Contrast Effects in Investment and Financing Decisions [*] [†]

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Abstract

This study develops an experimental design to examine whether prior market information inducing an incidental positive or negative emotion (contrast effect) distorts the risk attitudes of individuals. We find that individuals exposed to a positive emotional stimulus amplify risk-seeking in the gain domain, that is framed in terms of investment decisions, as opposed to individuals exposed to a negative emotional stimulus. The deviating risk preferences support an interpretation that prospect theory's subjective values of decision outcomes and decision weights in the gain domain are functions of emotions. However, individuals exposed to different contrast effects behave similarly in the loss domain, that is framed in terms of financing decisions, regardless of different emotional stimuli. We find that, on average, individuals spend 16% more time making financing decisions than investment decisions. The results provide robust evidence that contrast effects can lead to mistakes in investment decisions and suggest that financing decisions may require more mental effort than investment decisions. The extra time appears to erase contrast effects.

Keywords: Risk attitude, emotion, corporate finance, behavioral finance, investment.

JEL Classification: D81, D91, G11, G30, G41.

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The effect of the behavior of individuals on financial markets is a rising concern in financial economics. In real-world situations, investors and managers are seldom substituted by programmed rational agents as assumed in the traditional models. For example, the stock-market movements during the COVID-19 pandemic seem to challenge the traditional models. Shiller (2020) argues that the stock market crashes and frenzies during this pandemic are driven mainly by the behavior of individuals, not economic fundamentals.[1] More often than not, the behavior of individuals is critical to addressing empirical puzzles in financial economics.

Building on experimental literature on individual decision-making under uncertainty,[2] this paper attempts to fill gaps in the literature of behavioral finance by addressing how prior market information inducing an incidental positive or negative emotion, "contrast effects," may impact investment and financing decisions; and further, how these results may account for stock market crashes, frenzies, and security issuance decisions.

The effect of integral emotion (caused by the choice itself) or incidental emotion (caused by unrelated sources) on decision making under uncertainty has been extensively studied. On the other hand, little is known of contrast effects in a financial context. Hartzmark and Shue (2018) attempt to provide evidence of how contrast effects distort prices in financial markets. Hartzmark and Shue (2018) find that investors may think that earnings today look less impressive if yesterday's economic news was good and more impressive if yesterday's economic news was bad. Inspired by the work of Hartzmark and Shue (2018), the experiment introduced in this paper uses prior market information inducing emotion as a treatment.

[1] Shiller (2020) also addresses that stock market crashes and frenzies during the COVID-19 pandemic are possibly explained by "crowd psychology, the virality of ideas, and the dynamics of narrative epidemics," not the COVID-19 news itself.

[2] Many studies (e.g., Abdellaoui ea al., 2011; Fox and Tversky, 1995) find similar attitudes towards risk and uncertainty. Thus, we interchangeably use the terms "risk" and "uncertainty" while their definitions are different. Risk refers to the situation when the probabilities of potential outcomes are known; uncertainty refers to the situation when the probabilities of potential outcomes are unknown.

This study exploits Kahneman and Tversky's fourfold pattern of risk attitudes, summarized in their work on cumulative prospect theory (Tversky and Kahneman, 1992). The four-fold pattern of risk attitudes predicts that subjects will exhibit risk seeking for gains of low probabilities, risk aversion for gains of high probabilities, risk aversion for losses of low probabilities, and risk seeking for losses of high probabilities.

In addition, cumulative prospect theory posits that individuals overweight low-probability events and underweight high-probability events (Tversky and Kahneman, 1992). For instance, Kahneman (2011) shows that individuals perceive an increase from 0% to 5% as more impressive than an increase from 5% to 10%. Although both intervals are quantitatively equal, the change from 0% to 5% is also a qualitative change, which is more impressive because it provides a possibility where none existed before. This possibility effect can explain why people put more weight on low-probability outcomes and buy lottery tickets. Another assumption for cumulative prospect theory is that individuals are risk-seeking for losses and risk-averse for gains. These assumptions lead to the fourfold pattern of risk attitudes, described above.

Using an experimental design, Harbaugh et al. (2009) test whether individuals behave according to the fourfold pattern of risk attitudes. Our experimental design is based on Harbaugh et al. (2009). However, ours is different from Harbaugh, et al. (2009) in three ways: (i) our experiment takes place in a financial context by asking participants to choose between a stock and a bond; (ii) individuals make investment and financing decisions; and (iii) participants are exposed to prior market information inducing emotions.

We introduce two different types of prior market information stimuli as shocks to affect emotions.[3] First, we identify pictures and articles that stimulate negative emotions using the

[3] It is standard to use an affect check for testing whether economic experiments induce emotion. We use the experimental materials that have been tested for the affect check in previous studies (Ifcher et al., 2021).

Great Depression. Appendix IA shows the examples of the pictures and articles used. The Great Depression induces the most negative emotions among other recessions (Shiller, 2020). It's unlikely that participants suffered directly from the Great Depression according to their demographic characteristics. Thus, this negative emotional stimulus should be detached from their decision making and apart from portfolio bias.

Second, to stimulate positive emotions, we use pictures and articles from the roaring twenties. The roaring twenties preceded the Great Depression, so it's unlikely that participants benefitted according to their demographic characteristics. Thus, this positive emotional stimulus also should be detached from their decision making and safe from portfolio bias. Appendix IA includes the examples of the pictures and articles used.

We use two different types of information channels, pictures and articles. Pictures convey qualitative information inducing emotions, and articles convey quantitative information inducing emotions. These information channels are irrelevant to individuals' decision making directly, but they affect individuals' emotions.

Our findings show that individuals exposed to a positive prior stimulus amplify risk-seeking in investment decisions. To be exact, individuals exposed to a positive emotional stimulus in the experiment are more likely to invest in equity than individuals exposed to a negative emotional stimulus in the experiment. These results provide evidence that contrast effects can distort the investment behavior of individuals, which may lead to inefficient stock markets.

