	-	-

Asset	A	B	C
Settled Cash:	910		
Available Cash:	830		

Asset	A	B	C
Payoff	300	20	100
Chance	45%	55%	100%

Time Remaining: 4:17

[highlight completed trade]

Short-selling

Each player has 0 endowment of asset C, but you are allowed to sell up to 10 units of asset C even if you do not own any. If you sell asset C, you will have a negative settled amount of asset C. Thus at the end of the market round, you will have to pay the payoff of asset C for each unit you have sold. You are not

Commented [15]: I would frame the "90 B" in read.

Commented [16]: idem

Commented [17]: Here the example of "90 B" for Asset B might be confusing as people might think B stands for the Market. Actually, we might want to label "Assets X, Y and Z".

Commented [18]: 🙌

Commented [19]: Not sure if we need short-selling or just give them enough shares. This would require an example explaining it.

Commented [20]: Here I'm just trying to follow previous papers on CAPM experiments that allow short-selling of the risk-free asset. We can think more about it.

Commented [21]: So, this does not affect available cash. But, there is a debt pending, right? You can also go bankrupt. How is this handled?

allowed to have negative amounts of assets A and B. The figure below shows an example where player 1 sold one unit of asset C at 100. As a result of this transaction, player 1's current holdings of asset C are equal to -1, while her cash balance has increased by 100. Because player 1 is short 1 unit of asset C, the payoff of asset C (also equal to 100) will be deducted from her final payoffs.

Asset	A	B	C
Available	2	81	-1
Settled	2	81	-1
Requested	1	-	-
Offered	-	-	-

Asset	A	B	C
Payoff	300	200	100
Chance	45%	65%	100%

Time Remaining: 3:40

Commented [22]: idem

[highlight completed trade and current holdings]

Borrowing cash

You are allowed to borrow up to \$100 to buy assets. If you end up with a negative cash balance, it will be subtracted from your final points in the market round.

Final points

At the end of each market round your payoff is given by the actual payoff for each asset times the number of units of each asset you own, plus your remaining cash balance. You will see a summary page like the one shown below for player 1. In this example, the players has 2 units of asset A, 81 units of asset B, -1 units of asset C (he or she sold one unit short during the round) and 1010 in cash at the the of the market round. In this market round, the realized payoffs are: 20 for asset A, 80 for asset B, 100 for asset C. So the final payoff to the players is:

$$2 \times 20 + 81 \times 80 - 1 \times 100 + 1010 = 40 + 6480 - 100 + 1010 = 7430$$

Commented [23]: I am sure I understand. You can already "borrow" by selling C, right?

Commented [24]: this can be deleted. no borrowing cash (but we need to discuss initial loans)

Commented [25]: No bankruptcy rule, right?

Commented [26]: Why not giving them more cash and have no borrowing?

Commented [27]: this follows from other experiments, but we may not need this. We also need to think about the bankruptcy rule.

Commented [28]: Perhaps add an example.

Commented [29]: added a description of the example in the screenshot (highlighted in blue)

Market round 1: results

	Asset A	Asset B	Asset C	Cash
Final Holdings	2	81	-1	1010.0

Loan amount: 0
Realized payoff to asset A: 20
Realized payoff to asset B: 80
Realized payoff to asset C: 100
Your final payoff: 7430 points

Next