Experimental Instructions for *The Inference-Forecast Gap in Belief Updating*

1 *Baseline* treatment

1.1 *Inference Prior* and *Inference* parts

INSTRUCTIONS

Please read and follow all the instructions carefully! You will be asked to answer questions about these instructions and you will not be able to proceed unless you answer all questions correctly.

Overview

Most participants complete this study in **20 to 30 minutes**. Please start this study only if you have that much time in a single session. If you do not complete the study, or if the task times out on you, we will not be able to pay you. (The task is set to time out in two hours.)

This study has 40 rounds, divided into different parts. After you complete the study, you will receive a $5.00 base payment. In addition, the computer will randomly select one round to count for your bonus. Your answer in that round, together with some luck, will determine whether you will earn an additional $5.00 bonus or not. Because any round may count for your bonus, you should answer all questions carefully.

Firms and Stock Prices

In each round, there is a new pool of 20 **firms** belonging to two types: Some firms are **good** firms, while others are **bad** firms.

In any given month, a firm's stock price growth will be a random whole number (in ¢/cents). For example, it may be -300¢, or -290¢, or -280¢, and so on, up to 400¢. A negative stock price growth means that the firm's stock price decreases from the previous month. For the purpose of this study, you don't need to worry about stock price falling below zero.

The stock price growth of **good** firms will be generally higher than that of **bad** firms. However, for any given firm, there will be much randomness in its stock price growth in every month.

In each round, you will see the following information:

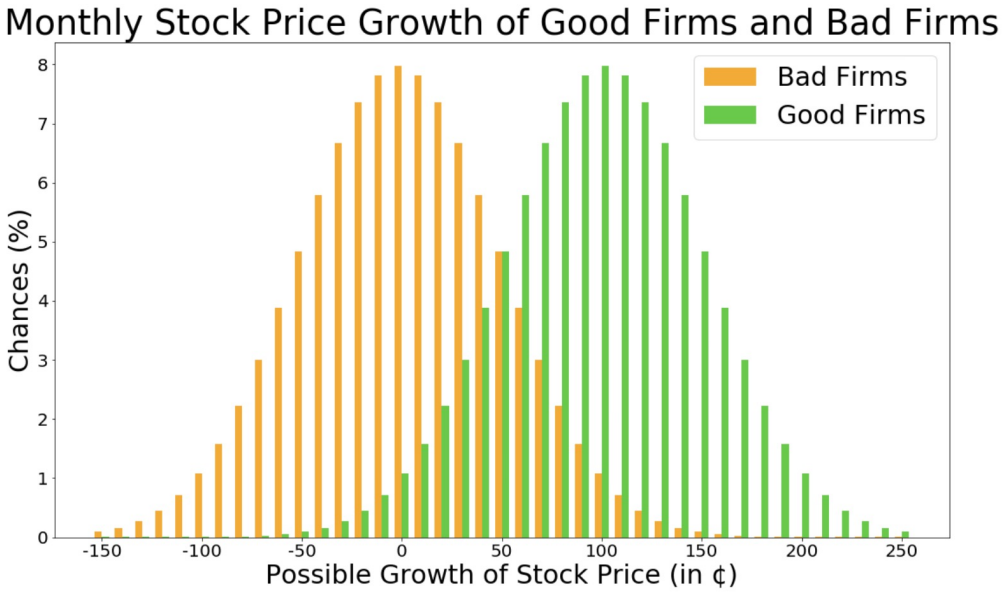
- In any given month, how likely the stock price of a **good** firm grows by a given amount (in ¢)
- In any given month, how likely the stock price of a **bad** firm grows by a given amount (in ¢)
- How many **good** firms and **bad** firms there are in the pool

Note that these conditions will change from round to round. Here is an example:

Round 1

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The pool of firms has the following composition.

8 Bad Firms | B | B | B | B | B | B | B | B | G | G | G | G | G | G | G | G | G | G | G | G | 12 Good Firms

As you can see, in the example above:

- The monthly stock price growth of any firm are always between **-150¢** and **250¢**.
- Good firms' monthly stock price growth is **100¢** on average. Bad firms' monthly stock price growth is **0¢** on average.
- The higher the green bar on top of a number, the more likely a good firm's stock price grows by that number. For example, the green bar on top of 100¢ indicates that there is a 8% chance that a good firm's stock price grows by 100¢ in a month. Similarly, the orange bar on top of 100¢ indicates that the chance of a bad firm's stock price growing by 100¢ in a month is a little less than 1%.
- For both good firms and bad firms, their monthly stock price growth is more likely to be close to the average than far from the average.
- A good firm and a bad firm are equally likely to have a monthly stock price growth of **50¢**. If the stock price growth of some firm is higher than **50¢** in a month, it is good news about the firm's quality. Conversely, if the stock price growth of some firm is lower than **50¢** in a month, it is bad news about the firm's quality.

In each round, the computer will randomly pick one firm from the pool. Each of the 20 firms is equally likely to be picked. We will ask you some questions about this chosen firm.

This study has multiple parts, and the questions we ask will differ across parts. Below are the instructions for Part 1.

Question in Part 1

In Part 1, we will ask you the following two questions.

How likely is it that the firm is **good**? [ ] %

How likely is it that the firm is **bad**? [ ] %

Note:

- **There is a best answer to each question.** In the example above where there are 12 good firms and 8 bad firms, the chance that the randomly picked firm is good is 12 / 20 = 60%, and the chance that it is bad is 8 / 20 = 40%.
- **You only need to type in your answer to one of the two questions.** The computer will automatically fill in [100 - what you type] as the answer to the other question.
- **You can only type in your answer after you have spent 8 seconds on the page.** Please use these 8 seconds to think carefully about your answers before typing them in.

Additional Information

In some rounds, before you answer the questions, we will also show you the **revenue growth** of the randomly picked firm in the **current** month. Here is an example:

The firm's revenue growth is **70¢** this month.

Note: With this additional piece of information, the best answers to the questions could be different. To get to the best answers, it is helpful to think through the following: On top of the information you already have, should the additional information affect your answers? If so, in which direction and by how much?

Bonus Rule

If the computer selects a question in this part to count for bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

We won't test you on the details of the bonus rule. But in case you are curious, you can click on "Bonus Details" below.

Bonus Details

Suppose your answer to the question that counts for the bonus is p% and the best answer should be q%, then your chance of getting the $5.00 bonus is (100 - (p-q)^2)%. Essentially, if your answer is exactly the best answer, then you get the bonus for sure. The more your answer misses, the smaller your chance of getting the bonus is. If your answer misses by more than 10%, you won't get the bonus.

Check Your Understanding

Before you proceed to Part 1, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

My bonus payment will depend on my answer to one randomly selected question.

- ○ True
- ○ False

Each one of the 20 firms in a pool is equally likely to be picked.

- ○ True
- ○ False

In the example above, there are 12 good firms and 8 bad firms in the pool. One firm is randomly picked from the pool. Without any other information, what is the chance that the firm is good?

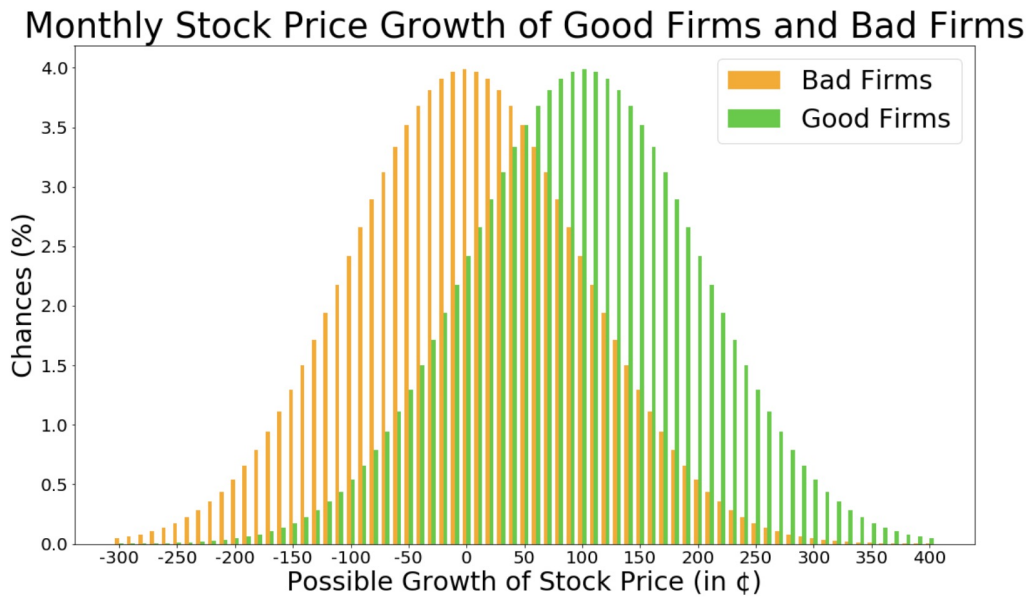
[ ] %

Next

Round 1

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The pool of firms has the following composition.

10 Bad Firms B B B B B B B B B B G G G G G G G G G G 10 Good Firms

One firm is randomly picked from this pool.

Please answer the following questions.

How likely is it that the firm is **good**? %

How likely is it that the firm is **bad**? %

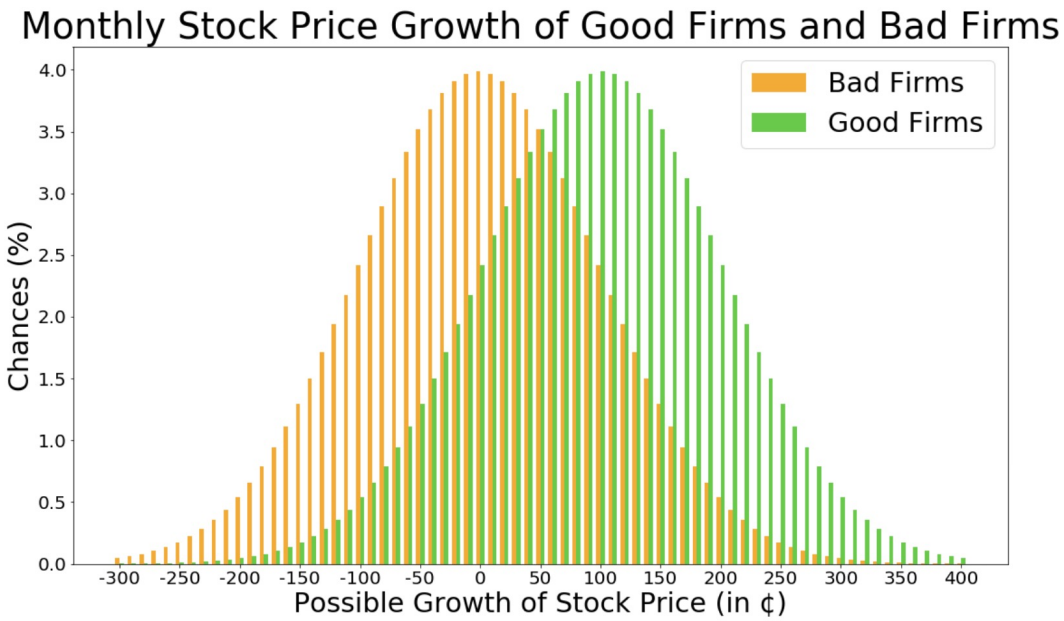
Next

Figure 1: A typical round of the *Inference Prior* part.

Round 9

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The pool of firms has the following composition.

16 Bad Firms B B B B B B B B B B B B B B B B G G G G 4 Good Firms

One firm is randomly picked from this pool.

Now we will show you the firm's **stock price growth** in the **current** month.

The firm's stock price growth is **30¢** this month.

Now, please answer the following questions.

How likely is it that the firm is **good**? %

How likely is it that the firm is **bad**? %

Next

Figure 2: A typical round of the *Inference* part.

1.2 *Forecast Prior*, *Forecast Revision*, and *Expectation Formation* parts

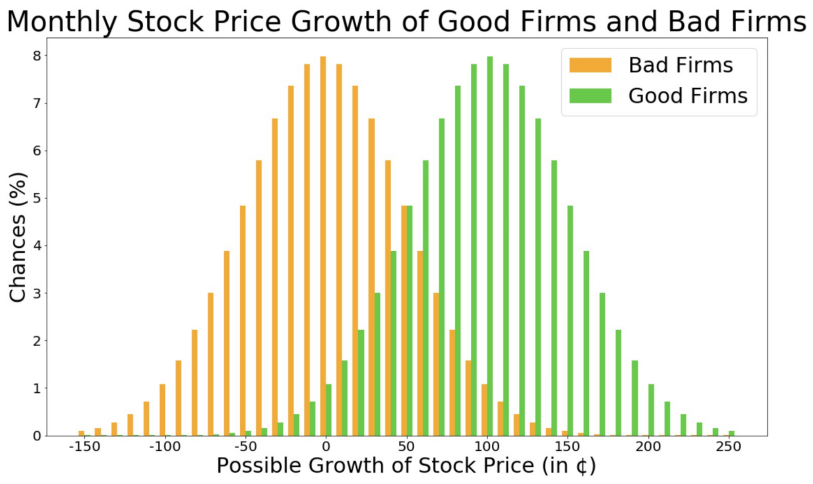
INSTRUCTIONS - PART 2

Part 2 is very similar to Part 1. **The only difference is that in each round, instead of asking you how likely it is that the chosen firm is good, we will ask you about its stock price growth last month.** Here is an example.

Round 17

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The pool of firms has the following composition.

8 Bad Firms B B B B B B B B G G G G G G G G G G G G 12 Good Firms

One firm is randomly picked from this pool.

Please answer the following question.

On average, what do you expect the firm's **stock price growth** to be **last** month? ¢

Note: There is a best answer to each question.
In the example above, the good firms' monthly stock price growth is 100¢ on average, and the bad firms' monthly stock price growth is 0¢ on average. Thus, we expect the overall average of the randomly picked firm's stock price growth in any month to be between 0¢ and 100¢.
There are 12 good firms, so **without any additional information** the randomly picked firm is good with a 12 / 20 = **60%** chance. Therefore, we expect the overall average of its monthly stock price growth to be **60%** * 100¢ + **40%** * 0¢ = 60¢.

Additional Information

In some rounds, same as in Part 1, before you answer the question, we will also show you the **stock price growth** of the randomly picked firm in the **current** month. Here is an example:

The firm's stock price growth is **70¢** this month.

Note:

- The additional information is about the firm's **stock price growth** in the **current** month. This is different from the question you need to answer, which is about the firm's **stock price growth** in the **last** month.
- **Whether a firm is good or bad is fixed and does not change from month to month.** Suppose in a given month, a firm is good and its stock price growth is 100¢ on average. Then, in the next month, this firm will still be good and its stock price growth will still be 100¢ on average. This is not affected by its stock price growth in any previous month.
- **With this additional piece of information, the best answer to the question could be different.** To get to the best answer, it is helpful to think through the following: On top of the information you already have, should the additional information affect your answer? If so, in which direction and by how much?

