Instructions

You are about to participate in an experiment in the economics of decision-making. If you follow these instructions carefully and make good decisions, you can earn a CONSIDERABLE AMOUNT OF MONEY, which will be PAID TO YOU IN CASH at the end of the experiment.

Your computer screen will display useful information. Remember that the information on your computer screen is PRIVATE. To ensure the best results for yourself, and accurate data for the experimenters, please DO NOT COMMUNICATE with the other participants at any point during the experiment. If you have any questions, or need assistance of any kind, raise your hand and the experimenter will come to you.

In the experiment you will make decisions over several periods. At the end of the last period, you will be paid the sum of your earnings over all periods, in cash.

The Basic Idea.

Each period will be divided into some randomly determined number of rounds. At the beginning of each period (in the first round) you will be given 40 **Francs** and will decide what percentage to:

- **Withdraw** each round (your cash earnings for the period are entirely determined by the Francs you withdraw)
- **Invest** in the blue and green stocks each round (the number of Francs you have in future rounds depends on how you invest now)

Your **earnings** are determined entirely by the Francs you withdraw in each round, but you can only make withdrawals in **future rounds** by investing some of your Francs now. If you chose to withdraw all of your Francs, you would only have Francs to withdraw from in the first round. However if you chose to withdraw none of your Francs, you would earn no money for the period. Regardless, when the period ends, any Francs remaining in your account will simply disappear.

Every round one of the two stocks (**blue** or **green**) will be valuable (we will call it the **"winning stock"**) and the other will be worthless. Any Francs invested in the winning stock will be more than doubled (**multiplied by 2.1**) to determine the number of Francs you start the **next round** with. Any money invested in the losing stock will simply disappear. Thus the more Francs you invest in the winning stock this round, the more Francs you have to withdraw from and invest with in the next round and so on.

Decision Bar.

Figure 1 shows your computer display. In the middle is the **decision bar** which shows the percentage of your beginning Francs you choose to withdraw (visualized in red), invest in green (visualized in green) or invest in blue (visulaized in blue) each round. The

- greater the fraction of the decision bar you fill with **red**, the greater the fraction of your Francs you will withdraw each round of the period,
- the greater the fraction filled with **blue** the greater the fraction you will invest in the blue stock each round, and
- the greater the fraction filled with **green** the greater the fraction you will invest in the green stock each round.

You can control the composition of the decision bar using the input boxes below it. The left hand box controls your withdrawal amount; The right hand box controls how you invest the remaining (un-withdrawn) Francs across the two stocks. Next to the decision bar are exact percentages showing the total fraction you

