

Instructions of the stock trading experiment

Hello and welcome to the laboratory of experimental economics of Montpellier.

You are going to participate in an experiment in which your decisions will be anonymous and partly determine your final payment. We invite you to read the following instructions carefully.

Please do not turn the page, as long as you are not invited to do so. Before the experience begins,

- Please make sure that you are seated in the place you have been assigned.
- Please do not log in to the computer until you are prompted to do so.
- Please inform us if your computer is not working properly.

Calendar of Today

Today, we will conduct an experiment consisting of two consecutive stock trading games. The following four steps describe the experiment:

1. Reading of the instructions of the games, followed by a practice round with the graphical interface.
2. Participation to Game 1 and then Game 2 (each game has 10 periods).
3. Questionnaires and quizzes.
4. **Payments: Your monetary reward, which will be paid in cash at the end of the game, consists of three elements:**
 - a) First a lump sum for your trip. This sum will be inevitably paid to you.
 - b) In addition to this amount, you are awarded a basic payment of 5 euros. However, if your losses in the game exceed the original total amount of cash we will give you to play and trade, then these will be deducted from these 5 euros.
 - c) In addition to these two amounts, a variable amount, that you will earn during the experiment, will be paid to you. You can earn more than 50 euros of variable amount in this experiment, depending on your performance and that of other participants.

Important considerations:

- The questionnaires and quizzes do NOT AFFECT the results of the games.
- The games are independent of each other. Therefore, the result of one game does not affect the other game.
- The time of the experiment will not exceed 3 hours.
- If you need to go to the bathroom, inform the experimenter at the end of one of the games.

Today's experience

You will play today trading games in which you will buy and sell stocks of a single company "X" on an artificial financial market. Please listen carefully to the instructions.

If you have questions related to the instructions, we will answer them at the end of the reading of the instructions. You can then raise your hand and ask your questions.

Besides, if you have any question during the experiment, please raise your hand. In this case, an experimenter will come to you and answer to your question personally.

Throughout the experiment, please respect the following rules:

1. Do not talk to other participants during all games, so during the whole experiment, and during breaks. This could affect the outcome of the experiment.

Please turn to the next page.

2. Use your mouse or keyboard only when the experimenter asks you to do so. Otherwise, it could generate problems.
 - ✓ If malfunctions occur, all participants will have to restart the game from the beginning.

Overview of stock trading games

- You buy and sell stocks (so you trade stocks) of the same company "X" on an artificial market composed of 6 traders, who correspond to 6 participants in this room, you included.

Goals in this experiment

Your goal in this experiment is to make the maximum profit you can in both games. **The computer will then randomly draw one of the two games for which you will be paid.**

For example, if the computer randomly selects Game 2, you will be paid based on your performance on the second game.

We use the "ECU" as currency in the experiment. 1 ECU will be exchanged for 0.002778 euro when paying at the end of the experiment. For example, 360 ECU will be exchanged for 1 euro.

At the beginning of each game, you will receive 10 stocks + 3600 ECU.

In addition to this, you will be **loaned 3600 additional ECU.**

At the beginning of each game, your initial cash is **7200 ECU (3600 ECU offered + 3600 ECU loaned).** The additional 3600 ECU that we lent you will have to be repaid at the end of each game.

Therefore, at the end of each game, 3600 ECU will be automatically deducted from your final cash (of your cash amount available).

If you are unable to repay this amount at the end of the game and the computer has selected this game to establish your payment, the computer will automatically deduct the amount you cannot refund from the basic payment of 5 euros previously mentioned in the section 'Calendar of Today', item 4b.

For example, if the computer has selected this game to calculate your payment and only you have 2000 ECU at the end of the first game over the 7200 ECU initially available (3600 ECU offered + 3600 ECU lent), you still have to repay the 3600 ECU lent. By removing the 2000 ECU you hold, you still have to pay back to the computer ($3600 - 2000 = 1600$) 1600 ECU. To make this reimbursement, these 1600 ECU will be directly deducted from the basic payment of 5 euros, previously mentioned in the section "Calendar of Today", item 4b.

There are three ways to make profits.

1. First, by buying and selling stocks, and by making a profit margin on these transactions, which will be called "profit margin".
2. Second, thanks to the dividends that are paid for each stock you hold at the end of each period.
3. Finally, in addition to the two previous ways, you can make profits in this experiment by accurately predicting future stock prices. This point will be described later.

Please turn to the next page.