However, when we ask subjects to borrow money to finance investment projects, we do not find evidence that contrast effects influence financing decisions. We do find that participants spend significantly more time making financing decisions than investment decisions. We hypothesize that financing decisions are more complicated and involve the possibility of

financial loss. The fact that subjects take significantly more time making financing decisions may be sufficient to move them from what Kahneman calls "fast thinking" to what he calls "slow thinking" (Kahneman, 2011). Kahneman (2011) calls slow thinking deliberative and more likely to result in decisions economists might predict. The fact that our subjects behave as predicted by economic theory when making financing decisions fits Kahneman's (2011) definition of "slow thinking."

We run our experiments using Amazon's Mechanical Turk (M-Turk) US participants. There is increasing evidence that these participants behave statistically similarly to students in lab environments or on the internet (Hoffman et al., 2020; Lian et al., 2018). Figure 1 shows the geographic location of M-Turk participants in our experiments. As we would expect, it seems that counties with high populations are likely to have more participants.

This paper is closely related to psychology studies on components that help agents to form expectations.[4] Contrast effects is one of them. Simonson and Tversky (1992) introduce two types of contrast effects. First, the local contrast effect refers to the effect of the offered set of alternatives. For example, the addition of an element, z, in a set {x, y}, changes the attractiveness of y in contrast to x. Suppose y is preferred to z, but x is not clearly preferred to z. Then, adding z to the offered set increases the attractiveness of y in contrast to x. Second, the background contrast effect illustrates how past experience influences the attractiveness of y in comparison to x. This effect is caused by an experience which is no longer relevant to current decisions. To test contrast effects on decision making, Simonsohn and Loewenstein (2006) conduct a field experiment based on the work of Simonson and Tversky (1992). In their field experiment,

[4] Individuals anchor on prior values when they make decisions (Kahneman and Tversky, 1974). For instance, Kahneman and Tversky (1974) use a lab experiment to show an initial random number can influence estimating the percentage of African countries in the United Nations. Such anchoring studies are related to contrast effects.

movers from expensive cities rent higher priced apartments than movers from cheaper cities. Although previously observed prices are not relevant, movers from expensive cities feel that the current prices are cheaper, taking account of wealth and taste.

In this paper, we use prior market information inducing an incidental positive or negative emotion, that is unrelated to current decisions, to test whether the contrast effect distorts the risk attitudes of individuals. The literature of emotion effects on risk attitudes is mainly divided into two areas. Emotion can influence the subjective value of a potential outcome and affect risk decision making (Arkes et al., 1988; Isen et al., 1988; Hsee and Rottenstreich, 2004; Han et al., 2012; Campos-Vazquez and Cuilty 2014; Adam et al., 2019). On the other hand, emotion also can influence the subjective probability function and affect risk decision making (Johnson and Tversky, 1983; Wright and Bower, 1992; Keller et al., 2002; Lerner et al., 2003; Jordan et al., 2012; Koppel et al., 2017). This paper ultimately shows that changes in the emotions of individuals influence decision-making in a financial context via affecting both the value function and the weighting function.

Following the lead of the psychology literature, several empirical puzzles in financial economics can be addressed using their experimental techniques. First, some studies offer evidence that an increase in a firm's stock price leads the firm to issue more equity (Stein, 1996). Rational managers believe the firms are overvalued at peak values; therefore, they try to take advantage of the high valuation by issuing more equity than bonds. According to the efficient market hypothesis, stock returns cannot be predicted. However, the correlation between issuing equity and stock returns is consistently negative and predictable empirically (Baker and Wurgler, 2000). Our experimental findings shed light on the contrast effects, which also can have predictive power for stock prices and returns.

Second, stock market prices can be overvalued, which can result in selling at the margin and crashing the stock market. Previous studies focus on the heterogeneity of agents and provide robust evidence that inexperienced traders are the cause of the distortion in prices because they tend to follow prospect theory rather than neoclassical theory (John List, 2004). In particular, they tend to buy when stock prices are rising and sell when they start to fall. We contribute to this line of research by providing evidence that contrast effects can lead to mistakes in investment decisions (e.g., an investment decision that is distorted by information that should be irrelevant).

The remainder of the paper is organized as follows. Section I provides the models related to this study. Section II describes the experimental design. Section III shows the main empirical results and investigates potential mechanisms. Section IV concludes.

I. Model

A. Theoretical Background

In equation (1), Kahneman and Tversky (1992) provide a way to assign the value of a gamble V using cumulative prospect theory. The subjective value of a potential outcome is denoted as $v(x_i)$ in equations (1) and (2). x_i is an outcome, which happens with p_i probability. P_i represents the probability that an outcome takes a value greater than or equal to x_i, and P_i^* represents the probability that an outcome takes a value greater than x_i. The subjective probability function is denoted as π_i in equation (3).

$$V = \sum v(x_i)\pi_i(p_i) \tag{1}$$

, where

$$v(x_i) = \begin{cases} x_i^a \ if \ x_i \geq 0 \\ -\lambda(-x_i)^\alpha \ if \ x_i \leq 0 \end{cases} \tag{2}$$

$$\pi_i = w(P_i) - w(P_i^*) \tag{3}$$

$$w(P_i) = P_i^{\gamma} / [P_i^{\gamma} + (1 - P_i)^{\gamma}]^{(1/\gamma)} \quad (4)$$

The parameters α and γ shape the value function and the curvature of the weighting function, respectively. The slope of the value function in loss domain is also determined by the parameter γ. Previous experimental results provide the estimates of α, γ, and λ as 0.88, 0.65, and 2.25, respectively (Tversky and Kahneman, 1992). According to these experimental estimates, the relative sensitivity of losses is greater than that of gains. Also, the weighting function is an inverse-S-shaped curve, which shows that individuals overweight a small probability and underweight a large probability. These empirical studies show that the absolute difference between the weight and the probability is largest when the probability is 0.1 and 0.8. The difference is smallest when the probability is 0.4. Using the empirical estimates, Harbaugh et al. (2009) propose an experiment to test the fourfold pattern of risk attitudes.

B. Risk Attitudes and Contrast Effects

This paper relies heavily on the experimental design developed by Harbaugh et al. (2009). In their experiment, participants make six choices between a lottery and the expected value of the lottery as shown in Table 1. According to the fourfold pattern of risk attitudes, participants should be risk-seeking by choosing lotteries over expected values for prospects 1 and 6. On the other hand, participants should be risk-averse by choosing expected values over lotteries for prospects 3 and 4.