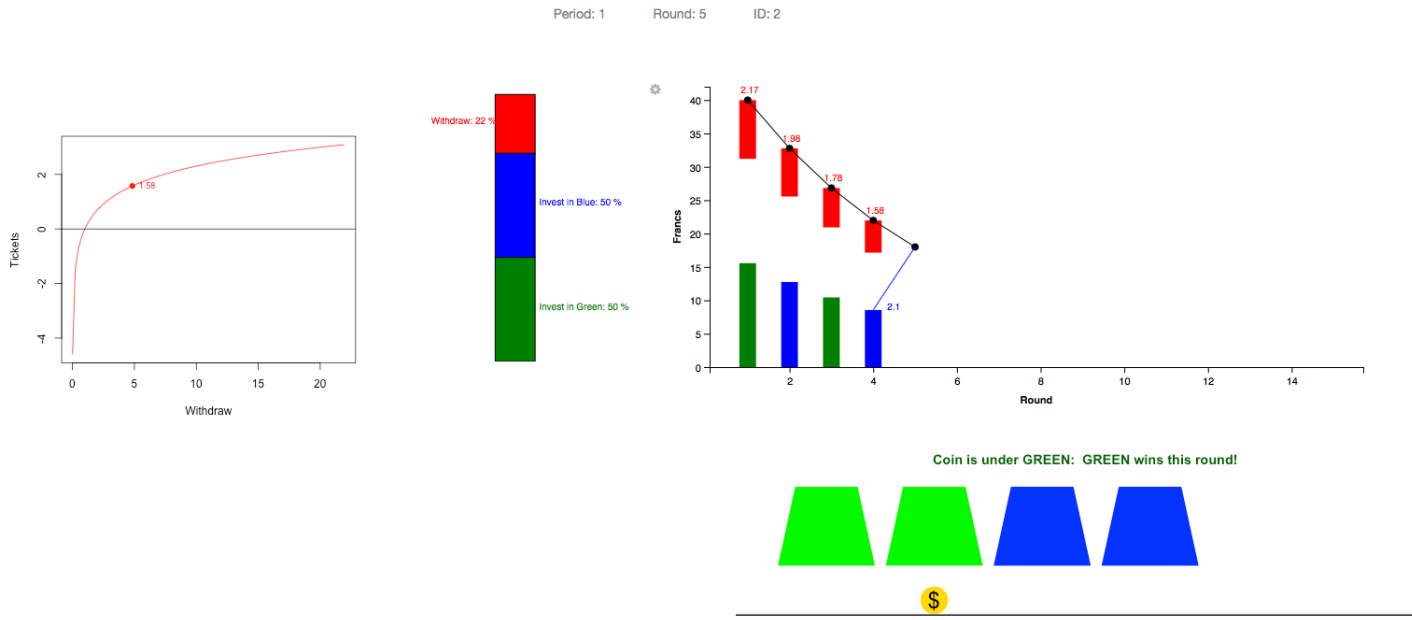

Figure 1: Computer display.

will withdraw each round and the fraction of the remaining Francs (e.g. those not withdrawn) you will invest in green vs. blue. After making your decision, you can finalize it by clicking the **submit button**.

Given the way the experiment is set up, you can expect to **maximize your earnings** by distributing the Francs you choose not to withdraw, according to the true probability that each stock is the winner. So, for example, if the blue stock is the winner 50% of the time, you can expect (on average) to maximize your earnings by investing 50% of the Francs you don't withdraw in the blue stock and 50% in the green stock. If the blue stock is instead the winner 75% of the time, you can expect (on average) to maximize earnings by investing 75% in blue and 25% in green, etc.

Buying Tickets

When you make a withdrawal in a round, it will be used automatically by the computer to buy **lottery tickets**.

The Francs you withdraw will automatically purchase tickets according to the **curved function** shown in Figure 2. A graph to the left of the slider on your screen also shows you, as you adjust the slider, how many tickets various levels of withdrawals will buy you given your starting Francs. This figure will rescale every round given the number of Francs you started the round with.

Because of the curved function, doubling the amount you withdraw will not double the number of tickets you earn. Instead, the number of tickets you earn increases by a fixed amount each time your wealth doubles. Specifically, doubling your withdrawal will always increase your tickets by 0.7. For example, consider the points highlighted in Figure 2. If you withdraw 1 franc, you earn 0 tickets, if you withdraw 2 Francs, you earn about 0.7 tickets, if you withdraw 4 Francs, you earn about 1.4 tickets, and so on.

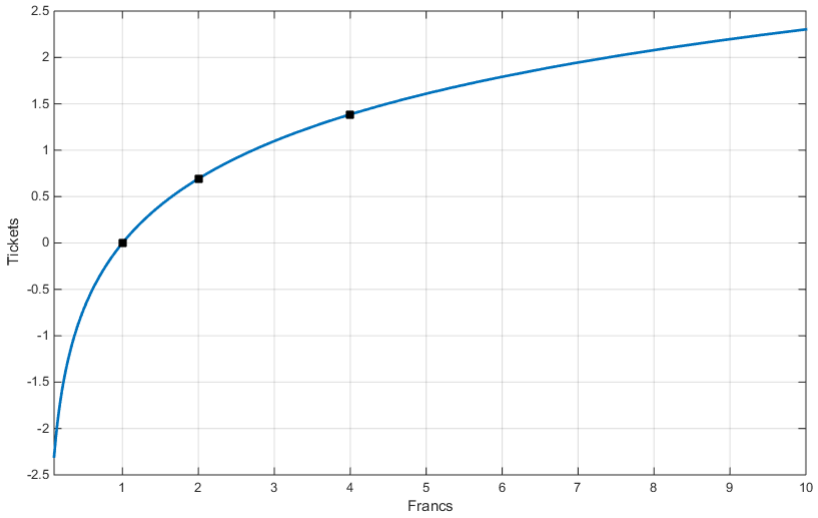

Figure 2: Ticket Conversion Chart.