Make a profit margin on the purchases and sales of stocks (achieve a profit margin)

To make a profit margin on the stocks you hold in your portfolio, when buying and selling stocks, **you can follow several strategies for a given stock portfolio.**

1) You can speculate on rising prices:

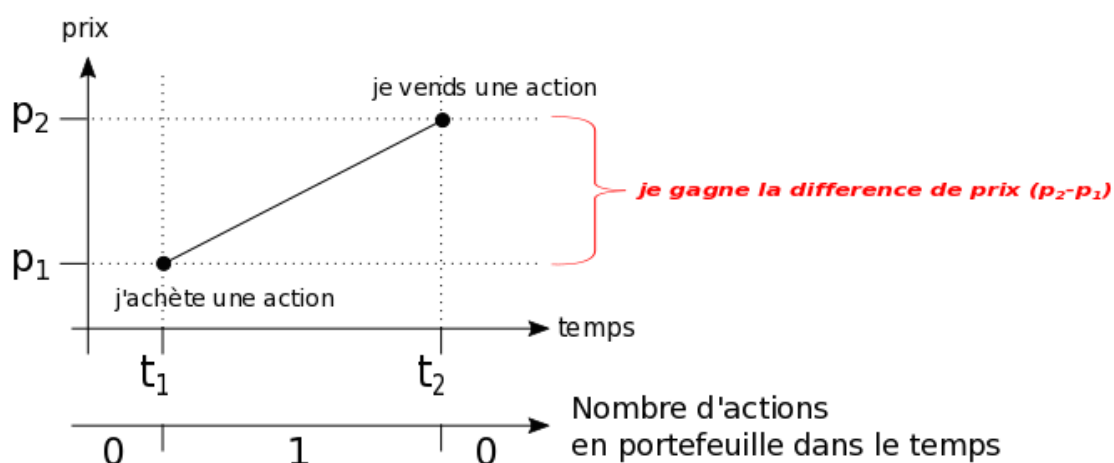
In this case, you anticipate a price increase. This involves buying stocks before they go up and then reselling them to realize a capital gain (a profit).

To do this, you need to buy stocks at a low price and sell them at a higher price, according to the following steps:

You buy stocks at a low price, you wait for prices to rise, and finally you sell those stocks at a higher price. For example (see the graph below for the example we give), suppose that you first buy in (t_1) a stock for 100 ECU (which is the price p_1). Then, in a successive time (t_2), the price of this stock rises to 120 ECU (which is the price p_2). If you sell this stock at that price, then you earn 120 (p_2 selling price) - 100 (purchase price p_1), which makes a profit of 20 ECU.

Here is a graphic illustration of this strategy:

Spéculation à la hausse



How prices are determined is explained later.

Please turn to the next page.

2) You can speculate on downward prices with your stocks in portfolio:

In this case, you anticipate lower prices. This involves selling stocks you hold in your portfolio before they fall, to buy them back in a second time, allowing you to make a capital gain.

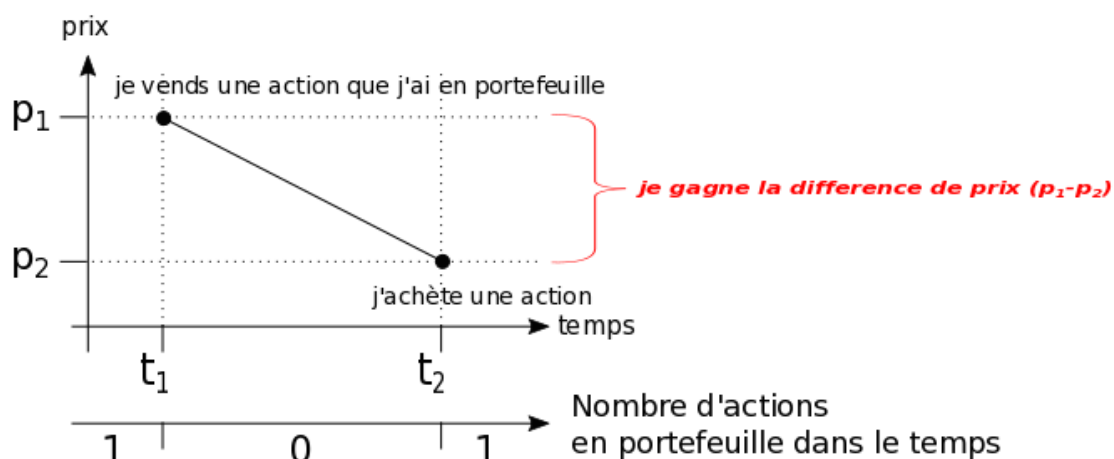
To do this, you need to sell your stocks in portfolio at a high price, then you wait for the prices to fall and buy them later at a lower price.

For example, (see the graph below for the example we give), suppose you have 1 stock in your portfolio with a unit price of 200 ECU. Anticipating a drop in prices, you first sell in (t_1) your stock on the market at 200 ECU (price p_1). In a successive time (t_2), the price of this stock drops to 150 ECU (price p_2). You decide then to buy it back to rebuild your initial portfolio.