This study applies an incidental positive or negative emotion (contrast effect) to the experimental design developed by Harbaugh et al. (2009) to find whether contrast effects distort individuals' risk attitudes. The effect of contrast effects has not been included in prospect theory. However, numerous experimental and empirical studies show emotions' effects on individual decision-making under uncertainty (Arkes et al., 1988; Isen et al., 1988; Hsee and Rottenstreich,

2004; Han et al., 2012; Campos-Vazquez and Cuilty 2014; Adam et al., 2019). Emotions can influence both prospect theory's value function and its weighting function (Johnson and Tversky, 1983; Wright and Bower, 1992; Keller et al., 2002; Lerner et al., 2003; Jordan et al., 2012; Koppel et al., 2017).

According to contrast effects, news about an economic boom from one day will lead to earnings the next day looking less impressive. This makes earnings less of an incentive, and individuals become more risk-seeking (Holt and Laury, 2002). In other words, emotion can influence the value function of prospects and individuals' risk attitudes. Emotion can also influence individuals' risk attitudes by changing the likelihood of a potential outcome in the weighing function.

Analogously, news about an economic depression from one day will make individuals more risk-averse the next. Simply put, it is anticipated that individuals exposed to a positive prior stimulus amplify risk seeking over investment and financing decisions. Those exposed to a negative prior stimulus amplify risk aversion over investment and financing decisions.

II. Experimental design

This experiment tests how choices of individuals between a stock and a bond vary with the following treatments: an exposure to a picture related to an economic boom or depression, or an exposure to an article related to an economic boom or depression. The experiment is designed to examine how each treatment affects the choices of individuals between a stock and a bond. This paper closely relies on the experiment developed by Harbaugh et al. (2009).

In our experiment, we ask subjects to make three investment decisions and three financing decisions as if they were a manager of a firm. We randomly select half of the participants to answer three investment questions first, and the other half to answer three finance questions first.

In each investment question, participants are given a choice to invest in either a bond or a stock. If they invest in the bond, future earnings are a certain return, which can be interpreted as a coupon payment in the real world. However, investing in the stock provides a risky return, which can be interpreted as a dividend payment in the real world. The risky return is either a higher return than the bond or no return at all. We use a survey dollar, ₳, to make the investing and financing decisions easier, and ₳1000 is equivalent to $1 (Hoffman et al., 2020; Lian et al., 2018). The following is an example of a part of an investment question:

- **Investing Decisions:** "Now, you are given a choice to invest in either a bond (certain return) or a stock (risky return). If you choose to invest in the bond, your future earnings will be ₳50. If you choose to invest in the stock, your future earnings will be either ₳500 with 1/10 chance or ₳0 with 9/10 chance."

In each finance question, participants are given a choice to borrow money through issuing a bond or issuing a stock. If they borrow money through issuing the bond, they pay a certain cost, which can be interpreted as a coupon payment to bond investors. Borrowing money through issuing a stock results in an uncertain cost. The uncertain cost is either a higher cost than the coupon payment to bond investors or no cost. All subjects receive the equivalent of $1 at the beginning of the experiment. Thus, subjects who answer the finance question first are not being asked to dip into their own money to answer a finance question. An example of a part of a finance question is displayed below:

- **Financing Decisions:** "Now, you are given a choice to borrow money by either issuing a bond (certain cost) or issuing a stock (uncertain cost). If you choose to borrow money by issuing the bond, your future earnings will be -₳50. If you choose to borrow money by issuing the stock, your future earnings will be either -₳500 with 1/10 chance or ₳0 with 9/10

chance."

Table 2 summarizes the six choices that a participant faces in the experiment. For example, the first row of the Table 2 shows that individuals need to choose between a stock that can provide a 10% chance of receiving a $0.5 dividend and a bond that yields a $0.05 coupon payment. Participants can earn a maximum of $1.5 depending on one of the six choices they make. Individuals earn a minimum of $0.5. The final expected amount of compensation is $1. To improve the quality of responses, we pay higher total compensation to our M-Turk participants than the compensation of the general M-Turk participants (Lian et al., 2018).

Table 3 summarizes the demographic information of M-Turk participants. Following Lian et al. (2018), we compare the proportion of participants in each demographic characteristic across economic boom and depression conditions. The two-sided *t*-test for having the same proportions supports the assumption that the mean demographic information of individuals in each group is about the same across the two economic conditions. In other words, participants are randomly assigned to groups, and demographic characteristics cannot account for the results.

III. Results

A. Baseline investment and financing decisions

Table 4 shows our main results. 129 participants are randomly exposed to either economic boom pictures and articles or economic depression pictures and articles. Then, we ask participants to make three investment decisions and three financing decisions. The first two columns in Panel A show that individuals are more likely to choose stocks for financing decisions than for investment decisions regardless of different emotional stimuli. In other words,

people are more risk-seeking in financing decisions, which is consistent with an assumption in cumulative prospect theory.[5]

Panel A also shows that there are differences among investment decisions, as a function of prior emotional stimuli. Individuals exposed to pictures and articles of an economic boom are more likely to invest in stocks than those exposed to pictures and articles of an economic depression. The results of 32 percent and 21 percent, respectively, are statistically different by the two-sided *t*-test (*p*-value: 0.05). In contrast, individuals make financing decisions similarly regardless of the prior stimulus (*p*-value: 0.88).

The last three columns of Panel A summarize Panel B, which reports the results of ordinary least squares (OLS) regressions. Controlling for gender, education, and age, we consistently find similar results that participants are more likely to choose to invest in stocks following an economic boom as opposed to individuals exposed to an economic depression. Participants appear to choose stocks about 11 percentage points more in the economic boom condition. The effects are statistically significant (*p*-value: 0.043) and economically large. Our results suggest that emotion can influence the value function of prospects in the gain domain (investment decisions). On the other hand, participants behave similarly in financing decisions regardless of the prior economic condition (*p*-value: 0.746).

B. Different probability stocks

We look further into investment and financing decisions. Table 5 shows that individuals exposed to both pictures and articles of an economic boom are more likely to choose stocks, particularly low- and mid-probability stocks, when compared to the individuals exposed to pictures and articles of an economic depression. Panel A shows that the results of 35 percent and

[5] Cumulative prospect theory (Tversky and Kahneman, 1992) assumes that individuals are risk-seeking for losses and risk-averse for gains.