Bonus Rule

If the computer selects a question in this part to count for bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

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Bonus Details

Suppose your answer to the question that counts for the bonus is p¢ and the best answer should be q¢, then your chance of getting the $5.00 bonus is (100 - (p-q)^2)%. Essentially, if your answer is exactly the best answer, then you get the bonus for sure. The more your answer misses, the smaller your chance of getting the bonus is. If your answer misses by more than 10¢, you won't get the bonus.

Check Your Understanding

Before you proceed, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

Which question will you need to answer in Part 2?

- ○ How likely is it that the firm is good/bad?
- ○ On average, what do you expect the firm's stock price growth to be last month?

In the example above, there are 12 good firms and 8 bad firms in the pool. The good firms' monthly stock price growth is 100¢ on average. The bad firms' monthly stock price growth is 0¢ on average. One firm is randomly picked from the pool. Without any additional information, **on average** what do you expect the firm's stock price growth to be last month?

[ ] ¢

Suppose we know that a firm is a good firm. Its monthly stock price growth is 100¢ on average. In the current month, its stock price growth turns out to be 20¢. On average, what do you expect this good firm's stock price growth to be in the last month?

[ ] ¢

Next

Round 17

There is a new pool of 20 firms.
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The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
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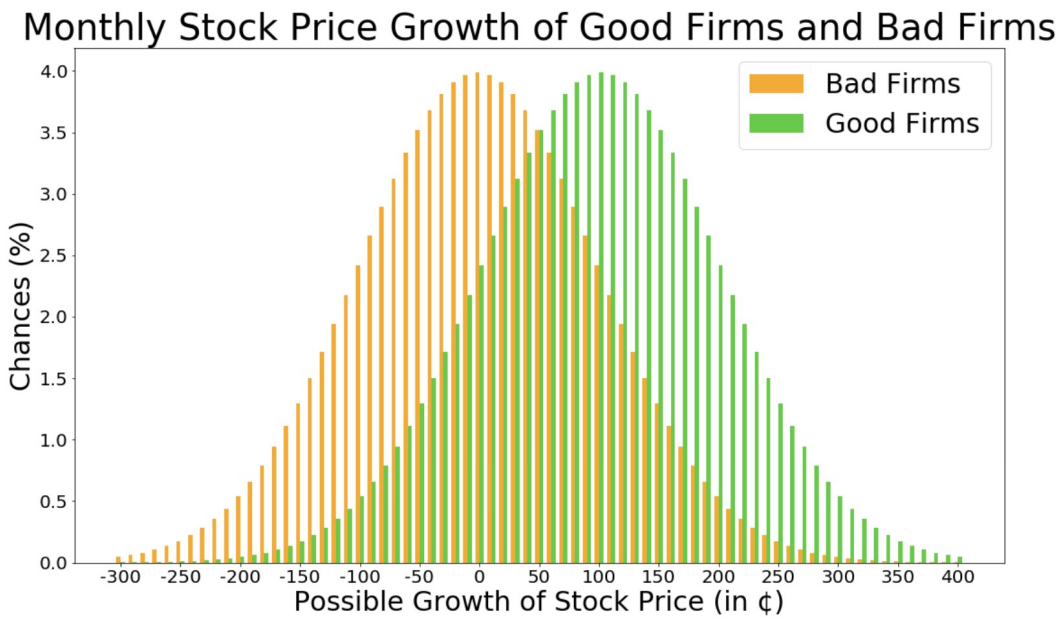


The pool of firms has the following composition.

4 Bad Firms B B B B G G G G G G G G G G G G G G G G 16 Good Firms

One firm is randomly picked from this pool.

Please answer the following question.

On average, what do you expect the firm's **stock price growth** to be **last** month? ¢

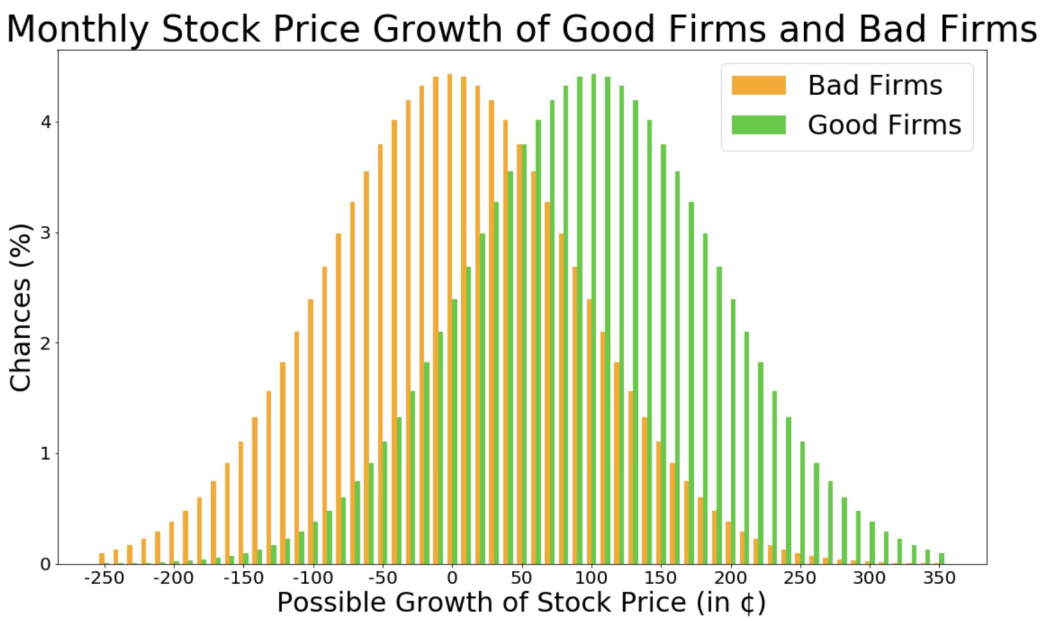
Next

Figure 3: A typical round of the *Forecast Prior* and *Expectation Formation* parts.

Round 25

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The pool of firms has the following composition.

10 Bad Firms B B B B B B B B B B G G G G G G G G G G 10 Good Firms

One firm is randomly picked from this pool.

Now we will show you the firm's **stock price growth** in the **current** month.

The firm's stock price growth is **170¢** this month.

Now, please answer the following question.

On average, what do you expect the firm's **stock price growth** to be **last** month? ¢

Next

Figure 4: A typical round of the *Forecast Revision* part.

1.3 Exit Survey

The main parts of the study are now finished. Thank you!

We would be grateful if you can tell us a bit about how you arrived at your answers to certain parts of this survey. To refresh your memory, below is an example of the information you see in a round.

Would you be so kind to answer the two questions below?

How did you arrive at your answers to the question "How likely is it that the firm is good" **after we show you the firm's stock price growth in the current month**? (For example, you can tell us about which pieces of information you relied on the most, what calculations or adjustments you performed, what rules-of-thumb you employed, etc.)

How did you arrive at your answers to the question "On average, what do you expect the firm's stock price growth to be last month? " **after we show you the firm's stock price growth in the current month**? (For example, you can tell us about which pieces of information you relied on the most, what calculations or adjustments you performed, what rules-of-thumb you employed, etc.)

After you answer the questions, click "Next."

Next

EXIT SURVEY

Before you leave, please answer the short exit survey below. This survey won't affect your payment, but we appreciate your thoughtful answers.

After you finish, please click "Next" and you will receive a completion code.

What is your age?

What is your gender?

- ○ Male
- ○ Female
- ○ Others

What is your highest level of education?

What is your annual household income?

Do you have investments in stocks or mutual funds?

- ○ Yes
- ○ No

Do you consider yourself familiar with probability theory and statistics?

- ○ Yes
- ○ No

Do you consider yourself familiar with economics or finance?

- ○ Yes
- ○ No

In rounds where we show you the firm performance in the current month, which question do you find more difficult to answer?

- ○ Questions about the stock price movement of another month are more difficult to answer.
- ○ Questions about whether the firms are good or bad are more difficult to answer.
- ○ The two questions are equally difficult.

Next

2 *Deterministic Outcome* treatment

2.1 *Inference Prior* and *Inference* parts

INSTRUCTIONS

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Overview

Most participants complete this study in **20 to 30 minutes**. Please start this study only if you have that much time in a single session. If you do not complete the study, or if the task times out on you, we will not be able to pay you. (The task is set to time out in two hours.)

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Firms, Stock Prices, and Revenues

In each round, there is a new pool of 20 **firms** belonging to two types: Some firms are **good** firms, while others are **bad** firms.

In any given month, a firm's stock price growth will be a random whole number (in ¢/cents). For example, it may be -300¢, or -290¢, or -280¢, and so on, up to 400¢. A negative stock price growth means that the firm's stock price decreases from the previous month. For the purpose of this study, you don't need to worry about stock price falling below zero.

The stock price growth of **good** firms will be generally higher than that of **bad** firms. However, for any given firm, there will be much randomness in its stock price growth in every month.

In each round, you will see the following information:

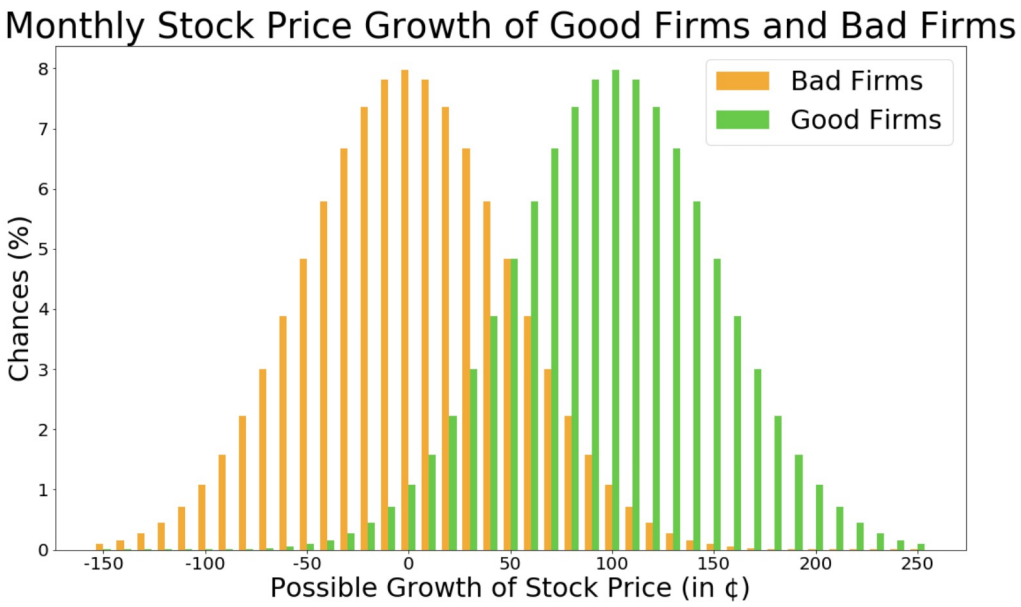
- In any given month, how likely the stock price of a **good** firm grows by a given amount (in ¢)
- In any given month, how likely the stock price of a **bad** firm grows by a given amount (in ¢)
- In any given month, how much the revenues of good firms and bad firms grow (Throughout this study, we use "revenue" to refer to a firm's revenue per share of stock, so the numbers are small.)
- How many **good** firms and **bad** firms there are in the pool

Note that these conditions will change from round to round. Here is an example:

Round 1

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The **revenue growth** of good firms and bad firms is shown below.

Good firms' revenues grow by 100¢ **every month**
Bad firms' revenues grow by 0¢ **every month**

The pool of firms has the following composition.

12 Bad Firms | B B B B B B B B B B B B G G G G G G G G | 8 Good Firms

As you can see, in the example above:

- The monthly stock price growth of any firm are always between **-150¢** and **250¢**.
- Good firms' monthly stock price growth is **100¢** on average. Bad firms' monthly stock price growth is **0¢** on average.
- The higher the green bar on top of a number, the more likely a good firm's stock price grows by that number. For example, the green bar on top of 100¢ indicates that there is a 8% chance that a good firm's stock price grows by 100¢ in a month. Similarly, the orange bar on top of 100¢ indicates that the chance of a bad firm's stock price growing by 100¢ in a month is a little less than 1%.
- For both good firms and bad firms, their monthly stock price growth is more likely to be close to the average than far from the average.
- A good firm and a bad firm are equally likely to have a monthly stock price growth of **50¢**. If the stock price growth of some firm is higher than **50¢** in a month, it is good news about the firm's quality. Conversely, if the stock price growth of some firm is lower than **50¢** in a month, it is bad news about the firm's quality.
- Good firms' revenues always grow by **100¢** every month. Bad firms' revenues always grow by **0¢** every month.

In each round, the computer will randomly pick one firm from the pool. Each of the 20 firms is equally likely to be picked. We will ask you some questions about this chosen firm.

This study has multiple parts, and the questions we ask will differ across parts. Below are the instructions for Part 1.

Question in Part 1

In Part 1, we will ask you the following two questions.

How likely is it that the firm is **good**? [ ] %

How likely is it that the firm is **bad**? [ ] %

Note:

- **There is a best answer to each question.** In the example above where there are 8 good firms and 12 bad firms, the chance that the randomly picked firm is good is 8 / 20 = 40%, and the chance that it is bad is 12 / 20 = 60%.
- **You only need to type in your answer to one of the two questions.** The computer will automatically fill in [100 - what you type] as the answer to the other question.
- **You can only type in your answer after you have spent 8 seconds on the page.** Please use these 8 seconds to think carefully about your answers before typing them in.

Additional Information

In some rounds, before you answer the questions, we will also show you the **stock price growth** of the randomly picked firm in the **current** month. Here is an example:

The firm's stock price growth is **70¢** this month.

Note: With this additional piece of information, the best answers to the questions could be different. To get to the best answers, it is helpful to think through the following: On top of the information you already have, should the additional information affect your answers? If so, in which direction and by how much?

Bonus Rule

If the computer selects a question in this part to count for bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

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Suppose your answer to the question that counts for the bonus is p% and the best answer should be q%, then your chance of getting the $5.00 bonus is (100 - (p-q)^2)%. Essentially, if your answer is exactly the best answer, then you get the bonus for sure. The more your answer misses, the smaller your chance of getting the bonus is. If your answer misses by more than 10%, you won't get the bonus.

Check Your Understanding

Before you proceed to Part 1, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

My bonus payment will depend on my answer to one randomly selected question.

- ○ True
- ○ False

Each one of the 20 firms in a pool is equally likely to be picked.

