Instructions – Asset Allocation Experiment

[Message to the reader: each [S #] bracket corresponds to a slide in the presentation. Letter after the number is a transition within the slide]

We’re about to begin. Please put your cell phones and other electronic devices in your bag and do not use them until the end of the experiment.

**[S 1a]**

Dear Participants,

Welcome and thank you for coming to this experiment. You will be paid for your participation, in cash, at the end of the experiment. **[S 2a]** You will remain anonymous to me and to all the other participants during the entire experiment; the only person who will know your identity is the person in the other room who is responsible for paying you at the end. **[S 2b]** Everyone will be paid in private and you are under no obligation to tell others how much you earned. The entire experiment will take place through the computer terminals.

Let us begin with a brief instruction where you will be given the complete description of the experiment and shown how to use the software. Please, pay attention to the instructions, as it is important for you to understand the details of the experiment. **[S 2c]** There will be a quiz at the end of the instructions that everyone needs to answer correctly before we can proceed to the actual experiment. Participants who are unable to answer the quiz will not be allowed to participate in the experiment. If you have any questions during the instruction period, raise your hand and your question will be answered so everyone can hear. **[S 2d]** If any difficulties arise after the experiment has begun, raise your hand, and an experimenter will come and assist you.

If you cannot see the entire projection screen, please come forward as it is important for you to see the entire screen.

Today, we will ask you to make investment decisions. Your final payment consists of a \_$5\_ show-up fee plus your investment earnings. **[S 3a]** Those earnings depend both on the choices you make and on luck. The choices of other participants do not affect your payoff in ANY way, at ANY point in the experiment and your choices do not affect their payoff. **[S 3b]** The entire experiment is split in 3 parts. I will now give you instructions for Part 1. **[S 3c]** You will get additional instructions before Part 2 and Part 3.

PART 1

**[S 4a]** Let me first summarize the investment process and then we will go through each step in more detail. You will start with an initial amount of money that you will be able to invest in two assets, A and B. **[S 4b]** You will have 10 periods to invest. At each period you will decide how to allocate your money between the two assets. At the end of each period, you will earn returns from that period’s investment in each asset. **[S 4c]** The two assets will pay differently, and later in the instructions I will explain what to expect from each asset. After period 10, the process ends and the computer will record your final money amount. **[S 4d]** This process of 10 investment periods is called **an investment path**. **[S 4e]** At the start of each path, your money will be reset to the initial amount.

In Part 1 you will complete 15 of these paths. **[S 4f]** Consequently, there will be 15 final amounts of money, one for each path. The computer will randomly select one of these 15 final amounts. **[S 4g]** The selected amount will be your payoff for Part 1.

Are there any questions? Let me now walk you through the procedure step by step.

The Initial Endowment: **[S 5a]** This is a screenshot of what you will see on your computer at the beginning of each path, that is, in period 1 of each path. In each path you start with $\_3\_, this is your initial endowment. **[S 5b]** This amount is displayed on the left side of the screen in the box labeled “Account”. **[S 5c]** It is also represented by the height of the bar in the middle of the screen. **[S 5d]** There is a grid in the background to help you get a sense of the bar's height.

Periods and Timing: As mentioned earlier a path is made of **10 periods**, starting at 1 and ending at 10. **[S 5d]** The sequence is displayed on the bottom of the screen **[S 5e]** and your current period is displayed in the upper left corner. Each period is an opportunity for you to invest. A period ends when the time runs out. **[S 5f]** You can see the timer on the left hand side. For the first period in each path you will have \_10\_ seconds to make your investment decision. For the other periods in the path, that is, periods 2 to 10, you will have \_6\_ seconds to make your investment decision.

Investing: Let me show you with a short video how to make your investment. **[S 6a]**

**Step 1.** Choose display. To start your investment, you first need to click on one of the two boxes at the bottom, the ones labeled with percentage and dollar signs. **[S 6b]** These boxes control how your allocation between assets A and B is displayed: in percentages or dollar terms. **[S 6c\_Play]** You have to click one of the boxes **in period 1** of each path. You can also change the display anytime simply by clicking on the other box. Select whichever box you find convenient and change it anytime you want.

**Step 2.** Activate the bar. Now you can activate the investment bar. **[S 6d]** Click anywhere on the light gray bar to activate it. Notice when the bar is light gray it means that your money is not invested in either asset. If the bar stays that way after the period ends, you will earn zero interest on your money: the same amount will just be transferred to the next period.