In this case, you have made a profit of 200 ECU (sale price p_1 of your stock) - 150 ECU (purchase price p_2 of your new stock), i.e. 50 ECU.

Here is a graphic illustration of this strategy:

Spéculation à la baisse avec une action en portefeuille



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3) You can also speculate on downward prices by short selling:

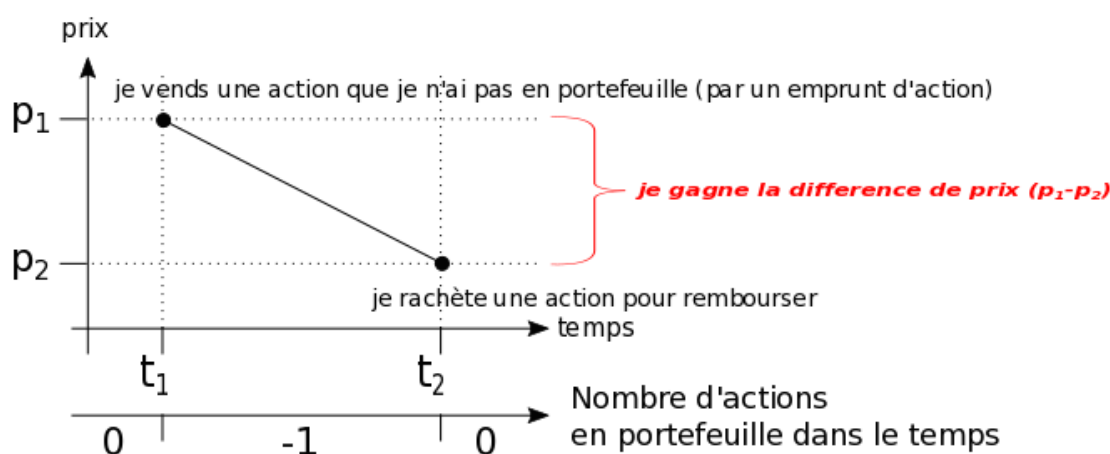
In this case, you also expect lower prices. However, unlike item 2 mentioned just before, this consists of selling stocks that you do not have in your portfolio, which you do not yet hold, and which are therefore loaned to you (by the experimenter) to carry out the operation.

Anticipating a decline in prices, you sell short a stock that you do not hold to buy it back in a second time at a lower price, which allows you to make a profit margin.

For example, (see the graph below for the example we give), assume that you have already sold all your stocks before and therefore you currently have no more stocks in portfolio. The current stock price is 250 ECU. You anticipate a drop in future prices. You then sell short at time (t_1) a stock on the market at 250 ECU (price p_1). In a successive time (t_2), the price of this stock drops to 220 ECU (price p_2). You then decide to buy it back to repay the stock that was loaned to you. You then make a profit of 250 ECU (selling price p_1 of the stock sold short) - 220 ECU (purchase price p_2 of the stock to repay the stock loan), i.e. 30 ECU.

Here is a graphic illustration of this strategy:

Spéculation à la baisse en vendant à découvert



- As a result, you can sell more stocks than you own. In other words, you can "own" a negative number of stocks. It's called short selling. You will then have to pay a **certain amount of money**, which we will call "**dividend**", for each period, on each sold short stock. An explanation of how dividends will work will be available later in the "Earn money with dividends" section.
- For example, suppose you hold 6 stocks in your portfolio and you sell 10. You will therefore have (6-10) or -4 (minus 4) stocks in portfolio at the end of this transaction. In this case, as long as you have -4 stocks at the end of each period, you will have to pay dividends on those 4 stocks sold short.

At the end of each period, the computer program will automatically calculate and deduct the dividend payment, for each stock sold short, from your cash in your portfolio.

- However, there is a constraint to be respected when selling short. **You can not have a negative number of stocks lower than -10 in your portfolio.** As examples, -11 or -12 stocks in your portfolio are impossible but -5 -6 or -10 stocks are possible. The computer program will not allow you to sell short any stocks if the transaction results in less than -10 stocks.

Therefore, if the number of stocks you want to sell exceeds the number of stocks you can sell, an error message will appear on your screen.

Now let's see how to use the computer interface. During the experiment, please make no other operation than those who are proposed to you, because that could raise problems.

Order screen

During each period you will enter your orders on the following screen.

Temps restant (secondes) 77

1

Montant d'argent actuellement à votre disposition 7200 2

Nombre d'actions que vous possédez 10 3

Prix maximum par action que vous êtes prêt(e) à payer 4

Quantité que vous souhaitez acheter 5

Prix minimum par action auquel vous êtes prêt(e) à vendre 6

Quantité que vous souhaitez vendre 7

OK 8

Entrez, s'il vous plaît, l'ordre d'achat et/ou de vente en spécifiant le prix et la quantité. Si vous ne souhaitez pas passer d'ordre de vente, entrez 0 (zéro) pour la quantité à vendre (de la même manière pour les ordres d'achat).