- ○ True
- ○ False

In the example above, there are 8 good firms and 12 bad firms in the pool. One firm is randomly picked from the pool. Without any other information, what is the chance that the firm is good?

[ ] %

Next

Round 1

There is a new pool of 20 firms.
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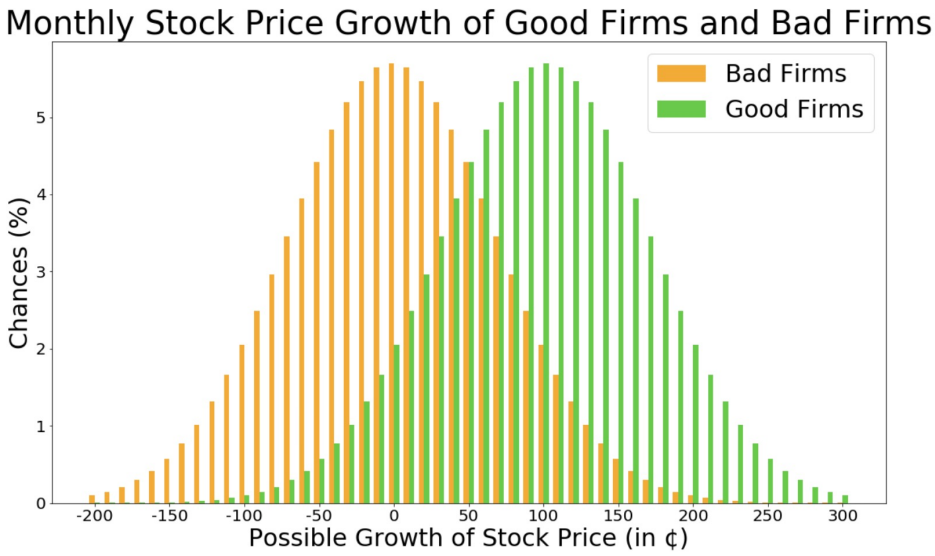

The **revenue growth** of good firms and bad firms is shown below.

Good firms' revenues grow by 100¢ **every month**
Bad firms' revenues grow by 0¢ **every month**

The pool of firms has the following composition.

10 Bad Firms | B B B B B B B B B B | G G G G G G G G G G | 10 Good Firms

One firm is randomly picked from this pool.

Please answer the following questions.

How likely is it that the firm is **good**? [ ] %

How likely is it that the firm is **bad**? [ ] %

Next

Figure 5: A typical round of the *Inference Prior* part.

Round 9

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

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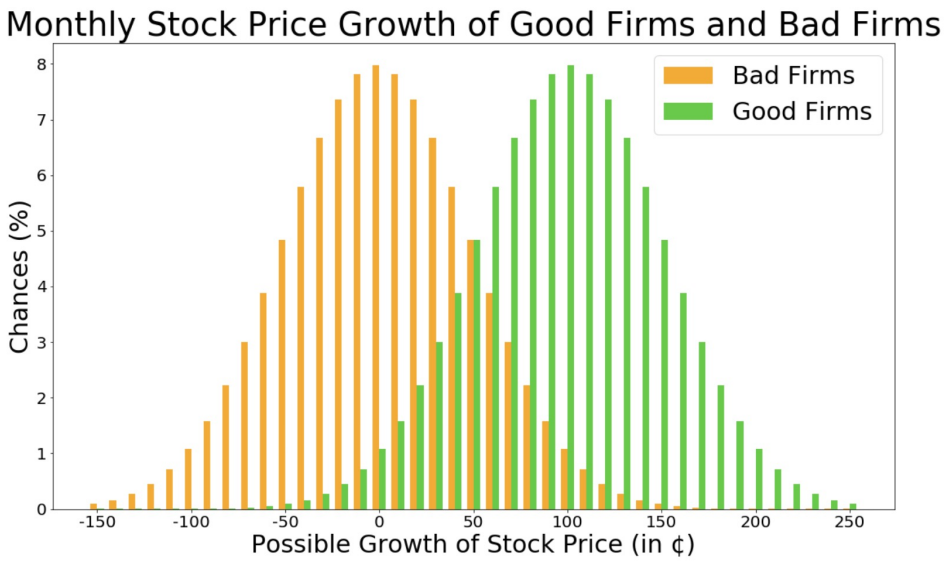


The **revenue growth** of good firms and bad firms is shown below.

Good firms' revenues grow by 100¢ **every month**
Bad firms' revenues grow by 0¢ **every month**

The pool of firms has the following composition.

10 Bad Firms B B B B B B B B B B G G G G G G G G G G 10 Good Firms

One firm is randomly picked from this pool.

Now we will show you the firm's **stock price growth** in the **current** month.

The firm's stock price growth is **-40¢** this month.

Now, please answer the following questions.

How likely is it that the firm is **good**? %

How likely is it that the firm is **bad**? %

Next

Figure 6: A typical round of the *Inference* part.

2.2 *Forecast Prior*, *Forecast Revision*, and *Expectation Formation* parts

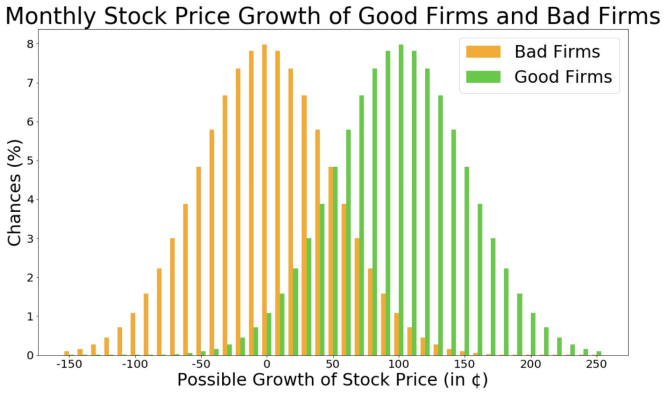
INSTRUCTIONS - PART 2

Part 2 is very similar to Part 1. **The only difference is that in each round, instead of asking you how likely it is that the chosen firm is good, we will ask you about its revenue growth next month.** Here is an example.

Round 17

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The **revenue growth** of good firms and bad firms is shown below.

Good firms' revenues grow by 100¢ **every month**
Bad firms' revenues grow by 0¢ **every month**

The pool of firms has the following composition.

12 Bad Firms B B B B B B B B B B B B G G G G G G G G 8 Good Firms

One firm is randomly picked from this pool.

Please answer the following question.

On average, what do you expect the firm's **revenue growth** to be **next** month? ¢

Note: There is a best answer to each question.
In the example above, the good firms' revenues grow by 100¢ every month, and the bad firms' revenues grow by 0¢ every month. Thus, we expect the overall average of the randomly picked firm's revenue growth in any month to be between 0¢ and 100¢. There are 8 good firms, so **without any additional information** the randomly picked firm is good with a 8 / 20 = **40%** chance. Therefore, we expect the overall average of its monthly revenue growth to be **40%** * 100¢ + **60%** * 0¢ = 40¢.

Additional Information

In some rounds, same as in Part 1, before you answer the question, we will also show you the **stock price growth** of the randomly picked firm in the **current** month. Here is an example:

The firm's stock price growth is **70¢** this month.

Note:

- The additional information is about the firm's **stock price growth** in the **current** month. This is different from the question you need to answer, which is about the firm's **revenue growth** in the **next** month.
- **Whether a firm is good or bad is fixed and does not change from month to month.** Suppose in a given month, a firm is good and its revenue grows by 100¢. Then, in the next month, this firm will still be good and its revenue growth will still grow by 100¢. This is not affected by its stock price growth in any previous month.
- **With this additional piece of information, the best answer to the question could be different.** To get to the best answer, it is helpful to think through the following: On top of the information you already have, should the additional information affect your answer? If so, in which direction and by how much?

Bonus Rule

If the computer selects a question in this part to count for bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

We won't test you on the details of the bonus rule. But in case you are curious, you can click on "Bonus Details" below.

Bonus Details

Suppose your answer to the question that counts for the bonus is p¢ and the best answer should be q¢, then your chance of getting the $5.00 bonus is (100 - (p-q)^2)%. Essentially, if your answer is exactly the best answer, then you get the bonus for sure. The more your answer misses, the smaller your chance of getting the bonus is. If your answer misses by more than 10¢, you won't get the bonus.

Check Your Understanding

Before you proceed, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

Which question will you need to answer in Part 2?

- ○ How likely is it that the firm is good/bad?
- ○ On average, what do you expect the firm's revenue growth to be next month?

In the example above, there are 8 good firms and 12 bad firms in the pool. The good firms' revenues grow by 100¢ every month. The bad firms' revenues grow by 0¢ every month. One firm is randomly picked from the pool. Without any additional information, **on average** what do you expect the firm's revenue growth to be next month?

[ ] ¢

Suppose we know that a firm is a good firm. Its revenue grows by 100¢ every month. In the current month, its stock price growth turns out to be 20¢. On average, what do you expect this good firm's revenue growth to be in the next month?

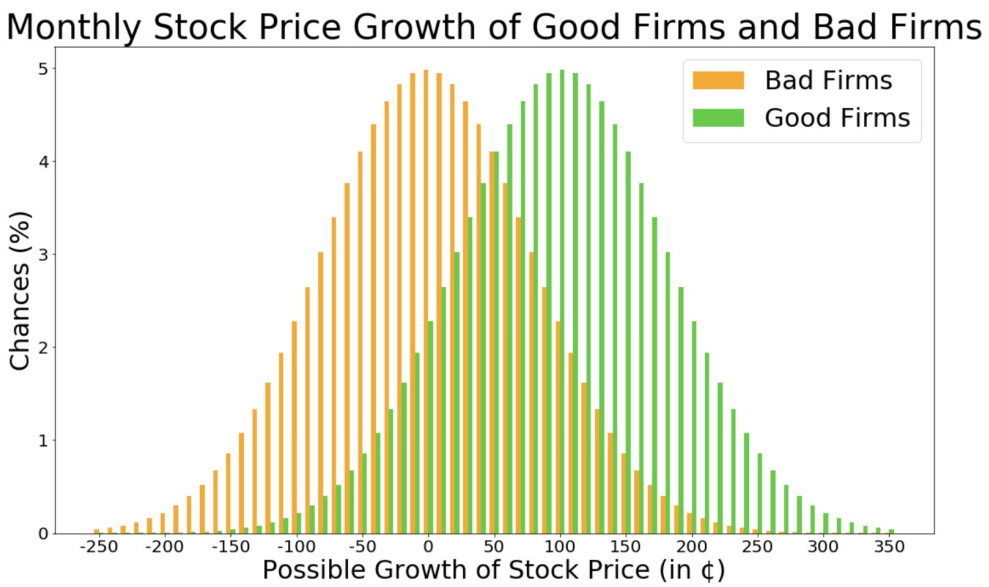
[ ] ¢

Next

Round 17

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The **revenue growth** of good firms and bad firms is shown below.

Good firms' revenues grow by 100¢ **every month**
Bad firms' revenues grow by 0¢ **every month**

The pool of firms has the following composition.

20 Bad Firms | B B B B B B B B B B B B B B B B B B B B | 0 Good Firms

One firm is randomly picked from this pool.

Please answer the following question.

On average, what do you expect the firm's **revenue growth** to be **next** month? ¢

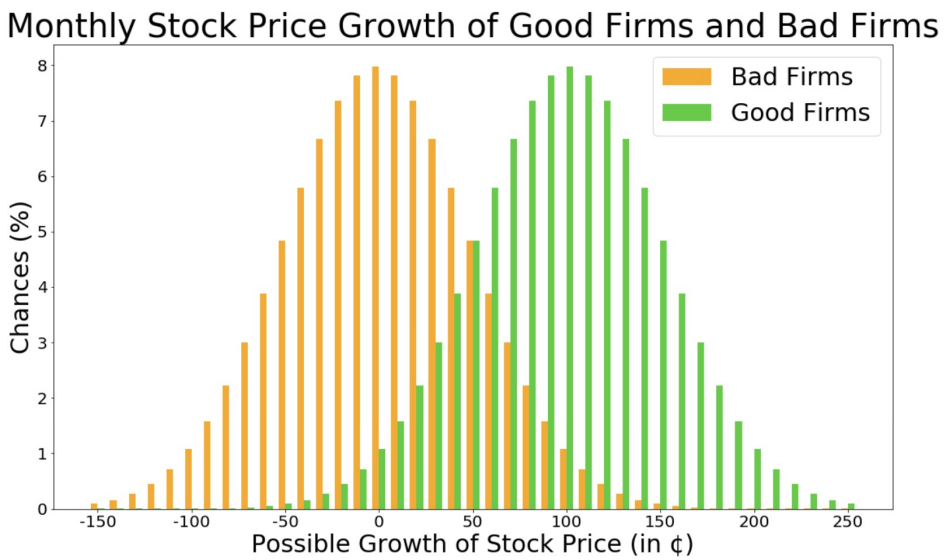
Next

Figure 7: A typical round of the *Forecast Prior* and *Expectation Formation* parts.

Round 33

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The **revenue growth** of good firms and bad firms is shown below.

Good firms' revenues grow by 100¢ **every month**
Bad firms' revenues grow by 0¢ **every month**

The pool of firms has the following composition.

10 Bad Firms | B B B B B B B B B B | G G G G G G G G G G | 10 Good Firms

One firm is randomly picked from this pool.

Now we will show you the firm's **stock price growth** in the **current** month.

The firm's stock price growth is **-40¢** this month.

Now, please answer the following question.

On average, what do you expect the firm's **revenue growth** to be **next** month? ¢

Next

Figure 8: A typical round of the *Forecast Revision* part.

3 *Binary Signal* treatment

3.1 *Inference Prior* and *Inference* parts

INSTRUCTIONS

Please read and follow all the instructions carefully! You will be asked to answer questions about these instructions and you will not be able to proceed unless you answer all questions correctly.

Overview

Most participants complete this study in **20 to 30 minutes**. Please start this study only if you have that much time in a single session. If you do not complete the study, or if the task times out on you, we will not be able to pay you. (The task is set to time out in two hours.)

This study has 40 rounds, divided into three parts. After you complete the study, you will receive a $5.00 base payment. In addition, the computer will randomly select one round to count for your bonus. Your answer in that round, together with some luck, will determine whether you earn an additional $5.00 bonus or not. Because any round may count for your bonus, you should answer all questions carefully.

Firms and Stock Prices

In each round, we start with a new pool of 20 **firms**. Some of them are **good** firms, while others are **bad** firms.

In any given month, a firm's stock price goes either up or down. A **good** firm's stock price, as you can imagine, is more likely to go **up** than that of a **bad** firm.

In each round, you will see three pieces of information:

- how many **good** firms and **bad** firms there are in the pool
- how likely the stock price of a **good** firm is to go **up** or **down**
- how likely the stock price of a **bad** firm is to go **up** or **down**

Here is an example:

There is a new pool of 20 firms.