6 percent are statistically significantly different by a two-sided *t*-test (*p*-value: 0.00). Also, the results of 29 percent and 13 percent are statistically significantly different (*p*-value: 0.02). On the other hand, individuals behave similarly across the economic conditions when choosing high-probability stocks (*p*-value: 0.14).

Panel B shows the results of additional tests. Taking account of covariates such as gender, education, and age, OLS regressions strengthen our results that individuals exposed to pictures and articles of an economic boom are more likely to choose mid- and low-probability stocks. The results suggest that people are more risk-seeking in investment decisions due to choosing low- and mid- probability stocks when a positive prior stimulus is applied. Our results suggest that emotion also can influence the weighting function in the gain domain (investment decisions) by increasing the elevation of the weighting function.

Similarly, Table 6 delves into financing decisions, but both Panels A and B show big *p*-values, which imply that individuals behave the same in financing decisions regardless of the economic condition they were exposed to. Possible explanations are described in the following section.

C. Cognitive load and the process of thinking

Our results, thus far, suggest that a prior stimulus can influence the behavior of individuals in investment decisions, but not in financing decisions. One possible explanation would be a difference in cognitive load between investment decisions and financing decisions. For instance, people may use different amounts of mental effort when they make different types of decisions.

Table 7 shows that participants spent 16% more time making financing decisions compared to making investment decisions. On average, subjects took 122 seconds to make investment decisions but took 142 seconds to make financing decisions. Financing decisions could require

more mental effort than investment decisions because people are possibly less familiar with financing decisions. This can lead to making financing decisions seem more difficult than investment decisions. If they are more difficult, people may think harder and take more time to make a decision. When they focus on making a decision, the prior stimulus (contrast effect) may affect their decisions less.

Another reason can be a division of cognitive processes. Kahneman (2011) argues that individuals use two systems of thought. System 1 produces reactions that require no effort, and System 2 requires more deliberative thinking. However, it is not observable which System subjects use. Using the time it took for first clicks on all questions, we can see which decisions need more reaction time; it took subjects 34 seconds and 45 seconds to make their first investment and financing decisions, respectively. It could be possible that financing decisions require more deliberative thinking by using System 2. Thus, treatments could affect the financing decisions less.

D. Using only pictures

In the previous sections, we use both pictures and articles as a prior stimulus. We expect to find a diminishing effect of a prior stimulus on investment decisions if we use only a picture as a stimulus. To test this hypothesis, 126 participants are randomly assigned to either a group exposed to economic boom pictures or a group exposed to economic depression pictures.

Table 8 shows that individuals exposed to a picture of an economic boom are more likely to choose stocks than those exposed to a picture of an economic depression. However, Panel A shows that the difference between 29 percent and 23 percent is not statistically significant (*p*-value: 0.30). Also, within financing decisions, a significant difference does not exist based on stimuli (*p*-value: 0.18). Controlling for gender, education, and age, we find the same results.

The results suggest that individuals are more likely to be affected by a combination of pictures and articles, not just pictures. To test the robustness of the results, we also compare between groups exposed to economic boom and depression articles in the next section.

E. Using only articles

We expect to find smaller effects of a prior stimulus on investment decisions if we use only articles rather than a combination of pictures and articles as the prior stimulus. To test this prediction, we randomly assign 119 participants to either a group exposed to economic boom articles or a group exposed to economic depression articles.

It appears that individuals exposed to an article about an economic boom also behave similarly to individuals exposed to an article about an economic depression. Table 9 shows that the difference between 28 percent and 31 percent is not statistically significant (*p*-value: 0.64). Likewise, within financing decisions, a significant difference does not exist across different stimuli (*p*-value: 0.99).

These findings are consistent with recent research on the stock market during the COVID-19 pandemic. Shiller (2020) makes the following comments about the pandemic stock market: "what changed investors' thinking over that interval was not just one narrative, but a constellation of related narratives." Our results provide robust evidence that individuals are more likely to be affected in investment decisions by a combination of pictures and articles, not by just one of them.

IV. Conclusion

This study shows experimental evidence that a prior stimulus can influence the behavior of individuals, and the distortion in the behavior of people may affect investment decisions. We find that individuals exposed to an economic boom condition inducing positive emotions are

more likely to invest in stocks than those exposed to an economic depression condition. In other words, individuals exposed to a positive emotional stimulus amplify risk-seeking in investment decisions.

More specifically, within investment decisions, we find that individuals exposed to both pictures and articles suggesting an economic boom are more likely to choose mid- and low-probability stocks when compared to those exposed to economic depression pictures and articles. The results suggest that contrast effects influence the risk attitudes of individuals and may lead to mistakes in investment decisions by influencing both the value function and the weighting function.

On the other hand, individuals behave the same in financing decisions regardless of the economic conditions to which they are exposed. Participants spend about 16% more time making financing decisions compared to investment decisions. It is possible that spending more time making financing decisions leads to fewer mistakes in financing decisions. This finding may explain why previous studies on the effects of emotion on loss domain contradict one another.

Findings from this paper raise some questions about financing decisions. Further studies can explain why individuals with different stimuli behave the same in financing decisions. However, it is evident that contrast effects can lead to mistakes in investment decisions. This study suggests that emotions influence individuals' decision making under uncertainty and may help solve equilibrium puzzles in financial economics.

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Figure 1. Geographic Location of Participants.
This figure shows the geographic location of the participants in our experiments. There are no participants in Alaska and Hawaii so we exclude these states from our map for the purpose of brevity. Each county on the map is colored based on its population, and each dot on the map represents a participant's location.