Jeu de trading d'actions 1 sur un total de 2 jeux.

1 / 10 Période

Historique des prix de marché

Jeu	Période 1	Période 2	Période 3	Période 4	Période 5	Période 6	Période 7	Période 8	Période 9	Période 10
1										

9

① indicates the remaining time to enter your orders. The time limit to enter your orders is 80 seconds maximum. When you have finished entering your orders, press the "OK" button ⑧. This step can be completed before 80 seconds if all participants have pressed the "OK" button. If you have not indicated your orders after 80 seconds (maximum time limit), the computer will automatically go to the next step (so on the next screen). In this case, your buy and sell orders will default to zero.

Please turn to the next page.

② indicates your cash (corresponding to the amount of money available in your portfolio); you can buy stocks up to the limit of this amount.

③ indicates the number of stocks you own.

④ is where you enter the maximum price per stock you are willing to pay for the stocks you want to buy during this period.

You can enter an integer between 1 and 2000.

At ⑤ you **must** enter the maximum number of stocks you wish to buy during this period. If you do not want to buy stocks, enter the number 0. The product of (4) and (5) must not be greater than the amount of available cash indicated in (2). An error message will appear if **【the number of stocks you want to buy】 × 【the maximum price you are willing to pay for each one】** exceeds your available cash (your money available).

In practice, the price at which you buy a stock will not always be the maximum price you are willing to pay. Indeed, the market price is established on the basis of all the orders proposed by the participants in this market. And if the market price is higher than the maximum amount you are willing to pay, **your order will not be executed**. Further explanation will be given later in these instructions.

At ⑥ indicate the minimum price per stock at which you are ready to sell your stocks during this period. You can enter an integer between 1 and 2000. The price you enter must not be greater than that in (4).

At ⑦ indicate here the number of stocks you want to sell during this period. If you do not want to sell stocks, enter the number 0.

In practice, the price at which you will sell a stock will not always be the minimum price at which you are willing to sell. Indeed, the market price is established on the basis of all the orders proposed by the participants in this market. And if the market price is lower than your minimum price, **your order will not be executed**. Further explanation on this subject will be given later

⑧ .After filling the fields ④ ~ ⑦, press the OK button. If all participants have pressed this button before the maximum time (80 seconds), then this step ends at this time. Otherwise this step will end at the end of 80 seconds.

⑨. This table shows the history of market prices. As a result, the cells after the current period are empty.

Before you begin, here is a summary of several important points regarding buying and selling stocks.

- **You can simultaneously offer buy and sell orders, or offer only a buy order or only a sell order. It is also possible to submit no order at all.**
- **When you do not want to submit a purchase order, please enter the number 0 as the quantity to buy. If you do not want to submit a sell order, please enter the number 0 as the quantity to sell.**

When the following conditions are not respected, the screen displays an error message:

Please turn to the next page.

1. The maximum purchase price multiplied by the quantity to be purchased must be less than or equal to the cash you own.
2. The maximum amount of stocks you can sell, so when you sell short, should simply allow you to meet the constraint mentioned above which states that you can not have in your portfolio an amount of stocks lower than -10. (See section short selling above).
3. When you offer both buy and sell orders, the maximum purchase price must be less than or equal to the minimum selling price.

Be careful, when you make a mistake and a message appears on the screen to tell you (see screen below), the time can freeze on your screen but continues to flow normally in the game. Therefore, be careful not to keep the message displayed too long.

Temps restant (secondes) 31

Montant d'argent actuellement à votre disposition	Nombre d'actions que vous possédez	Prix maximum par action que vous êtes prêt(e) à payer	Quantité que vous souhaitez acheter	Prix minimum par action auquel vous êtes prêt(e) à vendre	Quantité que vous souhaitez vendre
7200	10	<input type="text" value="1000"/>	<input type="text" value="10"/>	<input type="text" value="2000"/>	<input type="text" value="1"/>

Dialog

Votre argent disponible doit être supérieur ou égal au nombre d'actions que vous souhaitez acheter multiplié par le montant maximum que vous êtes prêts à payer.

