

Forecasting Exercises

In this exercise, you will be making some forecasts of uncertain events. You will do that by assigning probabilities that reflect your beliefs about future events.

For some events, there is great agreement about probabilities or chances. For example, if you were to roll a 6-sided die, most people would assign a probability of $1/6$ that a 5 would show, and most people would assign a probability of $1/2$ that an even number would show.

For other events, the probabilities are more subjective. Even people who have the same data in front of them could disagree about the chance of some future event.

If you think something is *extremely likely*, then you may want to assign it a 90% chance or 95% chance. If you think something is *extremely unlikely*, then maybe you give it a 10% chance, and if you think it is *nearly impossible*, only a 5% chance. The halfway mark, 50%, represents your belief that the event is *as likely to occur as not*. Use the numeric scale, from 0% to 100%, to represent how likely *you* think the events are.

Part 0: Discussion

Class discussion:

- What numeric probability do *you* associate with the following phrases?
 - Probably _____
 - Probably not _____
 - Likely _____
 - Unlikely _____
 - Beyond a reasonable doubt _____
 - Impossible _____
- What other phrases can you think of that imply uncertainty? And what probabilities do you associate with them?

Part 1: AMZN Forecasts

- 1) Use the AMZN stock price data from the earlier module to answer these questions about changes in the stock price for **all the trading days in the data set**. Use the Adjusted Close price for all questions.
 - a. Using all the trading days in the data set, for what percentage of those days was the Adjusted Close price higher by 1% or more exactly 40 trading days later? (The 40 days is approximately two months of trading days. You will have to exclude the most recent 40 days in the data set, as you don't have prices 40 days later.) _____
 - b. Answer the same question, but using 3% or more. _____
 - c. Answer the same question, but using 5% or more. _____

- 2) Use the AMZN stock price data from the earlier module to answer these questions about changes in the stock price for **trading days in 2013**. Use the Adjusted Close price for all questions.
 - a. Using trading days in 2013, for what percentage of those days was the Adjusted Close price higher by 1% or more exactly 40 trading days later? (The 40 days is approximately two months of trading days.) _____
 - b. Answer the same question, but using 3% or more. _____
 - c. Answer the same question, but using 5% or more. _____

- 3) Use the AMZN stock price data from the earlier module to answer these questions about changes in the stock price for **the most recent 250 trading days in the data set**. Use the Adjusted Close price for all questions.
 - a. Using the most recent 250 trading days in the data set, for what percentage of those days was the Adjusted Close price higher by 1% or more exactly 40 trading days later? (The 40 days is approximately two months of trading days. You will have to exclude the most recent 40 days in the data set, as you don't have prices 40 days later.) _____
 - b. Answer the same question, but using 3% or more. _____
 - c. Answer the same question, but using 5% or more. _____

Now you will make some forecasts by assigning probabilities. There are no right and wrong answers as long as you follow logical rules of consistency.

Use the following **Start Date**, **Start Price**, and **End Date**.

- **Start Date** = 8/29/2014
- **Start Price** = 339.04 (Adjusted Close price for AMZN, as reported on finance.yahoo.com, on the Start Date)
- **End Date** = 10/31/2014

- 4) Using the Start Price above,
- a. Find the price that is 1% higher than that price, rounded to the nearest cent. _____
 - b. Find the price that is 3% higher than that price, rounded to the nearest cent. _____
 - c. Find the price that is 5% higher than that price, rounded to the nearest cent. _____

- 5) Your forecasts for the AMZN stock price

Taking into account the calculations you did in Questions 1 – 3, report the probabilities you assign to the following questions.

- a. What is the chance that the Adjusted Close price on the End Date, as reported on finance.yahoo.com, will be higher by 1% or more than the Start Price? _____
(This should be a number between 0 and 1, or, equivalently, between 0% and 100%.)
 - b. What is the chance that the Adjusted Close price on the End Date, as reported on finance.yahoo.com, will be higher by 3% or more than the Start Price? _____
 - c. What is the chance that the Adjusted Close price on the End Date, as reported on finance.yahoo.com, will be higher by 5% or more than the Start Price? _____
- 6) Relationships among the forecasts from Question 5 above.
- a. True or False: Your answer to 5a has to be lower than your answer to 5b. Explain.
 - b. True or False: Your answer to 5b has to be lower than your answer to 5c. Explain.
 - c. What would be the interpretation of your answer to 5a being exactly the same as your answer to 5c?

Part 2: Other Forecasts

In this part, you are going to make some forecasts of stock prices and other things by assigning probabilities to represent the likelihood that something will happen. We will look at the class's forecasts later in the semester to see how well we did as a group.

Reminders:

- Probabilities are **between 0 and 1** (or, equivalently, between 0% and 100%).
- An individual should exhibit **consistency** across related forecasts. For example, you can't say that there is a 20% chance it will rain tomorrow and a 90% chance it won't rain tomorrow. That would be inconsistent, assuming that "will rain tomorrow" and "won't rain tomorrow" are defined in a mutually exclusive way.

You will enter your forecasts electronically so that later in the semester, we can see if collectively we made good forecasts. Here is the link to enter your forecasts: <http://tinyurl.com/math1112forecast>.

For all of these events, use the "settlement date" below: that is the date on which the events will be judged to have happened or not.

Settlement date for these forecasts = 11/14/2014

For the stock prices, we will use **Adjusted Close** prices from finance.yahoo.com as the source of data. *(The code in parentheses at the beginning identifies the event in the data collection sheet.)*

1. *(1HOG5D)* What is the probability that **HOG** stock will close **5%, or more, lower** on the settlement date compared to the first trading day of the current calendar year?
2. *(2HOG1D)* What is the probability that **HOG** stock will close **1%, or more, lower** on the settlement date compared to the first trading day of the current calendar year?
3. *(3HOG5U)* What is the probability that **HOG** stock will close **5%, or more, higher** on the settlement date compared to the first trading day of the current calendar year?
4. *(4HOG1U)* What is the probability that **HOG** stock will close **1%, or more, higher** on the settlement date compared to the first trading day of the current calendar year?
5. *(5HOG5M)* What is the probability that **HOG** stock will close **more than 5% lower and less than 5% higher** on the settlement date compared to the first trading day of the current calendar year?
6. *(6YAHOO)* What is the probability that the **CEO of Yahoo!** will be different on the settlement date from who it was on the first day of the calendar year?

7. (7ALLSP) What is the probability that Allstate Corp (stock ticker **ALL**) will be part of the **S&P 500** on the settlement date?
8. (8TWTNB) What is the probability that Taylor Swift (**@taylorswift13**) will have fewer Twitter followers than Barack Obama (**@BarackObama**) on the settlement date, according to <https://twitter.com/taylorswift13> and <https://twitter.com/barackobama>?
9. (9USDEUR) What is the probability that on the settlement date, you can get 0.78 or more EUR for 1 USD, according the Currency Converter at www.oanda.com?
10. (10BUFFS) What is the probability that the CU Buffs football team will have a current season winning percentage of greater than 25% as of the settlement date?
11. (11SNOW) What is the probability that the cumulative snowfall since this past July (as reported on the National Weather Service website) will be equal to or greater than the normal cumulative level?
12. (12CO68) What is the probability that Colorado Amendment 68 will be approved by voters in the 2014 election?