12 of them are **good** and **8** are **bad**.

In any given month,

a **good** firm's stock price:	a **bad** firm's stock price:
goes **up** with a **70%** chance	goes **up** with a **40%** chance
goes **down** with a **30%** chance	goes **down** with a **60%** chance

One firm is randomly picked from this pool.

In each round, the computer will randomly pick one firm from the pool. Each of the 20 firms is equally likely to be picked.

Additional information

In some rounds, we will also show you **how the stock price of the randomly picked firm has changed in the current month**. Here is an example:

The firm's stock price has gone **UP (↑)** this month.

Then we will ask you two questions about this picked firm. This study has two parts and the questions we ask will differ across parts. Below are the instructions for Part 1.

Questions in Part 1

In Part 1, we will ask you the following two questions.

How likely is it that the firm is **good**? [ ] %

How likely is it that the firm is **bad**? [ ] %

Note:

- **The following may be helpful for you to think about the answers.**
  - If the picked firm is **good for sure**, then the chance that it is good should be **100%**.
  - If the picked firm is **bad for sure**, then the chance that it is good should be **0%**.
  - If **neither is for sure**, then the chance that the picked firm is good should be **between 0% and 100%**. The more likely the firm is good, the higher the answer should be.
- **You only need to type in your answer to one of the two questions.** The computer will automatically fill in [100 - what you type] as the answer to the other question.
- **You can only type in your answer after you have spent a few seconds on the page.** Please use this time to think carefully about your answers before typing them in.

Bonus rule

If the computer selects a question in this part to count for bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

We won't test you on the details of the bonus rule. But in case you are curious, you can click on "Bonus Details" below.

Bonus Details

Suppose your answer to the question that counts for the bonus is p% and the best answer should be q%, then your chance of getting the $5.00 bonus is (100 - (p-q)^2/100)%. Essentially, if your answer is exactly the best answer, then you get the bonus for sure. The more your answer misses, the smaller your chance of getting the bonus is. If your answer misses by more than 10%, you won't get the bonus.

Check your understanding

Before having you proceed to Part 1, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

My bonus payment will depend on my answer to one randomly selected question.

- ○ True
- ○ False

Each one of the 20 firms in a pool is equally likely to be picked.

- ○ True
- ○ False

Suppose Firm A is for sure a good firm. What is the chance that Firm A is good?

- ○ 100%
- ○ Between 100% and 0%
- ○ 0%

Suppose it is uncertain whether Firm B is good or bad. What is the chance that Firm B is good?

- ○ 100%
- ○ Between 100% and 0%
- ○ 0%

Next

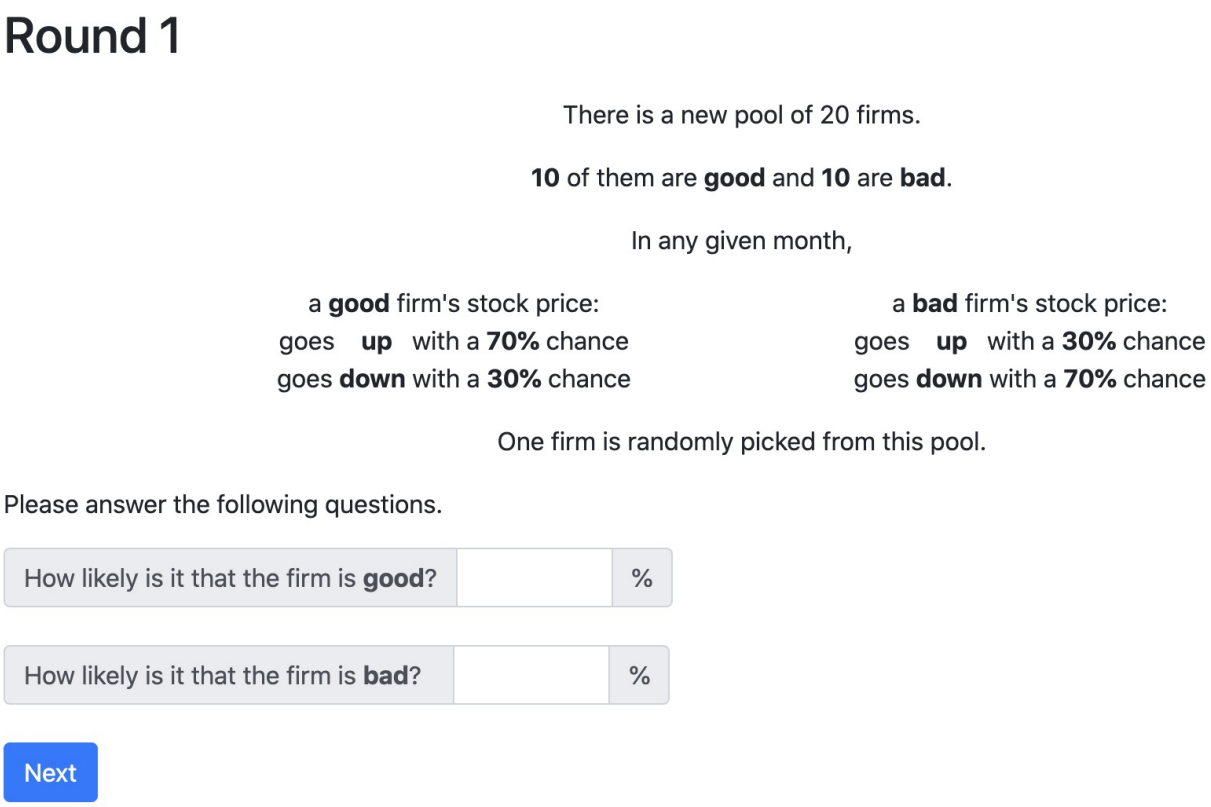


Figure 9: A typical round of the *Inference Prior* part.

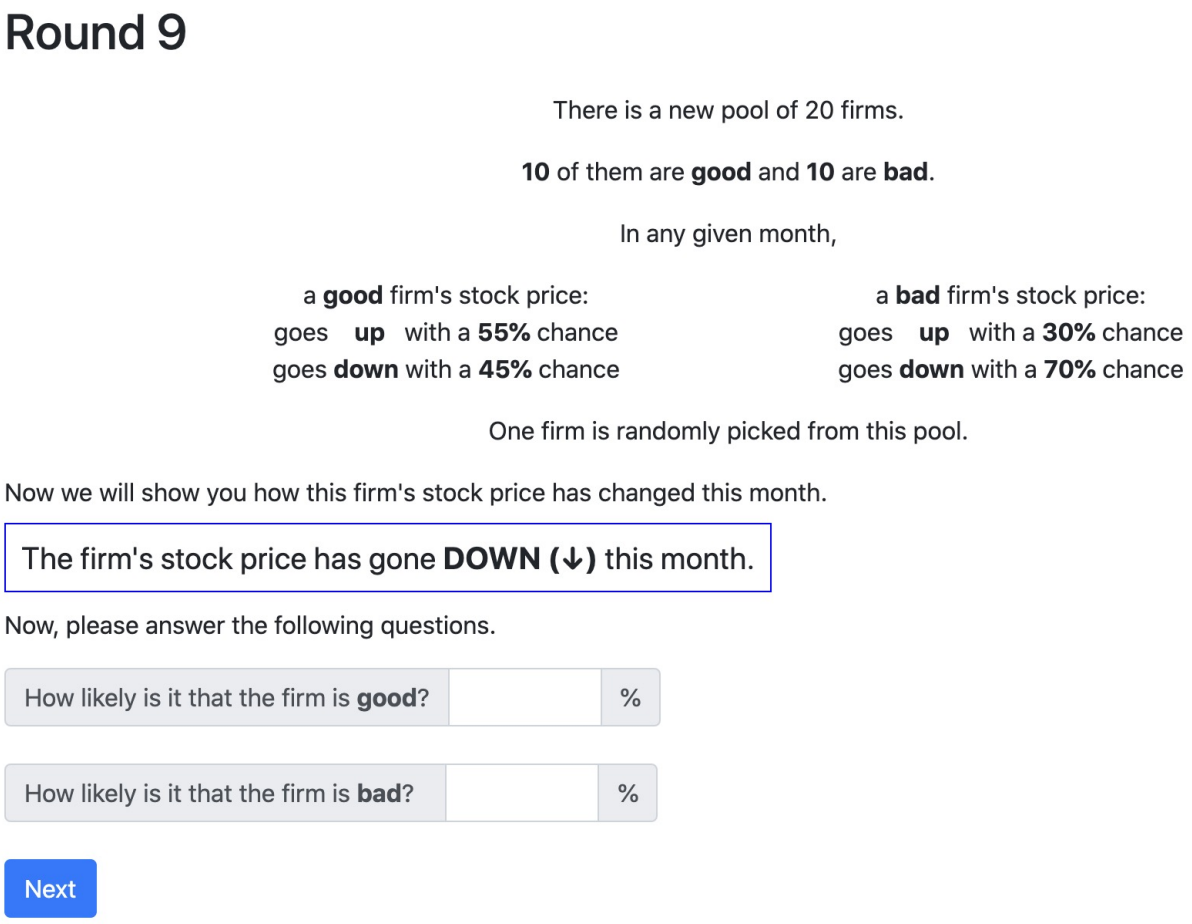


Figure 10: A typical round of the *Inference* part.

3.2 *Forecast Prior*, *Forecast Revision*, and *Expectation Formation* parts

INSTRUCTIONS - PART 2

Part 2 is very similar to Part 1. **The only difference is that in each round, instead of asking you how likely it is that the chosen firm is good, we will ask you about its stock price next month.** Here is an example.

There is a new pool of 20 firms.

12 of them are **good** and **8** are **bad**.

In any given month,

a **good** firm's stock price:	a **bad** firm's stock price:
goes **up** with a **70%** chance	goes **up** with a **40%** chance
goes **down** with a **30%** chance	goes **down** with a **60%** chance

One firm is randomly picked from this pool.

Please answer the following questions.

How likely is it that the firm's stock price will go **up** next month? [ ] %

How likely is it that the firm's stock price will go **down** next month? [ ] %

Same as before, in some rounds, we will also show you how the stock price of the randomly picked firm has changed in the current month.

Note:

- The questions we ask you are about the stock price **next month**. This is different from the additional information we may show you in some rounds, which is about the stock price in **the current month**.
- **Whether a firm is good or bad is fixed and does not change from month to month.** Suppose that, in a month, a firm is good and its stock price has 70% chance of going up. Then the next month, this firm will still be good and its stock price will still have 70% chance of going up. This is not affected by how its stock price changed in any previous month.
- **The following may be helpful for you to think about the answers.** Suppose a good firm's stock price goes up with a 70% chance, and a bad firm's stock price goes up with a 40% chance.
  - If the picked firm is **good for sure**, then the chance that its stock price goes up should be **70%**.
  - If the picked firm is **bad for sure**, then the chance that its stock price goes up should be **40%**.
  - If **neither is for sure**, then the chance that the firm's stock price goes up should be **between 40% and 70%.** The more likely the firm is good, the higher the answer should be.

Same as in Part 1, if the computer selects a question in this part to count for the bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

Check your understanding

Before having you proceed, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

Which question will you need to answer in Part 2?

- ○ How likely is it that the firm is good/bad?
- ○ How likely is it that the firm's stock price will go up/down next month?

Suppose we know that a firm is a good firm. Its stock price goes up with 60% chance in any given month. In this month, its stock price has gone **down**. What is the chance that its stock price will go **up** next month?

[ ] %

Suppose that a good firm's stock price goes up with a 70% chance. A bad firm's stock price goes up with a 40% chance. Given all we know about Firm A, it is uncertain whether Firm A is good or bad. What's the chance that Firm A's stock price will go **up** next month ?

- ○ 70%
- ○ Between 40% and 70%
- ○ 40%

Suppose that a good firm's stock price goes up with a 90% chance. A bad firm's stock price goes up with a 50% chance. Given all we know about Firm C, it is for sure a bad firm. What's the chance that Firm C's stock price will go **up** next month ?

- ○ 90%
- ○ Between 50% and 90%
- ○ 50%

Next

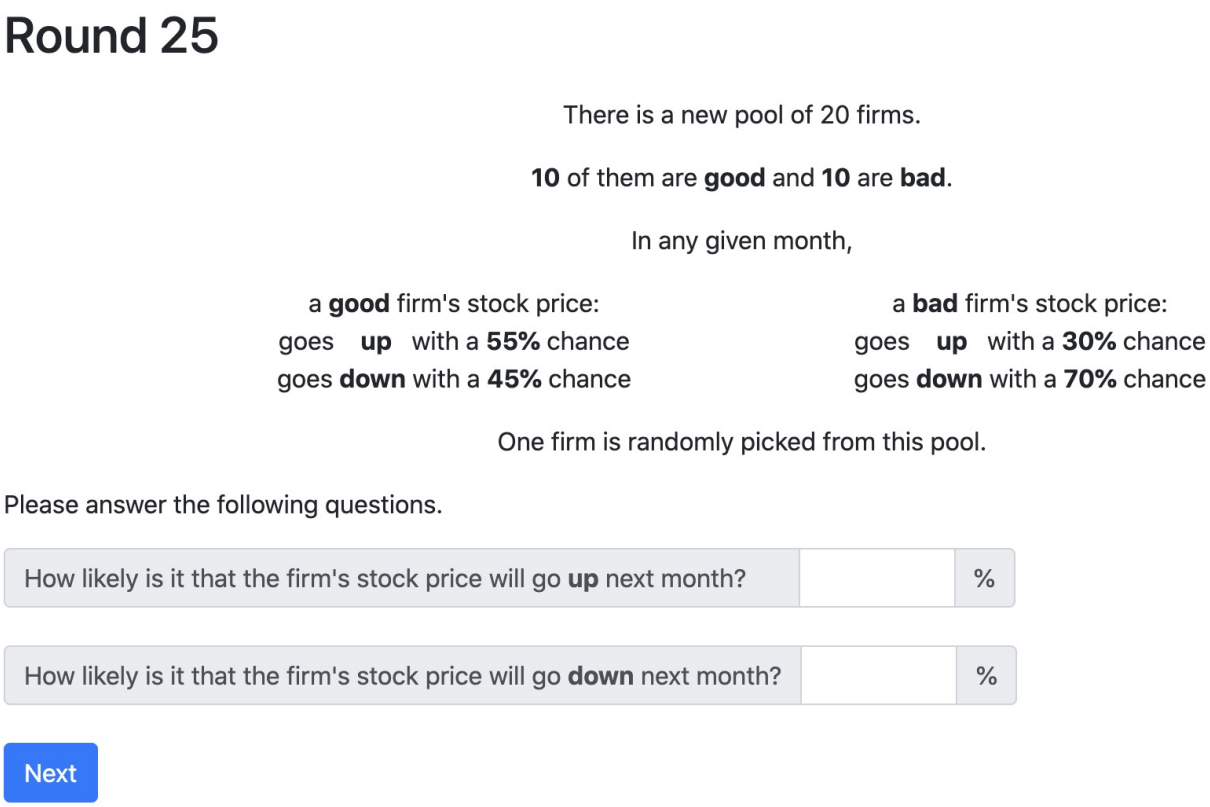


Figure 11: A typical round of the *Forecast Prior* and *Expectation Formation* parts.