Entrez, s'il vous plaît, l'ordre d'achat et/ou de vente en spécifiant le même manière pour les ordres d'achat.

d'ordre de vente, entrez 0 (zéro) pour la quantité à vendre (de la

Historique des prix de marché

Jeu	Période 1	Période 2	Période 3	Période 4	Période 5	Période 6	Période 7	Période 8	Période 9	Période 10
1										

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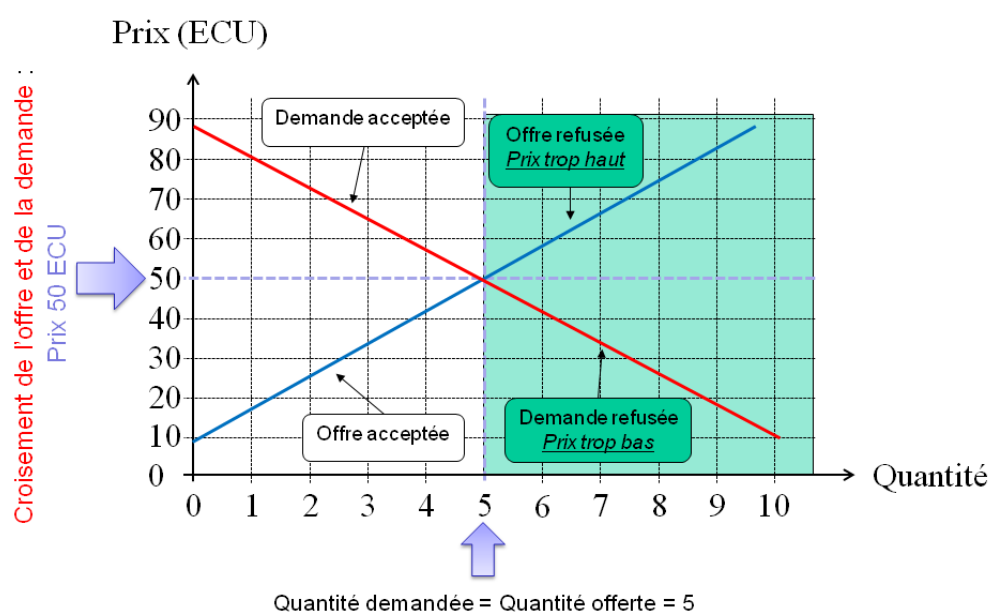
End of each period

① Market price

The price is set on the basis of the order book within your market (that is, by the orders given by all 6 traders in your market). The stock has the **same identical price for all traders** at the end of each period, which is set to equalize the number of purchase orders with the number of sell orders.

Here is a graphical illustration of the supply and demand curves for stocks:

Courbe d'offre et de demande d'actions :



The price set above at 50 ECU therefore corresponds to the crossing of the supply and demand curves. Five stocks will be exchanged during this period. For traders who have proposed buy orders (red curve) whose maximum amount is less than 50 ECU, their order will not be executed. On the other hand, for traders who have proposed sell orders (blue curve) whose minimum amount is greater than 50 ECU, their order will not be executed.

Please turn to the next page.

End screen for each period

At the end of each period, the following screen will be displayed.

		7	Temps restant (secondes)	1
		1	Prix	1
2	Nombre d'actifs achetés (vendus si négatif) dans cette période			0
	Montant d'argent actuellement à votre disposition (incluant l'argent qui vous a été prêté)			7680
3				
4	Nombre d'actions que vous possédez			10
	Next Value (Valeur prochaine)			324
5				
6	Nombre de prédictions comprises entre 90% et 110% du prix de marché réalisé concernant cette période depuis le début du jeu			0
9	Le dividende par action pour cette période est de :			48
CONTINUER				
8				

- ① indicates the market price, as explained above.
 - ② indicates the number of stocks you purchased during this period. If this number is negative, then this is the number of stocks you sold during this period.
 - ③ indicates the cash available after the transactions and dividend payments for that period.
 - ④ indicates the number of stocks you currently hold.
 - ⑤. An explanation of the term "Next Value" will be given on the next page.
 - ⑥ indicates the number of prices that have been predicted in the range of 90% to 110% of the market price for this period since the beginning of the game. An explanation for this will be proposed later in the section "Make money by predicting future prices".
 - ⑦ indicates the remaining time (maximum time 25 seconds) before this screen disappears. After viewing the information on this screen, press the (⑧) button to continue. This step can thus be completed before the 25 seconds (maximum time limit) if all the participants have pressed the button (⑧) to continue.
- At the end of the 25 seconds, if you did not press the (⑧) button, the computer will automatically go to the next step (so on the next screen).
- ⑨ indicates the dividend per stock for this period.