**Step 3.** Choose the allocation. **[S 6e]** Once you activate the bar you will notice that it is split between two colors: the top is **light blue**, and the bottom is **gray**. The top represents the amount of money allocated to Asset A, and the bottom represents the amount of money allocated to Asset B. **[S 6f]** Now you can see the display I previously mentioned. It shows how much money you have allocated to A and B either in dollar or in percentage terms. This example shows the dollar display. You can change the allocation between A and B in two ways: by holding the horizontal bar and moving it up or down or by clicking on the bar, as you can see in the video. **[S 6g]** Once you are satisfied with the allocation wait until the period ends.

**Step 4.** Proceed to the next period. When the period ends, a new gray bar will appear showing you the new amount. Here is the transition from period 1 to period 2. **[S 6h]** Your new amount will be the sum of the money you earned on both assets A and B and it will be shown on the **left** where your initial money amount was displayed. **[S 6i]** The new height of the bar will also represent this amount. Be aware that the background grid can be re-scaled to accommodate changes in the bar, so pay attention to the figures written on the grid. **[S 6j]** The last period's bar will become inactive but you will still be able to see your past allocation between assets A and B. Remember that you need to activate the bar and choose an allocation between A and B at every period, otherwise you earn no interest. Here is a period 2 allocation process and the transition to period 3. **[S 6k]** Notice how I changed the display from dollars to percentages. This process continues until period 10. After period 10, the path ends. **[S 7a]** Here is a screenshot of one path end. Your final amount will be shown in the box on the left and by the height of a green bar on the right. A message will appear informing you that the path ended. You need to click the “OK” button to continue. A new path will start shortly thereafter.

Assets A and B: Let me show you what to expect from the investment in each asset. **[S 8a]** In the upper **left** corner of your screen there is a box that reads “Asset A: mean return 6%, standard deviation 55%”; “Asset B mean return 3%.”. These numbers show how your investment in each asset grows and they will not change during the entire experiment.

Asset B: The 3% next to Asset B in the box means that, once the period ends, the amount allocated to Asset B will grow by \_3\_% **for sure**. The interest rate of \_3%\_ will not change throughout the duration of the experiment. **[S 8b]** A reminder: money in Asset B is represented by the **bottom, GRAY** portion of your active bar. **[S 9a]** Here is an example: if you have 2 dollars invested in B you will have 2 dollars and 6 cents in the next period. If you keep that money in B you will then have 2 dollars and 12.2 cents the period after. You can think of your money in Asset B being multiplied by 1.03. Note that 2 dollars is just an example. In the experiment you can choose any allocation you want provided it does not exceed your total amount.

Asset A: Contrary to asset B, your return on asset A is **uncertain**. **[S 10a]** Technically, the return on asset A has a Normal distribution with mean 6% and standard deviation 55%, as shown in the upper left box. This means that asset A grows by 6% on average. However, it may be more or it may be less. In particular, the growth rate could be negative. In this case the money you invested in Asset A will shrink. Although the return can be negative, the amount of money you hold on asset A can never go below zero. **[S 10b]** A reminder: money in Asset A is represented by the **top, LIGHT BLUE** portion of your active bar.

Another way to think about the return on this asset is that the amount you put in asset A will be multiplied by some positive number. On average, this number will be 1.06 which corresponds to a 6% growth. Let us call this number a multiplier. **[S 11a]** If the multiplier is less than 1, it means that your investment in Asset A shrinks. For example, if you allocate $2 to asset A and the multiplier turns out to be 0.8, you will have $1.6 in the next period. If the multiplier turns out to be 1.5, you will have $3 the next period. **[S 12a]** Here is a chart showing the probability of your multiplier being in a given range. With 20% chance it will be somewhere between 0 and 0.67. With 30% chance it will be somewhere between 0.67 and 1.06. With another 30% chance it will be somewhere between 1.06 and 1.7. Finally, with 20% chance it will be above 1.7

**[S 13a]** Once the period ends and you receive the returns on your assets, the box on the left marked “Last Period Multiplier” will show what turned out to be the multiplier for asset A in that period. The box will show always 1.03 as the multiplier for asset B.

Projection Bar: The returns from asset A obtained after several periods depend on many factors. **[S 13b]** In order to help you get an idea of the range of outcomes, we placed a **projection bar** at the end of the screen.