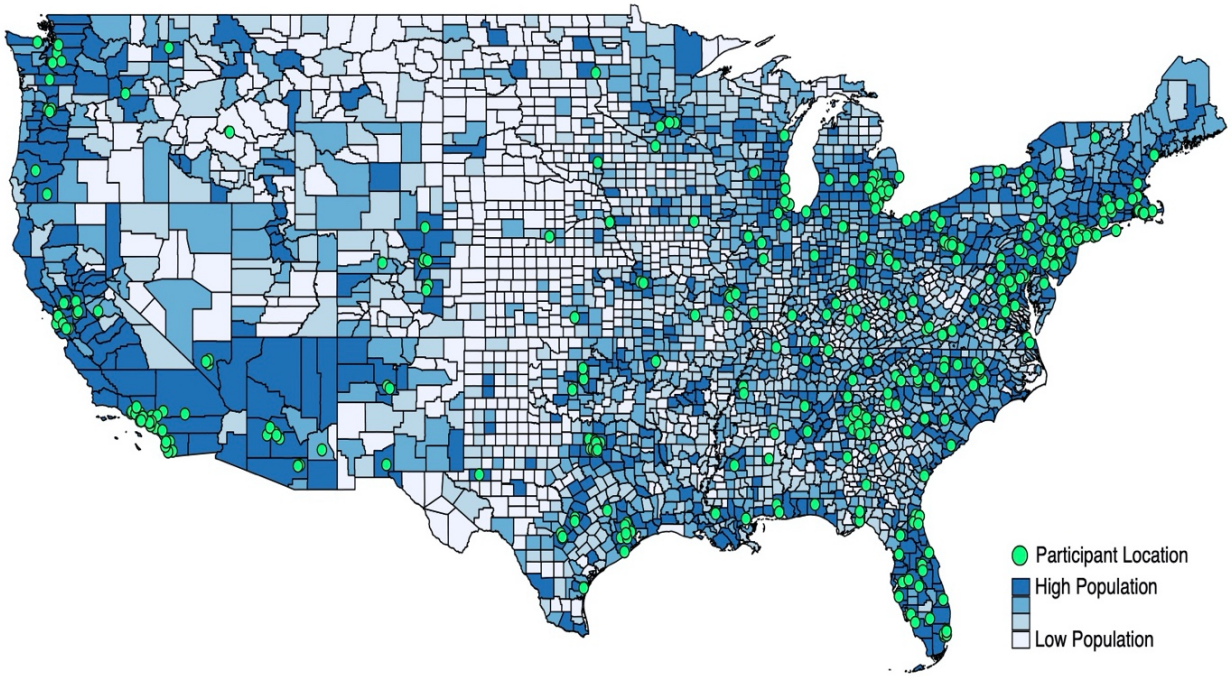

Table 1. The Six Prospects.

This table shows the six prospects used by Harbaugh et al. (2009). In their experiment, participants make six choices between a lottery and the expected value of the lottery. The fourfold pattern of risk attitudes predicts that participants should be risk-seeking by choosing lotteries over expected values for prospects 1 and 6 while participants should be risk-averse by choosing expected values over lotteries for prospects 3 and 4.

Prospect Number	Lottery	Expected Value	FFP Risk Attitude
1	1/10 of +$20, 9/10 of +$0	$2	Seeking
2	4/10 of +$20, 6/10 of +$0	$8	Neutral
3	8/10 of +$20, 2/10 of +$0	$16	Averse
4	1/10 of -$20, 9/10 of +$0	-$2	Averse
5	4/10 of -$20, 6/10 of +$0	-$8	Neutral
6	8/10 of -$20, 2/10 of +$0	-$16	Seeking

Table 2. Payoff Matrix with Treatments.

This table shows the payoff matrix of our experiments. We ask participants to make three investment decisions and three financing decisions. Individuals can choose between a stock and a bond.

Type	Stock	Bond
Investing Decisions	1/10 of +$0.5, 9/10 of +$0	$0.05
	4/10 of +$0.5, 6/10 of +$0	$0.2
	8/10 of +$0.5, 2/10 of +$0	$0.4
Financing Decisions	1/10 of -$0.5, 9/10 of -$0	-$0.05
	4/10 of -$0.5, 6/10 of -$0	-$0.2
	8/10 of -$0.5, 2/10 of -$0	-$0.4

Table 3. Demographic Information.

This table shows the demographic information of M-Turk participants. The proportion of participants in each demographic characteristic across economic boom and depression conditions are reported. Also, the last two columns of the table show *p*-values of the two-sided *t*-test for having the same proportions across the two economic conditions.

		Boom		Depression		Boom - Depression		
		Obs	%	Obs	%	%	*t*-stat	*p*-value
Panel A. Groups exposed to pictures and articles								
Age	Below 30	13	20	10	16	4	0.56	0.57
	30-40	21	32	18	29	3	0.40	0.69
	40-50	17	26	24	38	-12	-1.51	0.14
	Above 50	13	20	11	18	2	0.32	0.75
Gender	Female	26	39	28	44	-5	-0.58	0.57
	Male	40	61	35	56	5	0.58	0.57
Education	High School	27	41	20	32	9	1.08	0.28
	College	33	50	34	54	-4	-0.45	0.66
	Graduate School	6	9	9	14	-5	-0.92	0.36
Total		66		63				
Panel B. Groups exposed to pictures								
Age	Below 30	8	13	16	26	-13	-1.91	0.06
	30-40	29	45	21	34	11	1.31	0.19
	40-50	16	25	9	15	11	1.48	0.14
	Above 50	9	14	15	24	-10	-1.45	0.15
Gender	Female	39	61	24	39	22	2.54	0.01
	Male	25	39	38	60	-21	-2.35	0.02
Education	High School	25	39	26	42	-3	-0.33	0.75
	College	28	44	26	42	2	0.20	0.84
	Graduate School	11	17	10	16	1	0.16	0.88
Total		64		62				
Panel C. Groups exposed to articles								
Age	Below 30	9	15	7	12	4	0.57	0.57
	30-40	22	37	28	47	-9	-1.03	0.30
	40-50	17	29	13	22	7	0.89	0.37
	Above 50	11	19	10	17	2	0.28	0.78
Gender	Female	31	53	28	47	6	0.64	0.53
	Male	28	48	32	53	-6	-0.64	0.53
Education	High School	19	32	16	27	6	0.66	0.51
	College	32	54	33	55	-1	-0.08	0.93
	Graduate School	8	14	11	18	-5	-0.71	0.48
Total		59		60				

Table 4. Baseline Investment and Financing Decisions.