Earn money with dividends

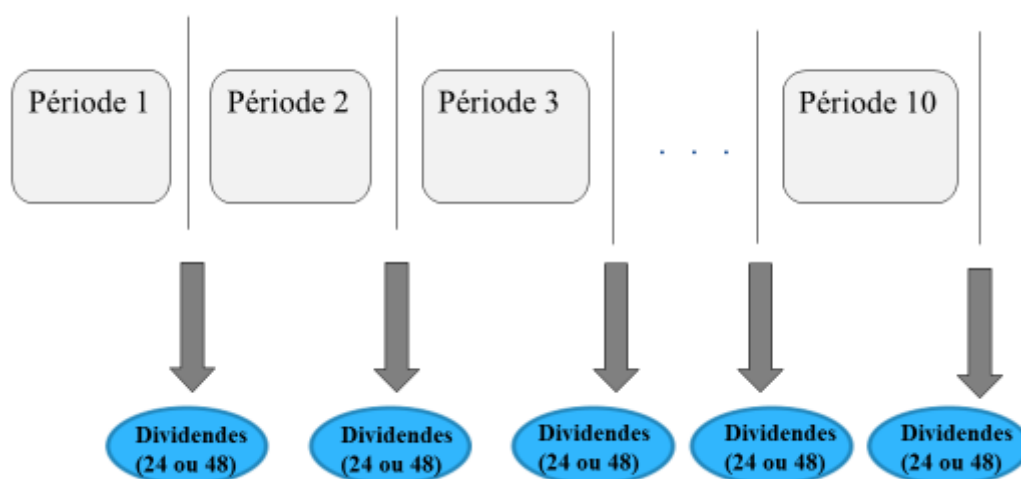
The dividend is the remuneration paid to you at the end of each period for each stock you hold in your portfolio. Conversely, you must pay a dividend at the end of each period for each stock sold short in your portfolio (negative value in the portfolio).

In each game, there are 10 periods (time) in which you enter your buy or sell orders and trade with other traders in your market.

At the end of each trading period, and for period 10 as well, the computer randomly selected one of these two possible values:

- 24 ECU or 48 ECU, to determine the dividend of the period. Each of these two values had the same chance of being selected by the computer and therefore had the same probability of occurrence.

Below is a graphical illustration of the distribution of dividends at the end of each period when you hold stocks in your portfolio:



Each stock held at the end of each period:

- gives you a dividend of 24 ECU if the computer randomly chose 24 ECU for this period,
- gives you a dividend of 48 ECU if the computer randomly chose 48 ECU for this period.

Therefore, the expected average dividend for each period is 36. The dividend received is automatically added to your available cash.

You are therefore offered a dividend per stock, based on the number of stocks you have at the end of each period. Income from dividends at the end of each period is therefore equal to:

- the dividend per stock, i.e. {24, 48} ECU x (times) the number of stocks you hold in your portfolio.

After the payment of the dividend at the end of period 10, there will be no other possible gains.

Please turn to the next page.

Conversely, each stock sold short, at the end of each period:

- **Costs** you a dividend of 24 ECU if the computer randomly chose the value 24 ECU for this period,
- **Costs** you a dividend of 48 ECU if the computer randomly chose the value 48 ECU for this period.

The dividend paid for each stock sold short is deducted automatically from your available cash.

Therefore, if your cash in your portfolio becomes negative during one of the 2 games because you sold short and do not have enough money to pay the dividends on those stocks sold short, **you will be considered as being bankrupt.**

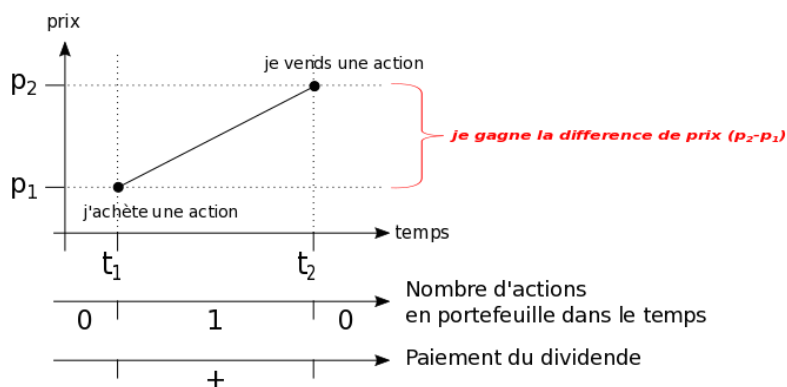
In this case, during the following periods of this game, you will no longer be able to buy and sell stocks (transactions). During these steps of buying and selling stocks, it will then be displayed on your screen a message asking you **to wait** while other traders continue to play.

Note, however, that even if you no longer participate in the buying and selling of stocks, you will have to continue paying dividends on the stocks sold short until the end of the game. Just like the money originally loaned (3600 ECU) that you can not repay, the amount of money lost during this game will be deducted from the basic payment of 5 euros mentioned in the "Calendar of Today", section payments item 4b, if the computer has selected this game to calculate your payment. In any case, **you will not be able to lose more than the 5 euros of the basic payment.**

However, even in bankruptcy, **you can continue, at the beginning of each period, to earn money** by making predictions of future prices. Further information on this topic will be given in the section "Prediction of future prices".