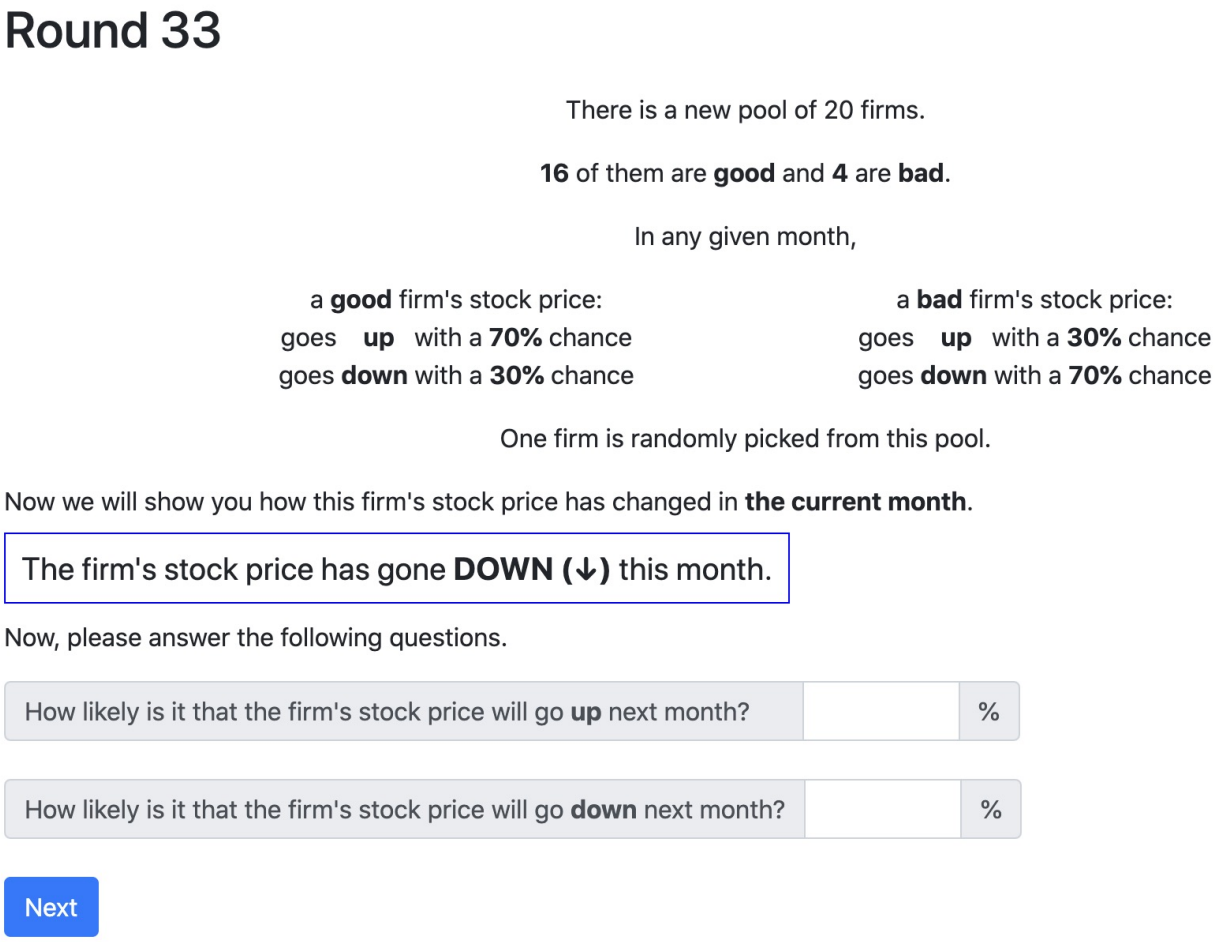


Figure 12: A typical round of the *Forecast Revision* part.

4 *Nudge* treatment

INSTRUCTIONS

Please read and follow all the instructions carefully! You will be asked to answer questions about these instructions and you will not be able to proceed unless you answer all questions correctly.

Overview

Most participants complete this study in **20 to 30 minutes**. Please start this study only if you have that much time in a single session. If you do not complete the study, or if the task times out on you, we will not be able to pay you. (The task is set to time out in two hours.)

This study has 24 rounds. After you complete the study, you will receive a $5.00 base payment. In addition, the computer will randomly select one round to count for your bonus. Your answer in that round, together with some luck, will determine whether you will earn an additional $5.00 bonus or not. Because any round may count for your bonus, you should answer all questions carefully.

Firms and Stock Returns

In each round, there is a new pool of 20 **firms** belonging to two types: Some firms are **good** firms, while others are **bad** firms.

In any given month, a firm's stock price growth will be a random whole number (in ¢). For example, it may be -300¢, or -290¢, or -280¢, and so on, up to 400¢. A negative stock price growth means that the firm's stock price decreases from the previous month. For the purpose of this study, you don't need to worry about stock price falling below zero.

The stock price growth of **good** firms will be generally higher than those of **bad** firms. However, for any given firm, there will be much randomness in its stock price growth in every month.

In each round, you will see the following information:

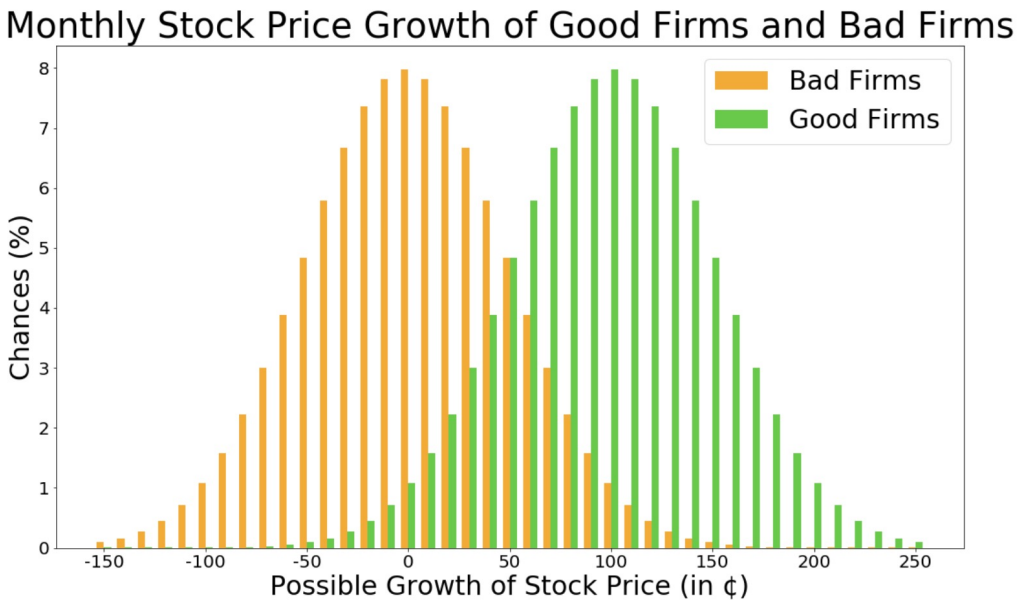
- In any given month, how likely the stock price of a **good** firm grows by a given amount (in ¢)
- In any given month, how likely the stock price of a **bad** firm grows by a given amount (in ¢)
- How many **good** firms and **bad** firms there are in the pool

Note that these conditions will change from round to round. Here is an example:

Round 1

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The pool of firms has the following composition.

12 Bad Firms | B B B B B B B B B B B B | G G G G G G G G | 8 Good Firms

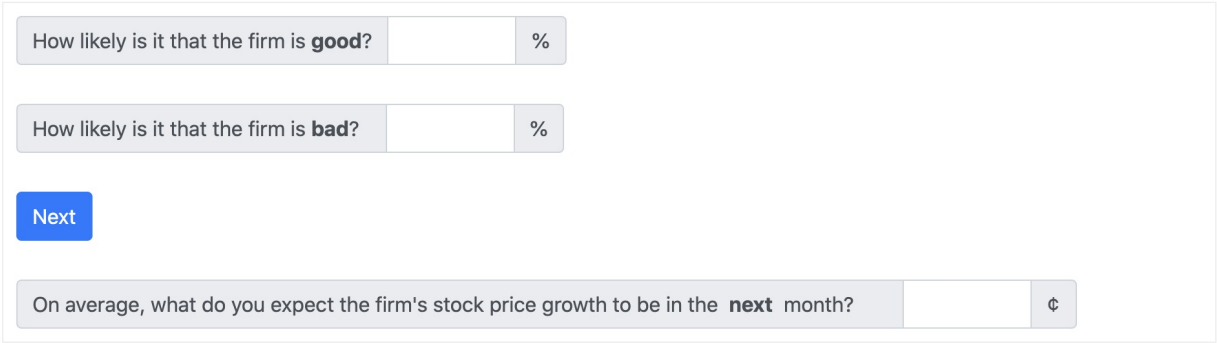
As you can see, in the example above:

- The monthly stock price growth of any firm are always between **-150¢** and **250¢**.
- Good firms' monthly stock price growth is **100¢** on average. Bad firms' monthly stock price growth is **0¢** on average.
- The higher the green bar on top of a number, the more likely a good firm's stock price grows by that number. For example, the green bar on top of 100¢ indicates that there is a 8% chance that a good firm's stock price grows by 100¢ in a month. Similarly, the orange bar on top of 100¢ indicates that the chance of a bad firm's stock price growing by 100¢ in a month is a little less than 1%.
- For both good firms and bad firms, their monthly stock price growth is more likely to be close to the average than far from the average.
- A good firm and a bad firm are equally likely to have a monthly stock price growth of **50¢**. If the stock price growth of some firm is higher than **50¢** in a month, it is good news about the firm's quality. Conversely, if the stock price growth of some firm is lower than **50¢** in a month, it is bad news about the firm's quality.

In each round, the computer will randomly pick one firm from the pool. Each of the 20 firms is equally likely to be picked.

Questions

We will ask you some questions about the randomly picked firm, in the following order.



Note:

- **There is a best answer to each question.**
  In the example above, there are 8 good firms and 12 bad firms. Thus, **without any additional information** the randomly picked firm is good with a 8 / 20 = **40%** chance and is bad with a 12 / 20 = **60%** chance.
  Moreover, the good firms' monthly stock price growth is 100¢ on average, and the bad firms' monthly stock price growth is 0¢ on average. Thus, we expect the overall average of the randomly picked firm's monthly stock price growth to be between 0¢ and 100¢. **Without any additional information**, we expect the overall average of its stock price growth in any month to be **40%** * 100¢ + **60%** * 0¢ = **40**.
- **You only need to type in your answer to one of the first two questions.** The computer will automatically fill in [100 - what you type] as the answer to the other question.
- **You can only type in your answer to the first two questions after you have spent 8 seconds on the page, and you need to wait another 8 seconds to type in your answer to the third question.** Please use the waiting time to think carefully about your answers before typing them in.

Additional Information

In some rounds, before you answer the questions, we will also show you the stock price growth of the randomly picked firm in the **current** month. Here is an example:

The firm's stock price growth is **70¢** this month.

Note: With this additional piece of information, the best answers to the questions could be different. To get to the best answers, it is helpful to think through the following: On top of the information you already have, should the additional information affect your answers? If so, in which direction and by how much?

Bonus Rule

If the computer selects a question in this part to count for bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

We won't test you on the details of the bonus rule. But in case you are curious, you can click on "Bonus Details" below.

Bonus Details

Suppose your answer to the question that counts for bonus is p and the best answer should be q, then your chance of getting the $5.00 bonus is (100 - (p-q)^2)%. Essentially, if your answer is exactly the best answer, then you get the bonus for sure. The more your answer misses, the smaller your chance of getting the bonus is. If your answer misses by more than 10, you won't get the bonus.

Check Your Understanding

Before you proceed to Part 1, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

My bonus payment will depend on my answer to one randomly selected question.

- ○ True
- ○ False

Each one of the 20 firms in a pool is equally likely to be picked.

- ○ True
- ○ False

In the example above, there are 8 good firms and 12 bad firms in the pool. One firm is randomly picked from the pool. Without any other information, what is the chance that the firm is good?

[ ] %

In the example above, there are 8 good firms and 12 bad firms in the pool. The good firms' monthly stock price growth is 100¢ on average. The bad firms' monthly stock price growth is 0¢ on average. One firm is randomly picked from the pool. **Without any additional information**, on average what do you expect the firm's stock price growth to be in the next month?

[ ] ¢

Suppose we know that Firm A is a good firm. Its monthly stock price growth is 100¢ on average. In the current month, its stock price growth turns out to be 20¢. On average, what do you expect Firm A's stock price growth to be in the next month?

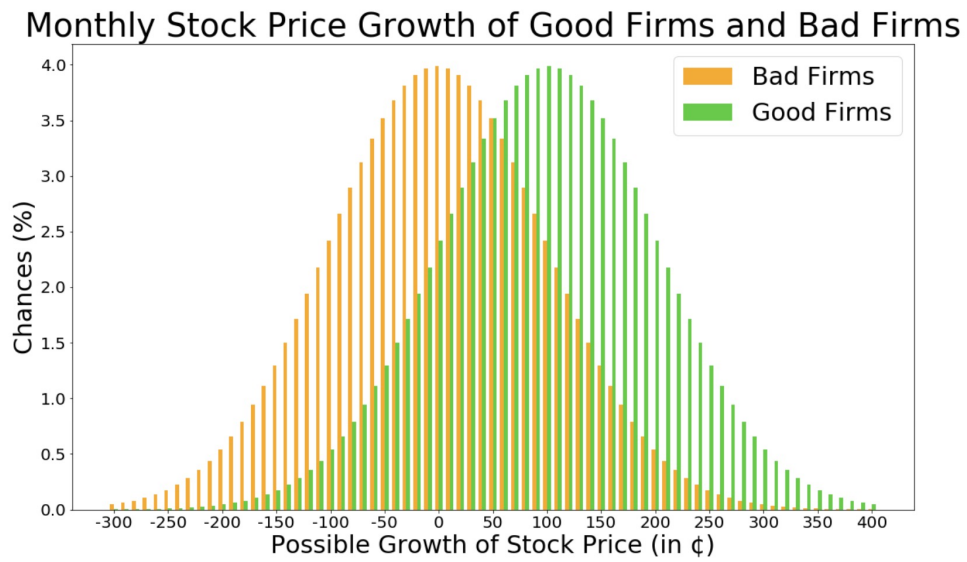
[ ] ¢

Next

Round 1

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The pool of firms has the following composition.