Let me explain how the projection bar works. Suppose for example that in the first period you invest $2 in Asset A. If you keep the returns on that same asset, how much money will you have at the end of the 10th period? **[S 14a]** Observe what happens on the left hand side of the graph. It is a simulation of your return. The vertical axis represents dollars and the horizontal axis the periods. It begins with 2 dollars in the first period and it ends after 10 periods. **[S 14b-Play]** Here is one potential final amount of money. But it can also be this. Or this. Or this. **[S 14c]** Notice that each time a path ends, we keep track where it lands by adding a dot on the right graph. Each dot represents a possible final amount of money. **[S 14d]** If we run enough paths, all with $2 invested in asset A, we will get a bunch of dots on the right end. The more dots each dollar region has, the more likely your amount of money will end up there. **[S 14e]** And that's exactly what the bar represents: the likelihood of your earnings ending up in a certain amount.

**[S 15a]** Now look at the example in the picture. It is period 4. Look at the projection bar. For the current investment strategy, **[S 15b]** the lower gray part is the projection of how much you will earn on asset B if you don’t change the allocation between assets until the end of the path. In this case, you will earn 1.89 dollars on asset B. This amount is for sure since there is no uncertainty on this asset. **[S 15c]** The upper part shows the projected earnings on asset A if you don’t change the allocation between assets until the end of the path. They correspond to the dots shown in the video. There is a 20% chance that the final amount lands in the white area above the gray one, a 60% chance that it lands in the dark blue area and another 20% chance that it lands above the dark blue area. **[S 15d]** Finally, there is a thick line showing the median, in this example, 16 dollars and 64 cents. This means that with a 50% chance your final amount will be somewhere below that number and with a 50% chance it will be somewhere above that number.

Notice also from our demonstration that probabilities are different within a segment. For example, receiving an amount above the dark blue area has a 20% chance, but within this 20% it is more likely to be close to the dark blue area than further away. In other words, it is more likely to get this payoff **[S 15e]** than this payoff **[S 15f]**, although both are possible. **[S 16a]** You can see this point more clearly on the frequency table. Based on the number of circles, it is more likely that your payoff will end up here **[S 16b]** rather than **[S 16c]** here, even though both of these areas correspond to the 20% region above the projection bar.

**[S17 a]**

Important Points:

1. **[S17 b]** The projection bar shows the likelihood of different final earnings at the end of the path **ASSUMING** the amount you receive from each asset is reinvested in the same asset in all the following periods. However, you can change the allocation between assets at every period.
2. **[S17 c]** At each period, the projection bar recalculates the probabilities. If you move the cursor up and down within a period, the bar shows instantly the new projection.
3. **[S 17d]** The multipliers on asset A are **independent** across periods. In other words, the multipliers of previous periods will in no way impact the multiplier in the current period. For example, if the multiplier in a previous period was very high, it does not mean it will be high again. The new multiplier will simply follow the rules of uncertainty described before.
4. **[S 17e]** All the participants start and end the paths at the same time. The clock starts as soon as the screen appears, so pay attention.
5. **[S 17f]** The multiplier for asset A in each period is the same for all participants. So, for example if the computer chooses 2 as a multiplier in period 4, it means that all participants will have their investment in asset A doubled.

Are there any questions?

If not, let us proceed to 5 practice paths. What you earn on these paths will **not** count towards your payment; these are meant only for you to familiarize yourself with the entire process of allocating money between assets A and B. Feel free to explore as many investment strategies as possible to better understand the different options.

[AUTHENTICATE clients]

Please double click on the icon on your desktop that says \_\_ABC STUDY\_. When the computer prompts you for your name, type a 4 digit number that you can easily remember. Please do not forget the number you typed. Then click SUBMIT and wait for further instructions.

[Pause to for everyone to submit]

Pay attention to the screen. The first practice path will be starting soon. Focus on understanding how to choose the display between percentage and dollars, how to activate the bar, and how to change the allocation between assets. Reminder: Once a path ends, you need to click the OK button in order to proceed to the next path.

[START game]

[Complete practice path 1]

You have now completed practice path 1. Are there any questions? Let’s proceed to practice paths 2 and 3. Now try to explore different investment strategies to get a good understanding of the investment process.

[Complete practice paths 2,3]

You have now completed 3 practice paths. Are there any questions?

If not, we will proceed to a short quiz. Please pay close attention to answering the questions, as you will not be permitted to continue with the experiment if you do not answer the questions correctly. Raise your hand if you have any question during the quiz.

[Complete quiz]

You have now completed the quiz. Let us proceed to the last 2 practice paths.