Here is a reminder, with graphics, of the different “profit margin” strategies associated with the potential dividend gains:

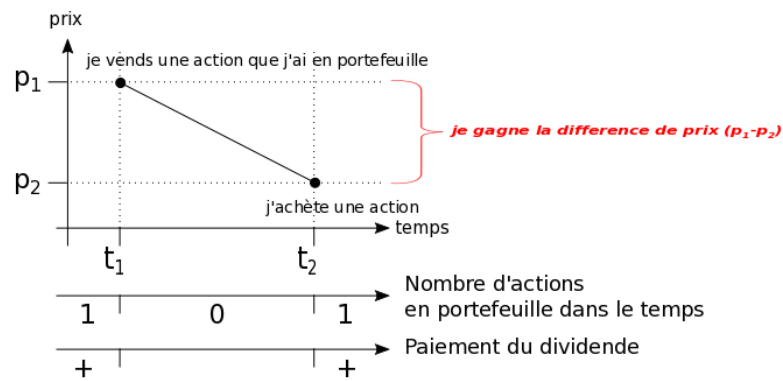
Spéculation à la hausse



In the graph above, buying a stock to speculate on upward prices allows you to earn a dividend per period until you sell the stock.

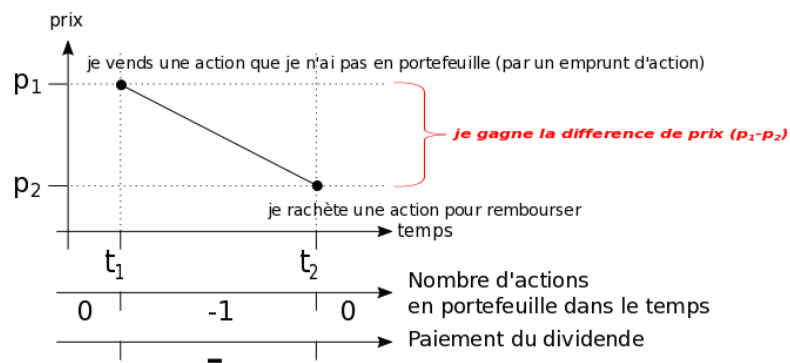
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Spéculation à la baisse avec une action en portefeuille



In the graph above, the sale of a stock in the portfolio to speculate on downward prices eliminates the possibility of obtaining a dividend per period for that stock until you buy it back.

Spéculation à la baisse en vendant à découvert



In the graph above, the short sale of a stock, which the experimenter has therefore loaned you so that you can speculate on downward prices, implies that you pay a dividend for that stock each period, until you repurchase it to pay it back.

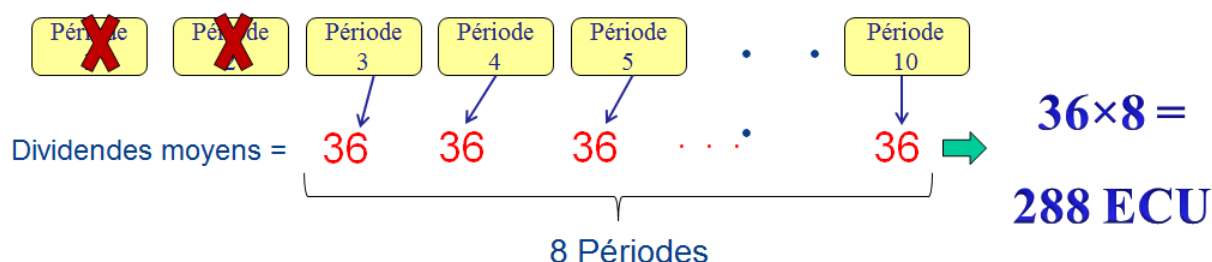
Please turn to the next page.

“Next value”

As mentioned earlier in the instructions, at the end of each period, an amount is displayed under the label "NEXT VALUE". This amount represents the sum of the expected average dividends per stock to be distributed for the remaining periods. For example, at the end of the second period, 8 periods remain to run. An expected average dividend of 36 ECU per stock will therefore be distributed 8 times. Therefore, **the "Next Value" is $36 \times 8 = 288$ ECU.**

Thus, if you have a stock in your portfolio and keep it until the end of the game, it will earn you on average an amount corresponding to the "next value" of the current period.

Here is a graphic illustration:



At the end of Period 10, the dividend (on average 36) is paid, as usual, based on the number of stocks you own. The money you hold after the payment of the dividends in Period 10 represents the final amount that you will earn in this game.

The value of the stocks at the end of Period 10, after the payment of the last dividend, is equal to 0. As a result, the stocks you hold after the 10th period can no longer be sold because they are worthless (they no longer yield dividends).