This table shows the results of comparing the choices of participants exposed to economic boom pictures and articles with the choices of participants exposed to economic depression pictures and articles. The first five columns of Panel A reports proportions of choosing stock across boom and depression conditions, the difference in their proportions, and the *t*-statistic and *p*-values of the two-sided *t*-test for having the same proportions across two groups. The last three columns of Panel A report the proportion difference between two groups controlling for participant characteristics through OLS. Panel B reports results of the OLS regressions and displays coefficients on the controls. In Panel B, *t*-statistics are shown in italics. ***, **, and * represent *p*-values smaller than 0.01, 0.05, and 0.10, respectively.

Panel A. Proportion of stock

	Boom	Depression	Diff.	*t*-stat	*p*-value	Diff. (OLS)	*t*-stat	*p*-value
Investment	0.32	0.21	0.11	1.97	0.05	0.110	2.024	0.043
Financing	0.37	0.36	0.01	0.14	0.88	0.020	0.324	0.746

Panel B. OLS regressions

	Dependent variable: Proportion of stock	
	Investment decisions	Financing decisions
Boom	**0.110****	0.020
	2.024	*0.324*
Male	-0.040	-0.055
	-0.691	*-0.850*
College	0.092	0.107
	1.569	*1.617*
Graduate School	-0.021	0.145
	-0.220	*1.375*
Age	-0.002	-0.005
	-0.557	*-1.538*
# observations	129	129
R-squared	0.0340	0.0460

Table 5. Investment Decisions Across Different Probability Stocks.

This table shows the results of comparing the choices of participants exposed to economic boom pictures and articles with the choices of participants exposed to economic depression pictures and articles. The first five columns of Panel A reports proportions of choosing stock across boom and depression conditions, the difference in their proportions, and the *t*-statistic and *p*-values of the two-sided *t*-test for having the same proportions across two groups. The last three columns of Panel A report the proportion difference between two groups controlling for participant characteristics through OLS. Panel B reports results of the OLS regressions and displays coefficients on the controls. In Panel B, *t*-statistics are shown in italics. ***, **, and * represent *p*-values smaller than 0.01, 0.05, and 0.10, respectively.

Panel A. Proportion of stock

	Boom	Depression	Diff.	*t*-stat	*p*-value	Diff. (OLS)	*t*-stat	*p*-value
Low	0.35	0.06	0.28	4.21	0.00	0.283	4.185	0.000
Middle	0.29	0.13	0.16	2.27	0.02	0.168	2.406	0.016
High	0.32	0.44	-0.13	-1.48	0.14	-0.121	-1.405	0.160

Panel B. OLS regressions

	Dependent variable: Proportion of stock		
	Low	Middle	High
Boom	**0.283*****	**0.168****	-0.121
	4.185	***2.406***	*-1.405*
Male	-0.085	-0.126*	0.092
	-1.187	*-1.693*	*0.998*
College	0.034	0.141*	0.102
	0.460	*1.865*	*1.090*
Graduate School	-0.052	-0.031	0.022
	-0.451	*-0.259*	*0.147*
Age	-0.007*	-0.004	0.006
	-1.940	*-1.055*	*1.321*
# observations	129	129	129
R-squared	0.0467	0.0663	0.0241

Table 6. Financing Decisions Across Different Probability Stocks.

This table shows the results of comparing the choices of participants exposed to economic boom pictures and articles with the choices of participants exposed to economic depression pictures and articles. The first five columns of Panel A reports proportions of choosing stock across boom and depression conditions, the difference in their proportions, and the *t*-statistic and *p*-values of the two-sided *t*-test for having the same proportions across two groups. The last three columns of Panel A report the proportion difference between two groups controlling for participant characteristics through OLS. Panel B reports results of the OLS regressions and displays coefficients on the controls. In Panel B, *t*-statistics are shown in italics. ***, **, and * represent *p*-values smaller than 0.01, 0.05, and 0.10, respectively.

Panel A. Proportion of stock

	Boom	Depression	Diff.	*t*-stat	*p*-value	Diff. (OLS)	*t*-stat	*p*-value
Low	0.35	0.3	0.05	0.56	0.57	0.072	0.888	0.375
Middle	0.35	0.29	0.06	0.76	0.45	0.076	0.924	0.355
High	0.41	0.49	-0.08	-0.94	0.35	-0.089	-1.001	0.317

Panel B. OLS regressions

	Dependent variable: Proportion of stock		
	Low	Middle	High
Boom	0.072	0.076	-0.089
	0.888	*0.924*	*-1.001*
Male	-0.152*	-0.042	0.027
	-1.759	*-0.474*	*0.290*
College	0.050	0.167*	0.106
	0.563	*1.871*	*1.105*
Graduate School	0.400***	0.175	-0.140
	2.863	*1.237*	*-0.922*
Age	-0.007*	-0.006	-0.002
	-1.647	*-1.422*	*-0.361*
# observations	129	129	129
R-squared	0.0841	0.0485	0.0331

Table 7. Time.

Variables are winsorized at 5% level before taking a mean to account for outliers. First click time represents the total number of seconds that individuals initially took to click for all questions. Last click time represents the total number of seconds that individuals lastly took to click for all questions. Page submit time represents the total number of seconds that individuals finished all questions.

Panel A. Time			
Type	Investment decisions	Financing decisions	Two-sided *t*-test
	Mean	Mean	*p*-value
Page submit time	121.93	141.54	0.00
First click time	33.58	44.58	0.00
Last click time	53.30	66.13	0.00
Panel B. Time for financing decisions			
Type	Less Experience	Full Sample	Two-sided *t*-test
	Mean	Mean	*p*-value
Page submit time		141.54	
First click time		44.58	
Last click time		66.13	

Table 8. Comparison Between Groups Exposed to Economic Boom and Depression Pictures.
This table shows the results of comparing the choices of participants exposed to economic boom pictures with the choices of participants exposed to economic depression pictures. The first five columns of Panel A reports proportions of choosing stock across boom and depression conditions, the difference in their proportions, and the *t*-statistic and *p*-values of the two-sided *t*-test for having the same proportions across two groups. The last three columns of Panel A report the proportion difference between two groups controlling for participant characteristics through OLS. Panel B reports results of the OLS regressions and displays coefficients on the controls. In Panel B, *t*-statistics are shown in italics. ***, **, and * represent *p*-values smaller than 0.01, 0.05, and 0.10, respectively.