[Complete practice path 4 and 5]

You have now completed practice paths 4 and 5. Are there any questions?

Before we start please write down your ID on your record sheet in front of you. You will locate your ID on the left side of your window bar. You will have to present the record sheet to get paid at the end of the experiment. Did everyone right their IDs down?

[Pause to make sure everyone wrote their IDs down]

Let me remind you how you will be paid for Part 1. At the end of the experiment, the computer will randomly select one of the 15 paths and you'll be paid the final amount you earned in that path.

Are there any questions? If there are any problems or questions from this point on, raise your hand and an experimenter will come and assist you.

We are ready to start the experiment. Please pull out your dividers.

[After path 20 (match 19 on the server screen), DO NOT click “Next Match”, turn to instructions]

**PART 2**

You have now completed Part 1 of the experiment. Please push in the dividers.

[Pause and make sure they pushed in their dividers]

You will now undertake 10 paths in Part 2 and another 10 paths in Part 3 of the experiment. At the end of Part 3, the computer will randomly select one of these 20 paths and you'll be paid the final amount in that path. This amount will be added to your show-up fee and to the final amount in the randomly selected path from part 1.

**[S 18a]** The rules in part 2 are similar to the rules in part 1. You start each path with $3, there are 10 periods in each path, and you allocate your money between the same assets A and B as before. There are however two differences. First and as already mentioned, there will be 10 paths rather than 15. Second, besides investing in assets A and B, you can now use part of your money to invest in a third asset, **asset C**, located on the lower left side of the screen **[S 18b]**. You can buy at most one unit of asset C in each period. You can make this investment by clicking the “buy” button **[S 18c]**. Asset C costs $1. So, if you decide to invest in it, \_$1\_ will be deducted automatically from your current amount of money, and the bar will shrink accordingly. In case you had already made your allocation between A and B prior to purchasing the asset, the money will be taken out of your two investments proportionally. For example, if you had 60% in Asset A and 40% in Asset B, 60 cents will be deducted from Asset A and 40 cents will be deducted from Asset B. Once the asset is purchased the button is disabled. The button is also disabled if you do not have enough funds to buy the asset, that is, if the amount of money you currently have is less than $1 .

If you purchase asset C, you will have a \_4\_% chance of receiving $\_20\_ and a 96% chance of not receiving anything. This information together with the cost of the asset is displayed above the “buy” button and will remain constant for the rest of the experiment. At the end of the period, you will find out if you received the $20. **[S 18d]** The result will be displayed under the label “previous result”. If you receive the $\_20\_, that amount is automatically added to your next period’s amount of money. You can then re-invest that money between assets A, B and C under the same set of rules.

Important point. Suppose several participants purchase asset C in the same period. Then, whether one participant receives $20 or not is independent of whether the other participants receives the $20. In other words, knowing the outcome of your asset C does not tell you anything about the outcome of asset C for the other participants. It does not tell you either about the likelihood of receiving $20 in a future period: this chance is always 4% independently of past realizations.

Are there any questions? If not, please pull out the dividers and let us proceed to 1 practice path. What you earn on this path will **not** count towards your payment. Please use this practice path to familiarize yourself with the new asset, asset C.

We have now completed the practice path. Are there any questions? If not, let us proceed to 10 paths in Part 2.

[Start next path]

[After path 31 (match 30 on the server screen), DO NOT click “Next Match”, turn to instructions]

**PART 3**

You have now completed part 2 of the experiment. Please push in the dividers.

[Pause and make sure they pushed in their dividers]

**[S 19b]** This is the last part of the experiment. It consists of \_10\_ paths. It has the same rules as Part 2, with one addition. In Part 3, you can learn about the performance of other participants in the experiment. **[S 19b]** More precisely, in the **lower left** corner of the screen, there are 3 boxes labeled, “Lowest”, “Average”, “Highest”. They hold the information as to how much is the lowest, the average, and the highest current amount of money among the \_\_\_ participants in this session. The boxes, however, do not reveal the identity of the participants with those amounts. If you wish, you can open one of these boxes by clicking on it. You will be able to open one of the boxes only in periods 5 and 9. In those periods, you can open always the same box or you can open different boxes each time. You can open at most one box but you can also decide not to open any box. Opening boxes is for information only. They do not affect the returns on your assets in any way or the returns on the assets of any other participant. **[S 19c]** When available, the boxes will appear in the lower left corner of the screen just as shown here.