Francs Graph

After everyone has made their withdrawal and investment decisions and clicked the **submit button**, the period will begin and the rounds will advance automatically. The **Francs Graph** (on the right side of the screen) shows what happens in each round. It plots (from left to right) a horizontal black line for each round of the Period so far: the higher the line is, the more Franks you started the round with. Below each line is a miniature version of the decision bar showing you how these Francs were allocated, given the choices you made at the beginning of the period. Specifically this bar will show you (1) the amount you withdrew (just under the horizontal line, in red) and (2) the amount you invested in the **winning stock** (at the bottom in whatever color stock won) each round. Between is a blank space representing the amount of money you invested in the losing stock, to remind you that any Francs invested in the losing stock disappear!

The Francs Graph will also visualize for you how your winning investment translates to next round's Francs. At the end of each round you will see an arrow pointing from the amount you invested in the winning stock pointing to the round's beginning Francs and a caption ""2.1x." This is to remind you that your beginning Francs **next round** is equal simply to 2.1 times the Francs you invested in the winning stock **this round**.

Finally, the Francs graph will show, in red, the number of tickets your withdrawals bought you each round as a number floating above the round's initial wealth level.

Winners and Losers

Every round the computer will determine which stock – the green or the blue – is the winner for the round. In the first part of the experiment, the computer will determine this randomly in the following way.

The lower right hand side of the screen will show you four **overturned cups** each round. Some of the cups will be green and some will be blue. Each round, the computer will randomly determine one of the cups to put a **coin under** (each cup has an equal likelihood of hiding the coin each round). At the end of the round the computer will lift the cups. Whichever color cup the coin is under will be the **color of the winning stock** – if the coin is under a green cup, the green stock will be the winner while if it is under a blue cup the blue stock will be the winner. Thus, if half of the cups are blue and half green, there is a 50% chance each of the blue and green stock being the winner. If three of the cups are green there is a 75%

chance of the green stock being the winner and a 25% of the blue stock of the winner. If three of the cups are instead blue there is a 75% chance of blue winning and 25% of green, and so on.

Later on we will pause the experiment, give you new instructions and change the way the winner is determined.

Periods and Rounds

The experiment will be divided up into a number of periods. Each period will be divided up into a number of rounds. At the beginning of each period (in round 1) you will be given 40 Francs to divide among withdrawals and investment in stocks. You will then play a number of rounds that will be **randomly** determined by the computer. Specifically each round there is a **10% chance** that the computer will determine that it is the **last round** of the period. Because each round is the last round with probability 10%, periods will last an average of 10 rounds. But, periods can be much shorter or much longer.

When a period ends, any Francs you have accumulated, but have **not withdrawn** to buy tickets, disappear and **become worthless**. Your earnings for the period will be determined by the total number of tickets you have purchased in the period. You will then start a new period with 40 Francs, and it will last a new randomly determined number of rounds.

Your Earnings

Your earnings each period will be determined by the lottery tickets you purchase with your withdrawals. Each lottery ticket gives you a 1 in 72 chance of winning **$6.00** for the period. So, if you earn 10 lottery tickets in a period, you can expect to make $6 \times \frac{10}{72} = \$0.83$ for that period, on average. If you earn 50 tickets instead, you expect to earn $6 \times \frac{50}{72} = \$4.12$ on average. Note that partial lottery tickets count and that if the total number of tickets you earn is negative, you will earn zero.

Lotteries for each period will be conducted at the end of the experiment by the computer, once all periods are complete. In addition to your lottery earnings, you will be paid the $5.00 show-up fee.

Reducing Randomness in Tickets

In the actual experiment, we will make a slight change to the payments from what is described above. Every round, the computer will randomly determine the period length and the winning stocks and show it to you – and how it impacts your earnings – on your screen to give you a sense of how the game works and how your decisions translated to earnings. However, in the background, the computer will randomly determine the length of the period thousands of more times for each period you play, calculating your tickets based on your withdrawals and decisions for that period each time. Your lottery tickets will be based on the **average lottery tickets** purchased over these thousands of these period length determinations. We do this simply to tie your earnings more closely to your decisions (and less to random chance).

Thank you for your participation!