4 Bad Firms B B B B G G G G G G G G G G G G G G G G 16 Good Firms

One firm is randomly picked from this pool.

Please answer the following questions.

How likely is it that the firm is **good**? 50 %

How likely is it that the firm is **bad**? 50 %

Please answer the following question.

On average, what do you expect the firm's stock price growth to be in the **next** month? ¢

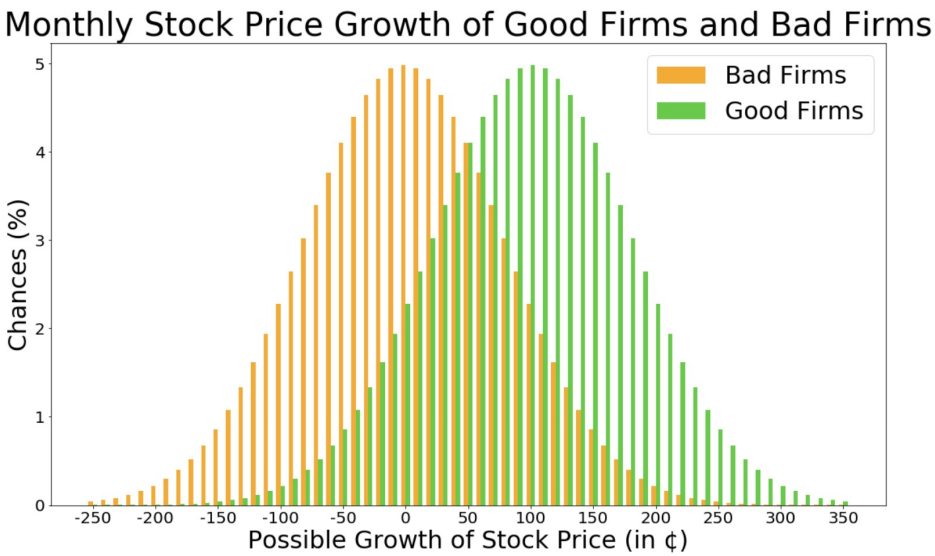
Next

Figure 13: Asking the *Inference* question before the *Forecast* question, prior (without signal).

Round 9

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The pool of firms has the following composition.

10 Bad Firms | B B B B B B B B B B | G G G G G G G G G G | 10 Good Firms

One firm is randomly picked from this pool.

Now we will show you the firm's stock price growth in the **current** month.

The firm's stock price growth is **80¢** this month.

Now, please answer the following questions.

How likely is it that the firm is **good**? 50 %

How likely is it that the firm is **bad**? 50 %

Now, please answer the following question.

On average, what do you expect the firm's stock price growth to be in the **next** month? ¢

Next

Figure 14: Asking the *Inference* question before the *Forecast* question, posterior (with signal).

5 *More Similar* treatment

5.1 *Inference Prior* and *Inference* parts

INSTRUCTIONS

Please read and follow all the instructions carefully! You will be asked to answer questions about these instructions and you will not be able to proceed unless you answer all questions correctly.

Overview

Most participants complete this study in **20 to 30 minutes**. Please start this study only if you have that much time in a single session. If you do not complete the study, or if the task times out on you, we will not be able to pay you. (The task is set to time out in two hours.)

This study has 40 rounds, divided into different parts. After you complete the study, you will receive a $5.00 base payment. In addition, the computer will randomly select one round to count for your bonus. Your answer in that round, together with some luck, will determine whether you will earn an additional $5.00 bonus or not. Because any round may count for your bonus, you should answer all questions carefully.

Firms and Profits

In each round, there is a new pool of 20 **firms** belonging to two types: Some firms are **good** firms, while others are **bad** firms.

In any given month, a firm's profit will be a random whole number (in ¢/cents). For example, it may be -300¢, or -290¢, or -280¢, and so on, up to 400¢. (Throughout this study, we use "profit" to refer to a firm's profit per share of stock, so the numbers are small.)

The profits of **good** firms will be generally higher than that of **bad** firms. Specifically, we use the word **profitability** to refer to a firm's **average** profit. Good firms have a profitability of 100, and bad firms have a profitability of 0. In other words, good firms' monthly profits are 100 on average, while bad firms' monthly profits are 0 on average. **However, for any given firm, there will be much randomness in its profit in every month.**

In each round, you will see the following information:

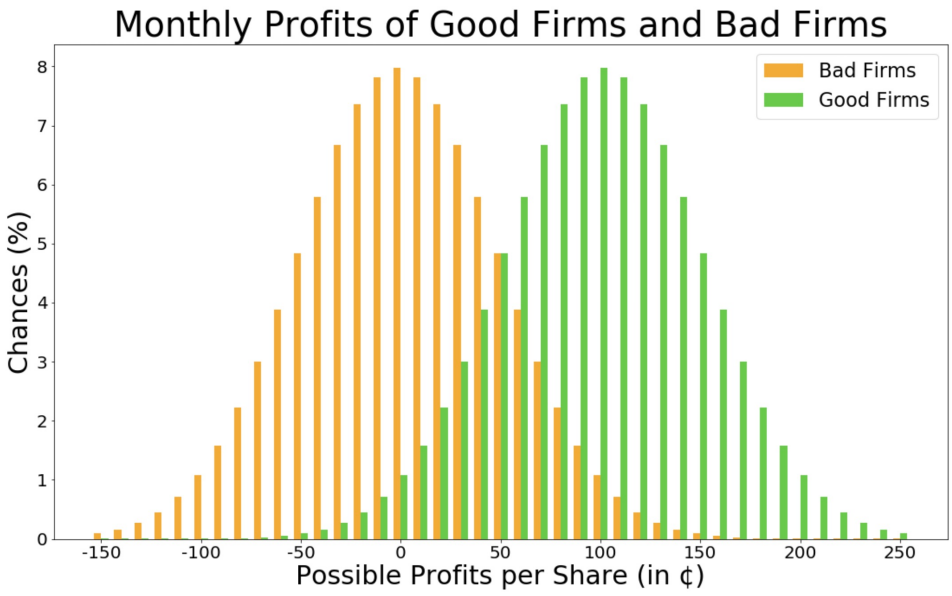
- In any given month, how likely the profit of **a good firm** turns out to be a given amount (in ¢)
- In any given month, how likely the profit of **a bad firm** turns out to be a given amount (in ¢)
- How many **good** firms and **bad** firms there are in the pool

Note that these conditions will change from round to round. Here is an example:

Round 1

There is a new pool of 20 firms.
The figure below describes the **profits** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's profit turns out to be that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's profit turns out to be that number (in ¢) in any given month.

Good firms' profitability is 100; their monthly profits are 100¢ **on average**
Bad firms' profitability is 0; their monthly profits are 0¢ **on average**



The pool of firms has the following composition.

8 Bad Firms of Profitability 0 | B | B | B | B | B | B | B | B | G | G | G | G | G | G | G | G | G | G | G | G | 12 Good Firms of Profitability 100

As you can see, in the example above:

- The monthly profit of any firm are always between **-150¢** and **250¢**.
- Good firms' profitability (average monthly profits) is **100(¢)**. Bad firms' profitability (average monthly profits) is **0(¢)**.
- The higher the green bar on top of a number, the more likely a good firm's profit turns out to be that number. For example, the green bar on top of 100¢ indicates that there is a 8% chance that a good firm's profit is 100¢ in a month. Similarly, the orange bar on top of 100¢ indicates that the chance that a bad firm's profit is 100¢ in a month is a little less than 1%.
- For both types of firms, their monthly profits are more likely to be close to the average than far from the average.
- Both types of firms are equally likely to have a monthly profit of **50¢**. If the profit of some firm is higher than **50¢** in a month, it is good news about the firm's quality. Conversely, if the profit of some firm is lower than **50¢** in a month, it is bad news about the firm's quality.

In each round, the computer will randomly pick one firm from the pool. Each of the 20 firms is equally likely to be picked. We will ask you some questions about this chosen firm.

This study has multiple parts, and the questions we ask will differ across parts. Below are the instructions for Part 1.

Question in Part 1

In Part 1, we will ask you the following question.

On average, what do you expect the firm's **profitability** to be?	

Note:

- **There is a best answer to each question.**
  In the example above, there are 12 good firms of profitability 100, so **without any additional information** there is a 12 / 20 = **60**% chance that the randomly picked firm has a profitability of 100.
  Thus, we expect the overall average of its profitability to be **60%** * 100 + **40%** * 0 = 60.
- **You can only type in your answer after you have spent 8 seconds on the page.** Please use these 8 seconds to think carefully about your answers before typing them in.

Additional Information

In some rounds, before you answer the questions, we will also show you the **profit** of the randomly picked firm in the **current** month. Here is an example:

The firm's profit is **70¢** this month.

Note: With this additional piece of information, the best answers to the question could be different. To get to the best answer, it is helpful to think through the following: On top of the information you already have, should the additional information affect your answer? If so, in which direction and by how much?

Bonus Rule

If the computer selects a question in this part to count for bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

We won't test you on the details of the bonus rule. But in case you are curious, you can click on "Bonus Details" below.

Bonus Details

Suppose your answer to the question that counts for the bonus is p and the best answer should be q, then your chance of getting the $5.00 bonus is (100 - (p-q)^2)%. Essentially, if your answer is exactly the best answer, then you get the bonus for sure. The more your answer misses, the smaller your chance of getting the bonus is. If your answer misses by more than 10, you won't get the bonus.

Check Your Understanding

Before you proceed to Part 1, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

My bonus payment will depend on my answer to one randomly selected question.

- ○ True
- ○ False

Each one of the 20 firms in a pool is equally likely to be picked.

- ○ True
- ○ False

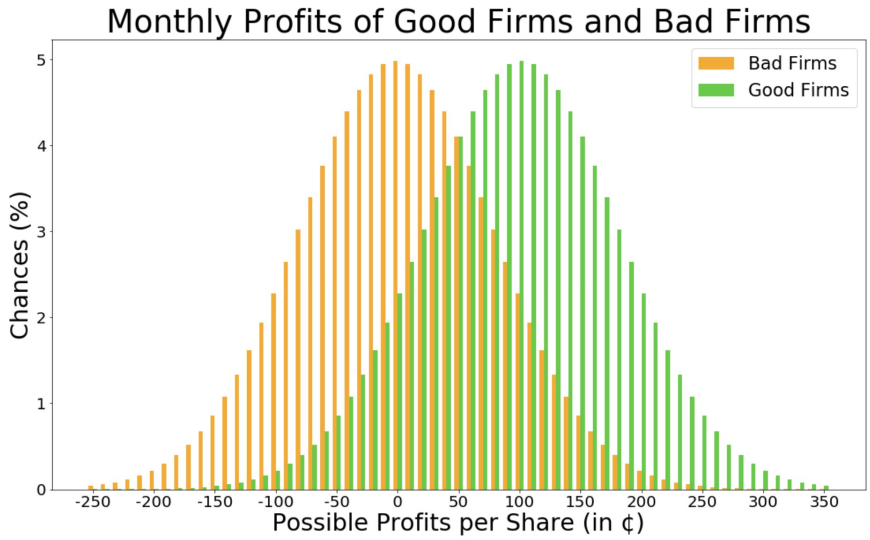
In the example above, there are 12 good firms of profitability 100 and 8 bad firms of profitability 0 in the pool. One firm is randomly picked from the pool. Without any additional information, what do we expect the firm's profitability to be on average?

Next

Round 1

There is a new pool of 20 firms.
The figure below describes the **profits** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's profit turns out to be that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's profit turns out to be that number (in ¢) in any given month.

Good firms' profitability is 100; their monthly profits are 100¢ **on average**
Bad firms' profitability is 0; their monthly profits are 0¢ **on average**



The pool of firms has the following composition.

10 Bad Firms of Profitability 0 | B B B B B B B B B B G G G G G G G G G G | 10 Good Firms of Profitability 100

One firm is randomly picked from this pool.

Please answer the following question.

On average, what do you expect the firm's **profitability** to be?

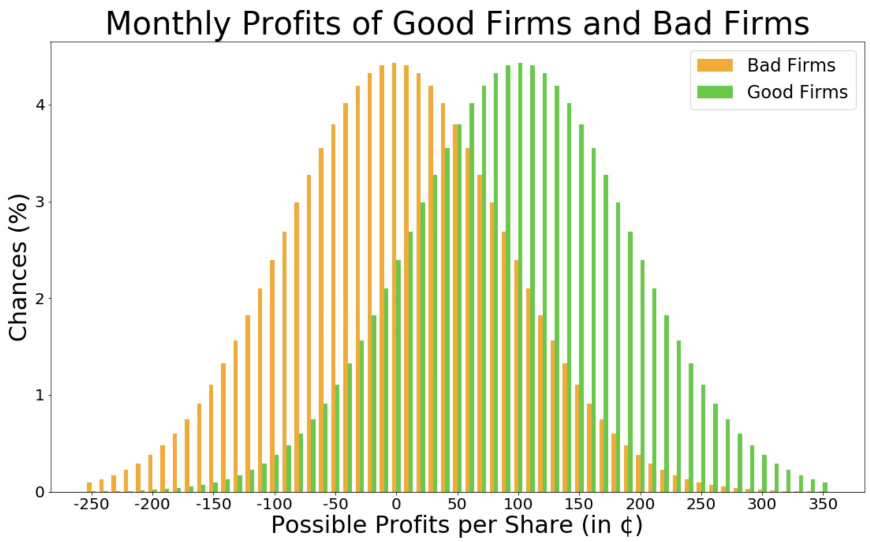
Next

Figure 15: A typical round of the *Inference Prior* part.

Round 9

There is a new pool of 20 firms.
The figure below describes the **profits** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's profit turns out to be that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's profit turns out to be that number (in ¢) in any given month.

Good firms' profitability is 100; their monthly profits are 100¢ **on average**
Bad firms' profitability is 0; their monthly profits are 0¢ **on average**



The pool of firms has the following composition.

10 Bad Firms of Profitability 0 | B B B B B B B B B B G G G G G G G G G G | 10 Good Firms of Profitability 100

One firm is randomly picked from this pool.

Now we will show you the firm's **profit** in the **current** month.

The firm's profit is **-70¢** this month.

Now, please answer the following question.

On average, what do you expect the firm's **profitability** to be?

Next

Figure 16: A typical round of the *Inference* part.