On the other hand, if you have a negative number of stocks because you sold short, the value of a stock being zero after period 10, you will not need to buy them back.

Below is the table of "Next Value". A copy of this table is given to you on the last page of this document. Refer to this copy during the experiment, when you need it.

« Next Value » Table

Current Period	Number of remaining periods	x	Average dividend per period	=	« Next Value » per stock you hold at the end of each period
1	9	x	36	=	324
2	8	x	36	=	288
3	7	x	36	=	252
4	6	x	36	=	216
5	5	x	36	=	180
6	4	x	36	=	144
7	3	x	36	=	108
8	2	x	36	=	72
9	1	x	36	=	36
10	0	x	36	=	0

Please turn to the next page.

Prediction of future prices

Before the beginning of each period, you are asked to predict market prices for all remaining periods. The following screen will appear.

Temps restant (secondes) 60

Période 1

Période 2

Période 3

Période 4

Période 5

Période 6

Période 7

Période 8

Période 9

Période 10

OK

Entrez ci-dessus, s'il vous plaît, vos prévisions de prix pour les 10 période(s) à partir de la période actuelle (la période 1) jusqu'à la période 10. Les valeurs des prévisions que vous proposez doivent être comprises entre 1 et 2000.

Jeu 1 sur un total de 2 Jeux --- 1 / 10 Période

Le jeu a commencé. L'argent à disposition et les actifs sont initialisés aux valeurs initiales.

Historique des prix

Jeu	Période 1	Période 2	Période 3	Période 4	Période 5	Période 6	Période 7	Période 8	Période 9	Période 10
1										

Your maximum time limit is 10 seconds for each prediction you will need to make. For example, if you have 10 predictions to make (as in the example of the screen above), you will have 100 seconds at your disposal. Other example, if you have 2 predictions to make, you will have 20 seconds at your disposal.

When you have finished your predictions, press OK. This step of forecasting future prices can therefore be completed before the maximum time allowed if all participants have pressed the OK button. If you have not entered your predictions before the time limit, the computer will give you a few extra seconds and ask you to press the OK button **to validate the predictions you have already entered**.

If you do not press the OK button after this additional time, the computer will automatically go to the next step (so on the next screen). In this case, your predictions will not be taken into account.

Please turn to the next page.

Number of future price predictions

You are asked to predict prices for all remaining periods, that is, all those that follow the current period. For example:

- Before the beginning of period 1, there are 10 periods left. So you have to predict 10 prices.
- Before the beginning of period 2, there remains 9 periods. So you have to predict 9 prices.
- ...
- Before the beginning of period 10, there remains 1 period. So you have to predict 1 price.

As a result, you will have to make a total of 55 market price predictions.

Make money by predicting future prices

The computer will record the number of precise predictions you make (= that is, will count the number of times your price predictions are actually between 90% and 110% of the realized market price of the period).

For each forecast that you propose, and which is between 90% and 110% of the market price actually achieved over the period to be predicted, you will earn 36 ECU.

Therefore, after each game, you will win an amount calculated according to the following formula:

$X * 36$ ECU. (with X corresponding to the number of precise predictions).

As an example, if you make 30 accurate predictions for the entire game, you will gain:

$30 * 36$ ECU = 1080 ECU.

Precision of the prediction	Your earnings for each accurate prediction
Between 90% and 110% of the real price	36 ECU

As mentioned earlier, even when you are bankrupt, you can continue to earn money by making predictions of future prices at the beginning of each period.

Summary of ways to make a profit

You have three ways to make a profit. (1) Make a profit from trading stocks (i.e. buying and selling stocks), (2) earn dividends by owning stocks, and (3) accurately predict market prices. You can **earn more than 50 euros of variable** amount in this experiment.

Training

A training session will take place, in which you are given time to learn how to proceed with the software. In particular, you will learn how to enter your purchase and sale orders as well as your predictions. First, a screen for predicting future prices will appear. Press the "OK" button after you finish entering your price predictions. Once everyone has pressed the "OK" button, the computer will then display the order screen.

Next, indicate your buy and sell orders and then click on the "OK" button to validate. The training session will end when everyone has validated their orders.

The results of the training session will not be displayed. The rewards do not depend on this training session.

Let's start with this training.

As mentioned earlier, a table of the "Next value" is available on the following page.

« Next Value » Table

Current period	Number of remaining periods	x	Average dividend per period	=	« Next Value » per stock you hold at the end of each period
1	9	x	36	=	324
2	8	x	36	=	288
3	7	x	36	=	252
4	6	x	36	=	216
5	5	x	36	=	180
6	4	x	36	=	144
7	3	x	36	=	108
8	2	x	36	=	72
9	1	x	36	=	36
10	0	x	36	=	0