Remember that you can only open a box in periods 5 and 9. In periods 1, 2, 3, 4, 6, 7, 8 and 10 the boxes will not appear on the screen.

Are there any questions? If not, pull out the dividers and let us proceed to 10 paths in Part 3.

[Start the next path]

The experiment is now over. Your payoff is displayed on the screen. Please write down the payoff from both Part 1, displayed as subset1, and Parts 2&3, displayed as subset 2, onto your record sheet. Write down the total by adding the $5 show-up fee to the sum. We will round up to the nearest quarter.

[Pause and see if they have written the payoff]

Lastly, please fill out the questionnaire you see on the screen. Reminder: You remain anonymous to the experimenter. Please submit your answers once you are finished. Once you submit your answers, please put the mouse on the side of the computer and do not use either the mouse or the keyboard.

[Write Output]

We will pay each of you in private in the next room in the order of your Subject ID number. Remember you are under no obligation to reveal your earnings to the other participants.

Please remain seated and keep the dividers pulled out until we call you to be paid. Do not converse with the other participants or use your cell phone. When we call your ID number please take all of your belongings with you and exit the lab. Also, please return the quiz display to me on your way to the other room. Thank you for your cooperation.

[CALL all the participants in sequence by their ID #]

[Note to experimenter: use the “pay” file to call and pay subjects and remember to **call them by ID +1**, that is, ID 0 in the pay file corresponds to subject ID 1]

Could the person with ID number 1 go to the next room to be paid?

**Quiz**

1. Look at the display on the paper in front of you. What is the current period?
2. 1
3. 2
4. 6
5. 8
6. Had the person not chosen any allocation between assets A and B, how much would she have in the next period?
   1. $1.44
   2. $4.16
   3. $5.60
   4. $7.29

3. In this period, how much has the person invested in Asset A?

1. $5.60
2. $4.16
3. $1.44
4. $0.81

4. Assume this person keeps reinvesting the returns of asset A in A and the returns of asset B in B until the end of the path. Given the current allocation, how much money will this person have in asset **B** after the path ends?

* 1. $1.67
  2. $1.44
  3. $1.03
  4. $7.29

5. Assume this person keeps reinvesting the returns of asset A on A and the returns of asset B on B until the end of the path. Given the current allocation, how much money will this person have in asset **A** after the path ends?

* 1. $7.29
  2. $5.60
  3. $18.00
  4. Cannot be determined with certainty

6. Forget about the display. Imagine you invest $1 in Asset A and $1 in Asset B and suppose the multiplier on Assets A and B are 2.00 and 1.03 respectively. How much money will you have in the next period?

* 1. $3.03
  2. $4.00
  3. $5.03
  4. Cannot be determined from the information given.

**Questionnaire**

1. What is your gender?

a. Male

b. Female

2. You would best describe yourself as:

a. Caucasian

b. African-American

c. Asian

d. Hispanic

e. Native American

f. Other

3. What U.S. state do you come from (or country if you are an international student)?

Write in text

4. What is your home ZIP code?

Write in number

5. What is your Major?

Write in text

6. What is your GPA?

Write in number

7. Have you ever studied finance or financial economics?

a. No

b. Some but no college coursework

c. Yes, 1 course

d. Yes, 2 or more courses

8. Are you on Financial Aid?

a. No

b. Partial Aid

c. Full Aid

9. Do you have a part time job?

a. No

b. Yes, I have 1 job

c. Yes, I have 2 jobs

10. You would best describe your parents’ annual income to be:

a. Below $50,000

b. Between $50,000 and $100,000

c. Between $100,000 and $150,000

d. Between $150,000 and $200,000

e. Between $200,000 and $250,000

f. Between $250,00 and $500,000

g. Above $500,000

h. Prefer not to answer

11. Please briefly describe your experience with the experiment today. How did you go about making your investment decisions? Were there any parts in the experiment that you may have not understood well?

**RECORD SHEET**

**Subject ID: \_\_\_\_\_\_\_\_\_\_\_**

Show-up fee: $\_\_\_\_\_\_

Subset 1 Earnings (Part 1): $\_\_\_\_\_\_

Subset 2 Earnings (Parts 2&3): $\_\_\_\_\_\_

TOTAL EARNINGS: $\_\_\_\_\_\_

(Earnings will be rounded up to the nearest quarter)

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Amount received:\_\_\_\_\_\_\_\_\_\_\_\_\_\_

School ID #:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_