5.2 *Forecast Prior*, *Forecast Revision*, and *Expectation Formation* parts

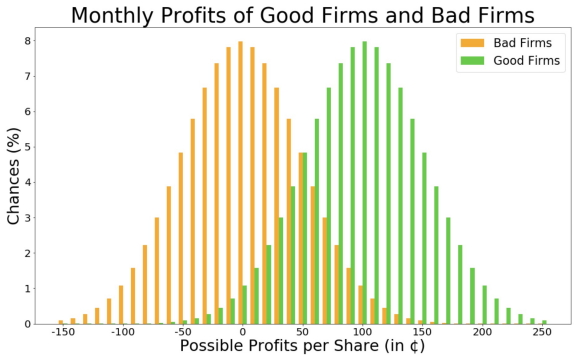
INSTRUCTIONS - PART 2

Part 2 is very similar to Part 1. **The only difference is that in each round, instead of asking you about the chosen firm's profitability, we will ask you about its profit last month.** Here is an example.

Round 17

There is a new pool of 20 firms.
The figure below describes the **profits** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's profit turns out to be that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's profit turns out to be that number (in ¢) in any given month.

Good firms' profitability is 100; their monthly profits are 100¢ **on average**
Bad firms' profitability is 0; their monthly profits are 0¢ **on average**



The pool of firms has the following composition.

8 Bad Firms of Profitability 0 | B B B B B B B B G G G G G G G G G G G G | 12 Good Firms of Profitability 100

One firm is randomly picked from this pool.

Please answer the following question.

On average, what do you expect the firm's **profit** to be **last** month? ¢

Note:

- **There is a best answer to each question.**
  In the example above, the good firms' monthly profits are 100¢ on average, and the bad firms' monthly profits are 0¢ on average. Thus, we expect the overall average of the randomly picked firm's profit in any month to be between 0¢ and 100¢. There are 12 good firms, so **without any additional information** there is a 12 / 20 = **60**% chance that the randomly picked firm is good. Thus, we expect the overall average of its profit in any month to be **60%** * 100¢ + **40%** * 0¢ = 60¢.
- **You can only type in your answer after you have spent 8 seconds on the page.** Please use these 8 seconds to think carefully about your answers before typing them in.

Additional Information

In some rounds, before you answer the questions, we will also show you the **profit** of the randomly picked firm in the **current** month. Here is an example:

The firm's profit is **70¢** this month.

Note:

- The additional information is about the firm's **profit** in the **current** month. This is different from the question you need to answer, which is about the firm's **profit** in the **last** month.
- **A firm's profitability is fixed and does not change from month to month.** Suppose in a given month, a firm is good and its profitability (average monthly profits) is 100(¢). Then, in the next month, this firm will still be good and its profitability (average monthly profits) will still be 100(¢). This is not affected by its profit in any previous month.
- **With this additional piece of information, the best answer to the question could be different.** To get to the best answer, it is helpful to think through the following: On top of the information you already have, should the additional information affect your answer? If so, in which direction and by how much?

Bonus Rule

If the computer selects a question in this part to count for bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

We won't test you on the details of the bonus rule. But in case you are curious, you can click on "Bonus Details" below.

Bonus Details

Suppose your answer to the question that counts for the bonus is p¢ and the best answer should be q¢, then your chance of getting the $5.00 bonus is (100 - (p-q)^2)%. Essentially, if your answer is exactly the best answer, then you get the bonus for sure. The more your answer misses, the smaller your chance of getting the bonus is. If your answer misses by more than 10¢, you won't get the bonus.

Check Your Understanding

Before you proceed, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

Which question will you need to answer in Part 2?

- ○ On average, what do you expect the firm's profitability to be?
- ○ On average, what do you expect the firm's profit to be last month?

In the example above, there are 12 good firms of profitability 100 and 8 bad firms of profitability 0 in the pool. One firm is randomly picked from the pool. Without any additional information, **on average** what do you expect the firm's profit to be last month?

[ ] ¢

Suppose we know that a firm is good and its profitability (average monthly profits) is 100(¢). In the current month, its profit turns out to be 20¢. On average, how much do you expect its profit to be in the last month?

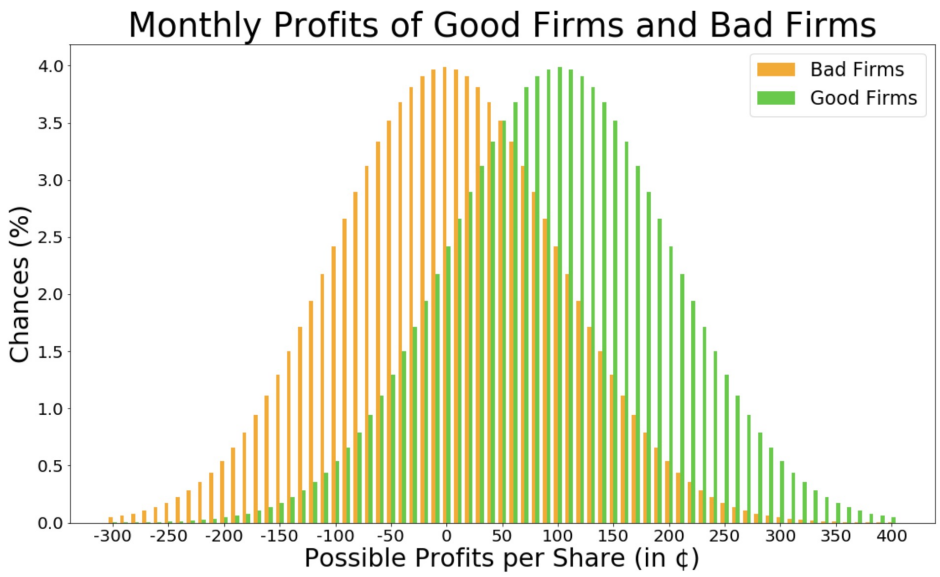
[ ] ¢

Next

Round 17

There is a new pool of 20 firms.
The figure below describes the **profits** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's profit turns out to be that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's profit turns out to be that number (in ¢) in any given month.

Good firms' profitability is 100; their monthly profits are 100¢ **on average**
Bad firms' profitability is 0; their monthly profits are 0¢ **on average**



The pool of firms has the following composition.

10 Bad Firms of Profitability 0 | B B B B B B B B B B | G G G G G G G G G G | 10 Good Firms of Profitability 100

One firm is randomly picked from this pool.

Please answer the following question.

On average, what do you expect the firm's **profit** to be **next** month? ¢

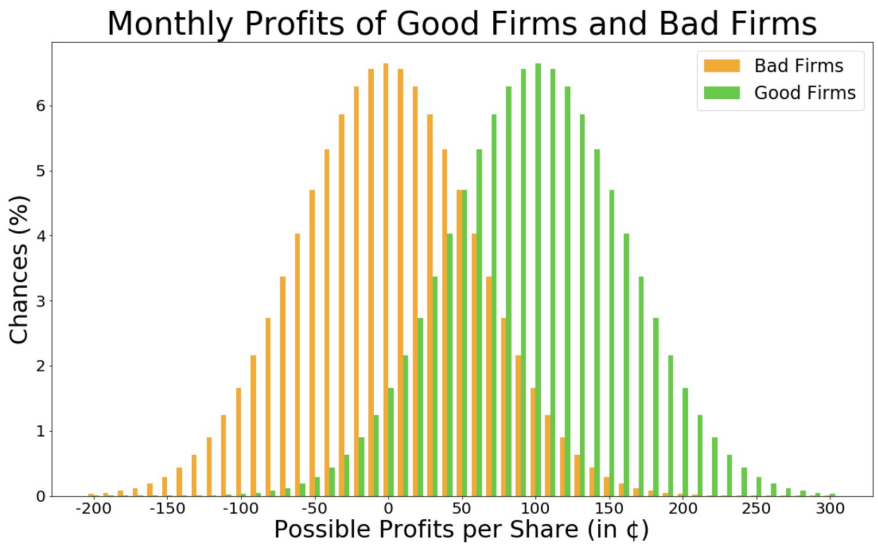
Next

Figure 17: A typical round of the *Forecast Prior* and *Expectation Formation* parts.

Round 25

There is a new pool of 20 firms.
The figure below describes the **profits** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's profit turns out to be that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's profit turns out to be that number (in ¢) in any given month.

Good firms' profitability is 100; their monthly profits are 100¢ **on average**
Bad firms' profitability is 0; their monthly profits are 0¢ **on average**



The pool of firms has the following composition.

10 Bad Firms of Profitability 0 | B B B B B B B B B B | G G G G G G G G G G | 10 Good Firms of Profitability 100

One firm is randomly picked from this pool.

Now we will show you the firm's **profit** in the **current** month.

The firm's profit is **-30¢** this month.

Now, please answer the following question.

On average, what do you expect the firm's **profit** to be **next** month? ¢

Next

Figure 18: A typical round of the *Forecast Revision* part.

6 *Less Similar* treatment

6.1 *Inference Prior* and *Inference* parts

INSTRUCTIONS

Please read and follow all the instructions carefully! You will be asked to answer questions about these instructions and you will not be able to proceed unless you answer all questions correctly.

Overview

Most participants complete this study in **20 to 30 minutes**. Please start this study only if you have that much time in a single session. If you do not complete the study, or if the task times out on you, we will not be able to pay you. (The task is set to time out in two hours.)

This study has 40 rounds, divided into different parts. After you complete the study, you will receive a $5.00 base payment. In addition, the computer will randomly select one round to count for your bonus. Your answer in that round, together with some luck, will determine whether you will earn an additional $5.00 bonus or not. Because any round may count for your bonus, you should answer all questions carefully.

Firms, Stock Prices, and Revenues

In each round, there is a new pool of 20 **firms** belonging to two types: Some firms are **good** firms, while others are **bad** firms.

In any given month, a firm's stock price growth will be a random whole number (in ¢/cents). For example, it may be -300¢, or -290¢, or -280¢, and so on, up to 400¢. A negative stock price growth means that the firm's stock price decreases from the previous month. For the purpose of this study, you don't need to worry about stock price falling below zero.

The stock price growth of **good** firms will be generally higher than that of **bad** firms. However, for any given firm, there will be much randomness in its stock price growth in every month.

In each round, you will see the following information:

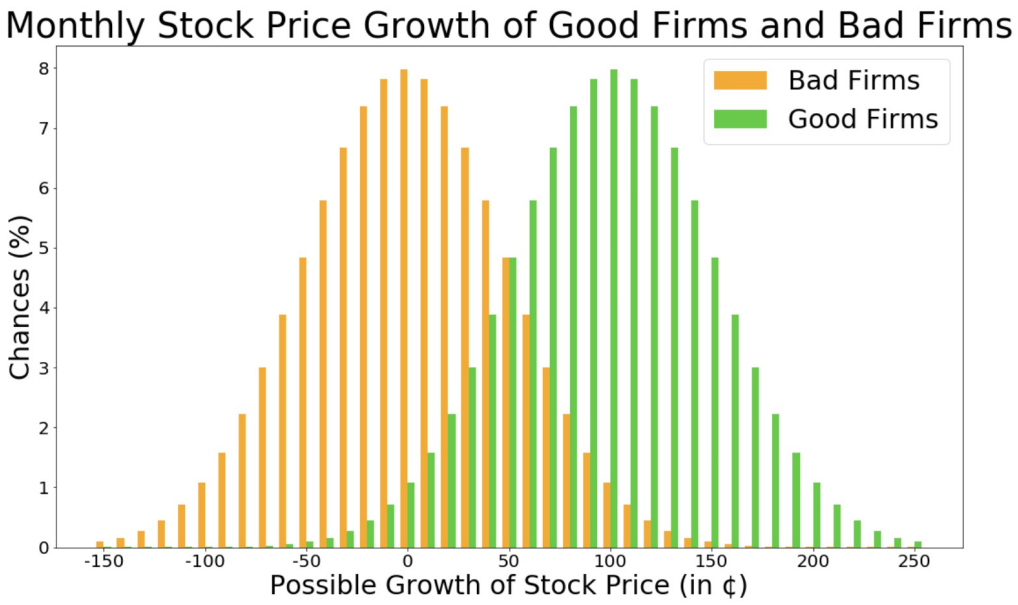
- In any given month, how likely the stock price of a **good** firm grows by a given amount (in ¢)
- In any given month, how likely the stock price of a **bad** firm grows by a given amount (in ¢)
- In any given month, how the revenues of good firms and bad firms change
- How many **good** firms and **bad** firms there are in the pool

Note that these conditions will change from round to round. Here is an example:

Round 1

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The **revenue change** of good firms and bad firms is shown below.

Good firms' revenues **grow every month**
Bad firms' revenues **never grow** in any month

The pool of firms has the following composition.

8 Bad Firms | B B B B B B B B | G G G G G G G G G G G G | 12 Good Firms

As you can see, in the example above:

- The monthly stock price growth of any firm are always between **-150¢** and **250¢**.
- Good firms' monthly stock price growth is **100¢** on average. Bad firms' monthly stock price growth is **0¢** on average.
- The higher the green bar on top of a number, the more likely a good firm's stock price grows by that number. For example, the green bar on top of 100¢ indicates that there is a 8% chance that a good firm's stock price grows by 100¢ in a month. Similarly, the orange bar on top of 100¢ indicates that the chance of a bad firm's stock price growing by 100¢ in a month is a little less than 1%.
- For both good firms and bad firms, their monthly stock price growth is more likely to be close to the average than far from the average.
- A good firm and a bad firm are equally likely to have a monthly stock price growth of **50¢**. If the stock price growth of some firm is higher than **50¢** in a month, it is good news about the firm's quality. Conversely, if the stock price growth of some firm is lower than **50¢** in a month, it is bad news about the firm's quality.
- Good firms' revenues grow in every month. Bad firms' revenues never grow in any month.

In each round, the computer will randomly pick one firm from the pool. Each of the 20 firms is equally likely to be picked. We will ask you some questions about this chosen firm.

This study has multiple parts, and the questions we ask will differ across parts. Below are the instructions for Part 1.

Question in Part 1

In Part 1, we will ask you the following two questions.

How likely is it that the firm is **good**?		%

How likely is it that the firm is **bad**?		%

Note:

- **There is a best answer to each question.** In the example above where there are 12 good firms and 8 bad firms, **without any additional information**, the chance that the randomly picked firm is good is 12 / 20 = 60%, and the chance that it is bad is 8 / 20 = 40%.
- **You only need to type in your answer to one of the two questions.** The computer will automatically fill in [100 - what you type] as the answer to the other question.
- **You can only type in your answer after you have spent 8 seconds on the page.** Please use these 8 seconds to think carefully about your answers before typing them in.

Additional Information

In some rounds, before you answer the questions, we will also show you the **stock price growth** of the randomly picked firm in the **current** month. Here is an example:

The firm's stock price growth is **70¢** this month.

Note: With this additional piece of information, the best answers to the questions could be different. To get to the best answers, it is helpful to think through the following: On top of the information you already have, should the additional information affect your answers? If so, in which direction and by how much?