Panel A. Proportion of stock

	Boom	Depression	Diff.	*t*-stat	*p*-value	Diff. (OLS)	*t*-stat	*p*-value
Investment	0.29	0.23	0.06	1.03	0.30	0.040	0.728	0.467
Financing	0.34	0.42	-0.08	-1.33	0.18	-0.089	-1.431	0.152

Panel B. OLS regressions

	Dependent variable: Proportion of stock	
	Investment decisions	Financing decisions
Boom	0.040	-0.089
	0.728	*-1.431*
Male	-0.061	-0.032
	-0.989	*-0.457*
College	0.067	0.083
	1.125	*1.232*
Graduate School	0.034	-0.006
	0.425	*-0.068*
Age	-0.004	-0.005*
	-1.625	*-1.848*
# observations	126	126
R-squared	0.0308	0.0438

Table 9. Comparison Between Groups Exposed to Economic Boom and Depression Articles.
This table shows the results of comparing the choices of participants exposed to economic boom articles with the choices of participants exposed to economic depression articles. The first five columns of Panel A reports proportions of choosing stock across boom and depression conditions, the difference in their proportions, and the *t*-statistic and *p*-values of the two-sided *t*-test for having the same proportions across two groups. The last three columns of Panel A report the proportion difference between two groups controlling for participant characteristics through OLS. Panel B reports results of the OLS regressions and displays coefficients on the controls. In Panel B, *t*-statistics are shown in italics. ***, **, and * represent *p*-values smaller than 0.01, 0.05, and 0.10, respectively.

Panel A. Proportion of stock								
	Boom	Depression	Diff.	*t*-stat	*p*-value	Diff. (OLS)	*t*-stat	*p*-value
Investment	0.28	0.31	-0.02	-0.47	0.64	-0.024	-0.489	0.627
Financing	0.36	0.36	0.00	0.01	0.99	-0.008	-0.133	0.909

Panel B. OLS regressions		
	Dependent variable: Proportion of stock	
	Investment decisions	Financing decisions
Boom	-0.024	-0.007
	-0.487	*-0.114*
Male	-0.068	-0.049
	-1.301	*-0.765*
College	0.012	-0.034
	0.216	*-0.497*
Graduate School	0.058	-0.075
	0.751	*-0.798*
Age	0.000	0.003
	0.124	*0.928*
# observations	119	119
R-squared	0.0216	0.0235

INTERNET APPENDIX

for

Contrast Effects in Investment and Financing Decisions *

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Appendix IA. Experimental Instruction.

[Group A]

PART 1

Now, imagine you are a manager of a firm. You will be asked to make six choices. Your current earnings are ₳1000, and your future earnings will depend on one of six choices you will make. Since your total earnings from Part 1 will be your cash payoff at the end of the experiment, please carefully make the decisions.

Current Earnings (₳1000) + Future Earnings = My Total Earnings

Timer for Qualtrics

[Group B, D, and E]

PART 1

Now, imagine you are a manager of a firm. You will be asked to make six choices. Imagine the economy has been good. The Roaring Twenties is an example of a good economy. Part 3 provides a glimpse of the Roaring Twenties.

Your current earnings are ₳1000, and your future earnings will depend on one of six choices you will make. Since your total earnings from Part 1 will be your cash payoff at the end of the experiment, please carefully make the decisions.

Current Earnings (₳1000) + Future Earnings = My Total Earnings

Timer for Qualtrics

[Group C, F, and G]

PART 1

Now, imagine you are a manager of a firm. You will be asked to make six choices. Imagine the economy has been bad. The Great Depression is an example of a bad economy. Part 3 provides a glimpse of the Great Depression.

Your current earnings are ₳1000, and your future earnings will depend on one of six choices you will make. Since your total earnings from Part 1 will be your cash payoff at the end of the experiment, please carefully make the decisions.

Current Earnings (₳1000) + Future Earnings = My Total Earnings

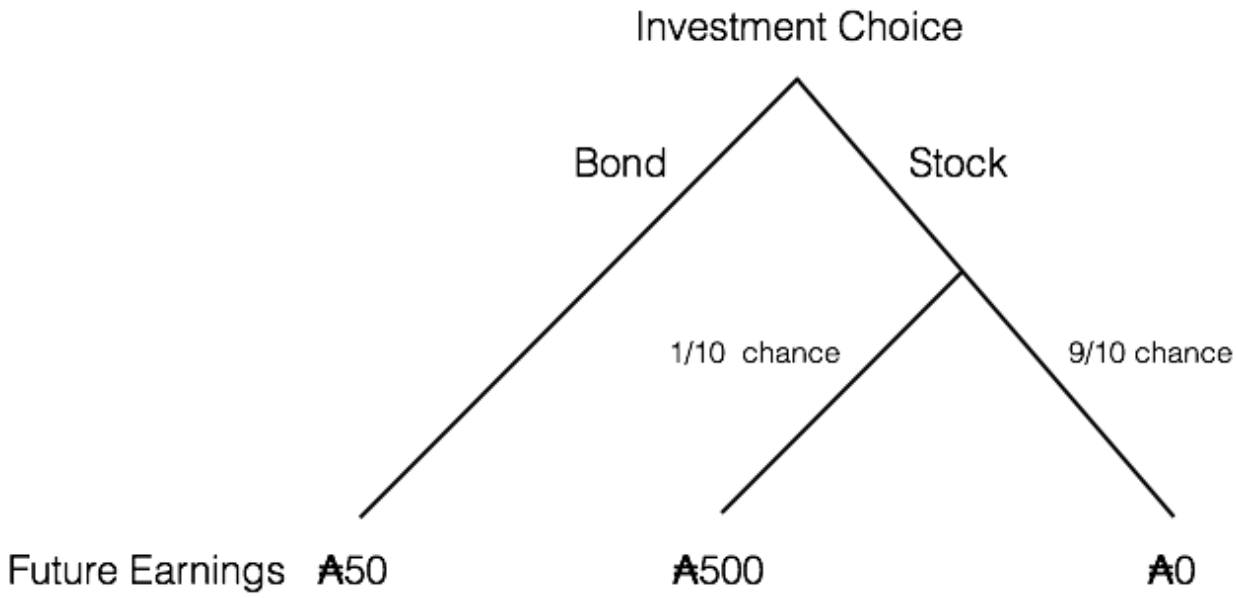
Timer for Qualtrics

[Common to all the groups]

PART 2

First Choice (Investment):

Now, you are given a choice to invest in either a bond (certain return) or a stock (risky return). If you choose to invest in the bond, your future earnings will be ₳50. If you choose to invest in the stock, your future earnings will be either ₳500 with 1/10 chance or ₳0 with 9/10 chance. The following diagram helps you understand the investment process.