Bonus Rule

If the computer selects a question in this part to count for bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

We won't test you on the details of the bonus rule. But in case you are curious, you can click on "Bonus Details" below.

Bonus Details

Suppose your answer to the question that counts for the bonus is p% and the best answer should be q%, then your chance of getting the $5.00 bonus is (100 - (p-q)^2)%. Essentially, if your answer is exactly the best answer, then you get the bonus for sure. The more your answer misses, the smaller your chance of getting the bonus is. If your answer misses by more than 10%, you won't get the bonus.

Check Your Understanding

Before you proceed to Part 1, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

My bonus payment will depend on my answer to one randomly selected question.

- ○ True
- ○ False

Each one of the 20 firms in a pool is equally likely to be picked.

- ○ True
- ○ False

In the example above, there are 12 good firms and 8 bad firms in the pool. One firm is randomly picked from the pool. Without any other information, what is the chance that the firm is good?

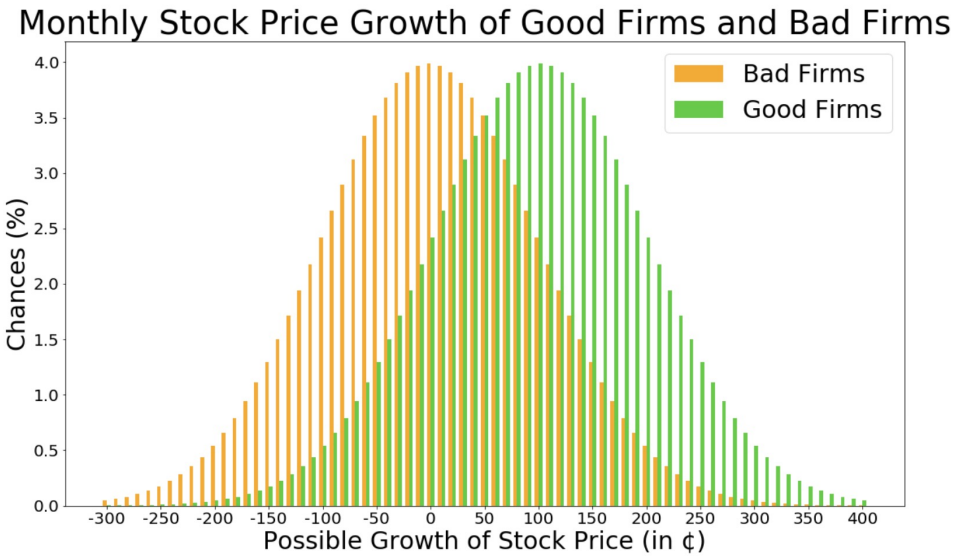
[ ] %

Next

Round 1

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The **revenue change** of good firms and bad firms is shown below.

Good firms' revenues **grow every month**
Bad firms' revenues **never grow** in any month

The pool of firms has the following composition.

16 Bad Firms | B B B B B B B B B B B B B B B B | G G G G | 4 Good Firms

One firm is randomly picked from this pool.

Please answer the following questions.

How likely is it that the firm is **good**? ____ %

How likely is it that the firm is **bad**? ____ %

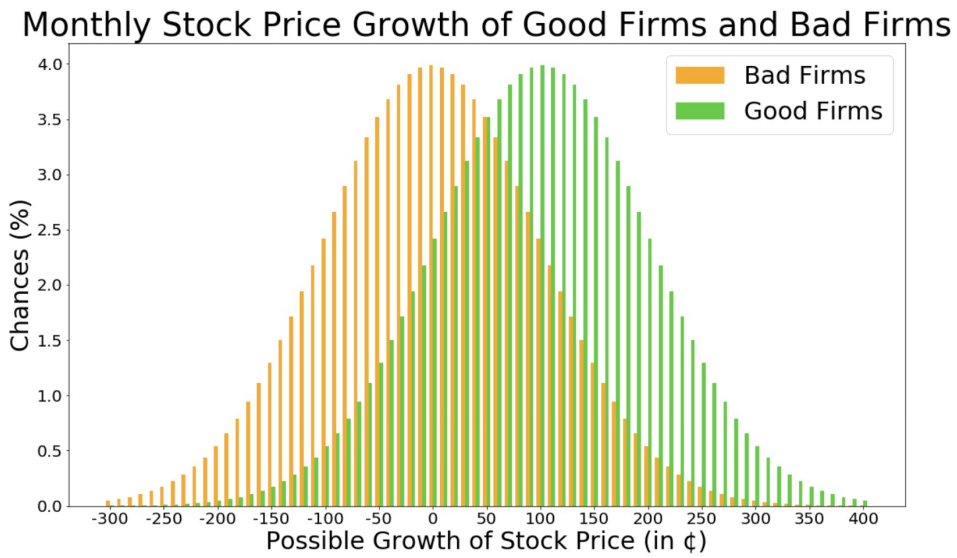
Next

Figure 19: A typical round of the *Inference Prior* part.

Round 9

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The **revenue change** of good firms and bad firms is shown below.

Good firms' revenues **grow every month**
Bad firms' revenues **never grow** in any month

The pool of firms has the following composition.

4 Bad Firms | B B B B | G G G G G G G G G G G G G G G G | 16 Good Firms

One firm is randomly picked from this pool.

Now we will show you the firm's **stock price growth** in the **current** month.

The firm's stock price growth is **150¢** this month.

Now, please answer the following questions.

How likely is it that the firm is **good**? %

How likely is it that the firm is **bad**? %

Next

Figure 20: A typical round of the *Inference* part.

6.2 *Forecast Prior*, *Forecast Revision*, and *Expectation Formation* parts

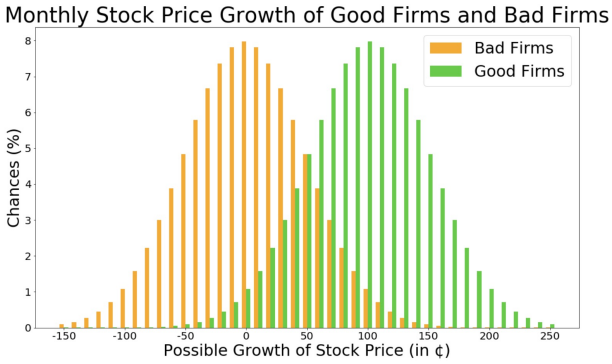
INSTRUCTIONS - PART 2

Part 2 is very similar to Part 1. **The only difference is that in each round, instead of asking you how likely it is that the chosen firm is good, we will ask you about its revenue growth next month.** Here is an example.

Round 17

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The **revenue change** of good firms and bad firms is shown below.

Good firms' revenues **grow every month**
Bad firms' revenues **never grow** in any month

The pool of firms has the following composition.

8 Bad Firms | B B B B B B B B | G G G G G G G G G G G G | 12 Good Firms

One firm is randomly picked from this pool.

Please answer the following questions.

How likely is it that the firm's **revenue** grows next month? %

How likely is it that the firm's **revenue** does **not** grow next month? %

Note: There is a best answer to each question. In the example above, there are 12 good firms and 8 bad firms. Thus, without any additional information, the chance that the randomly picked firm is good is 12 / 20 = 60%, and the chance that it is bad is 8 / 20 = 40%. Since a good firm's revenue always grows and a bad firm's revenue never grows, the chance that the randomly picked firm's revenue grows in any month is 60%.

Additional Information

In some rounds, same as in Part 1, before you answer the question, we will also show you the **stock price growth** of the randomly picked firm in the **current** month. Here is an example:

> The firm's stock price growth is **70¢** this month.

Note:

- The additional information is about the firm's **stock price growth** in the **current** month. This is different from the question you need to answer, which is about the firm's **revenue growth** in the **next** month.
- **Whether a firm is good or bad is fixed and does not change from month to month.** Suppose in a given month, a firm is good and its revenue grows. Then, in the next month, this firm will still be good and its revenue growth will still grow. This is not affected by its stock price growth in any previous month.
- **With this additional piece of information, the best answer to the question could be different.** To get to the best answer, it is helpful to think through the following: On top of the information you already have, should the additional information affect your answer? If so, in which direction and by how much?

Bonus Rule

If the computer selects a question in this part to count for bonus, then your answer to that question will determine your chance of earning the $5.00 bonus. Without going into the details, the bonus rule is designed so that **the closer your answer is to the best answer, the higher your chance of getting the bonus is.** Therefore, in each question, your answer should be as close as possible to the best answer.

We won't test you on the details of the bonus rule. But in case you are curious, you can click on "Bonus Details" below.

Bonus Details

Suppose your answer to the question that counts for the bonus is p% and the best answer should be q%, then your chance of getting the $5.00 bonus is (100 - (p-q)^2)%. Essentially, if your answer is exactly the best answer, then you get the bonus for sure. The more your answer misses, the smaller your chance of getting the bonus is. If your answer misses by more than 10%, you won't get the bonus.

Check Your Understanding

Before you proceed, we need to ask you some questions to make sure that you understand the instructions. Click the button below to go to the understanding questions.

Understanding questions:

Which question will you need to answer in Part 2?

- ○ How likely is it that the firm is good/bad?
- ○ How likely is it that the firm's revenue goes up/does not go up next month?

In the example above, there are 12 good firms and 8 bad firms in the pool. The good firms' revenues grow every month. The bad firms' revenues never grow in any month. One firm is randomly picked from the pool. Without any additional information, what is the chance that the firm's revenue grows next month?

[ ] %

Suppose we know that a firm is a good firm. Its revenue grows every month. In the current month, its stock price growth turns out to be 20¢. What is the chance that this good firm's revenue grows next month?

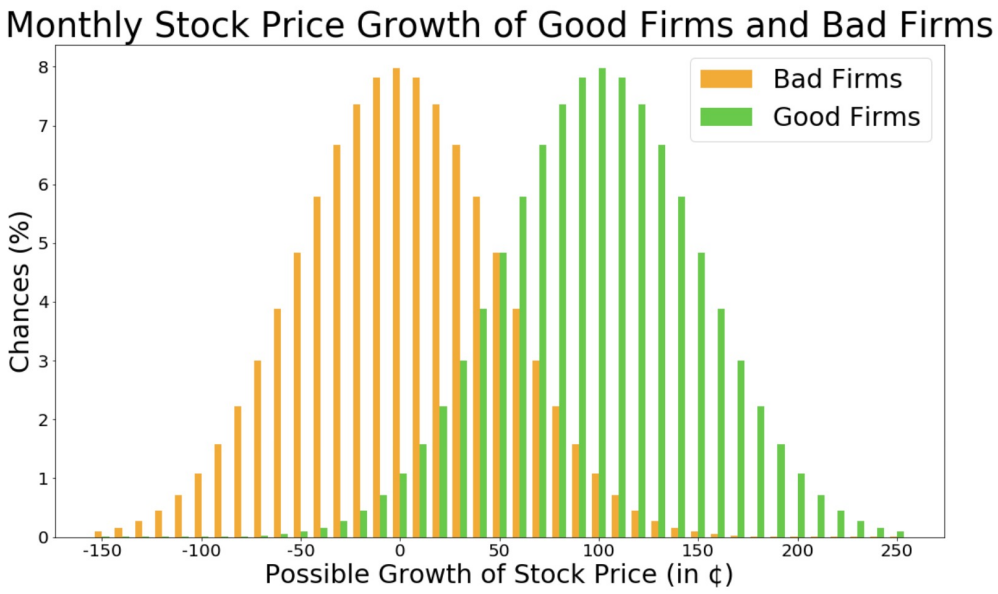
[ ] %

Next

Round 17

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The **revenue change** of good firms and bad firms is shown below.

Good firms' revenues **grow every month**
Bad firms' revenues **never grow** in any month

The pool of firms has the following composition.

10 Bad Firms | B B B B B B B B B B | G G G G G G G G G G | 10 Good Firms

One firm is randomly picked from this pool.

Please answer the following questions.

How likely is it that the firm's **revenue** grows next month? ____ %

How likely is it that the firm's **revenue** does **not** grow next month? ____ %

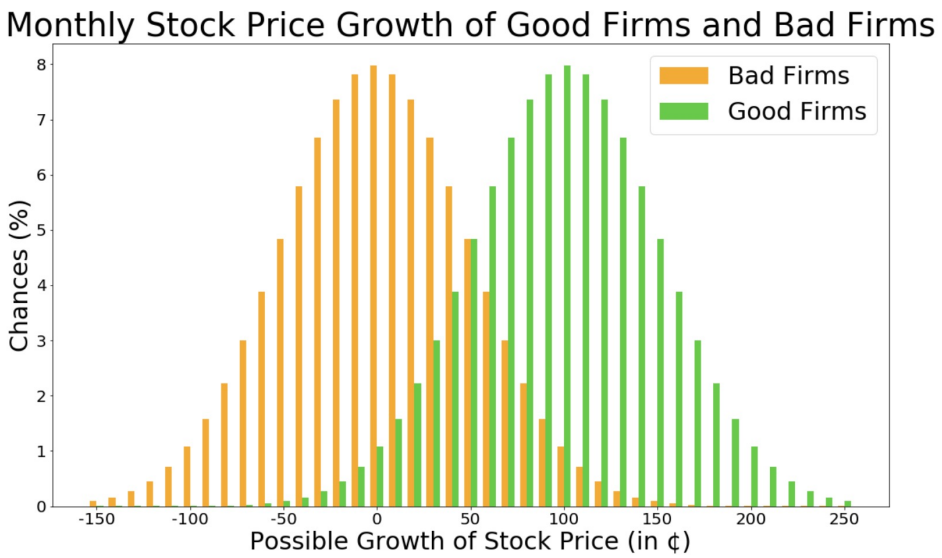
Next

Figure 21: A typical round of the *Forecast Prior* and *Expectation Formation* parts.

Round 25

There is a new pool of 20 firms.
The figure below describes the **stock price growth** of good firms and bad firms in any given month:
The green bar on top of each number is the chance (%) that a good firm's stock price grows by that number (in ¢) in any given month.
The orange bar on top of each number is the chance (%) that a bad firm's stock price grows by that number (in ¢) in any given month.

Good firms' monthly stock price growth is 100¢ **on average**
Bad firms' monthly stock price growth is 0¢ **on average**



The **revenue change** of good firms and bad firms is shown below.

Good firms' revenues **grow every month**
Bad firms' revenues **never grow** in any month

The pool of firms has the following composition.

10 Bad Firms | B B B B B B B B B B | G G G G G G G G G G | 10 Good Firms

One firm is randomly picked from this pool.

Now we will show you the firm's **stock price growth** in the **current** month.

The firm's stock price growth is **70¢** this month.

Now, please answer the following question.

How likely is it that the firm's **revenue** grows next month? ____ %

How likely is it that the firm's **revenue** does **not** grow next month? ____ %

Next

Figure 22: A typical round of the *Forecast Revision* part.