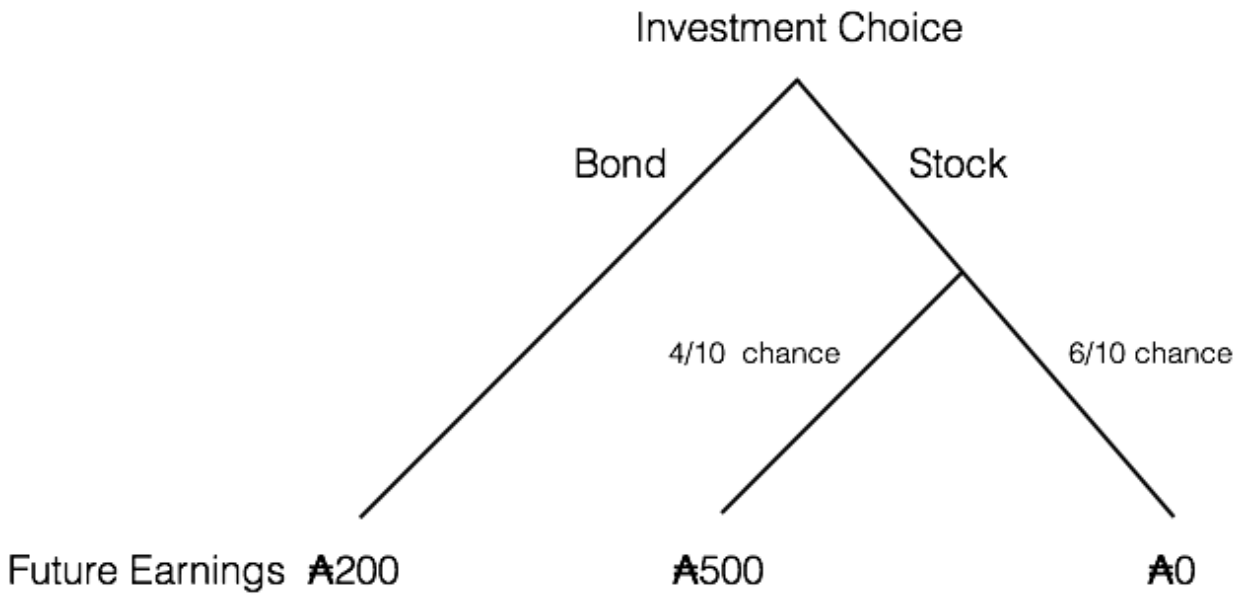
First Choice (Circle One)

Bond Stock

Timer for Qualtrics

Second Choice (Investment):

Now, you are given a choice to invest in either a bond (certain return) or a stock (risky return). If you choose to invest in the bond, your future earnings will be ₳200. If you choose to invest in the stock, your future earnings will be either ₳500 with 4/10 chance or ₳0 with 6/10 chance. The following diagram helps you understand the investment process.



Second Choice (Circle One)

Bond Stock

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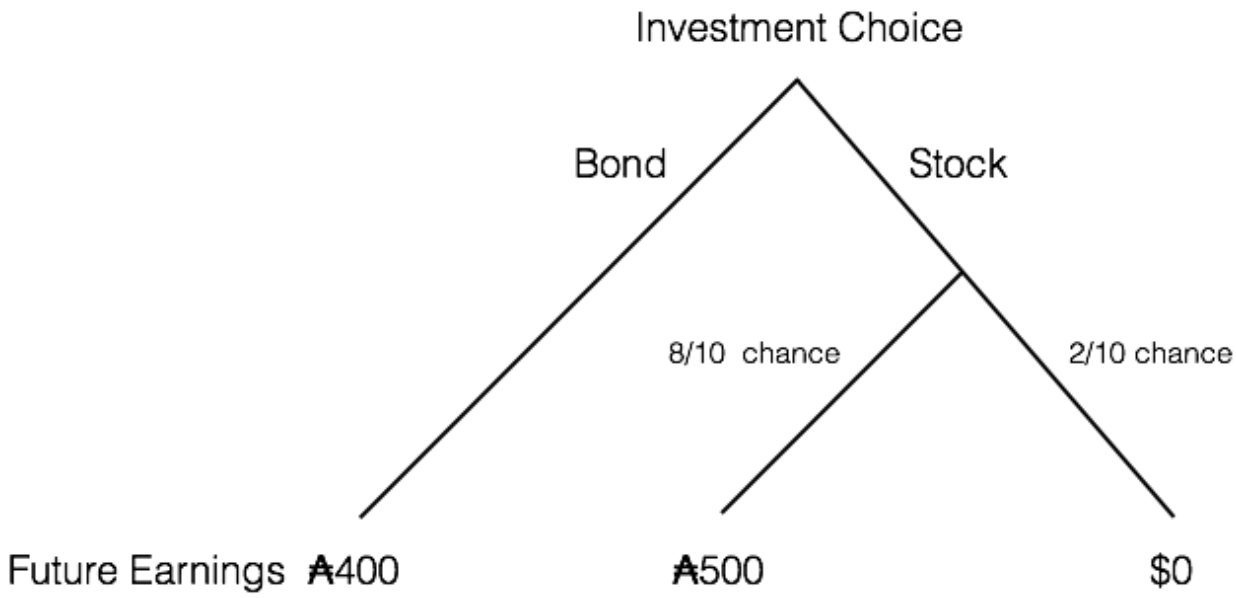
Third Choice (Investment):

Now, you are given a choice to invest in either a bond (certain return) or a stock (risky return). If you choose to invest in the bond, your future earnings will be ₳400. If you choose to invest in the stock, your future earnings will be either ₳500 with 8/10 chance or ₳0 with 2/10 chance. The following diagram helps you understand the investment process.



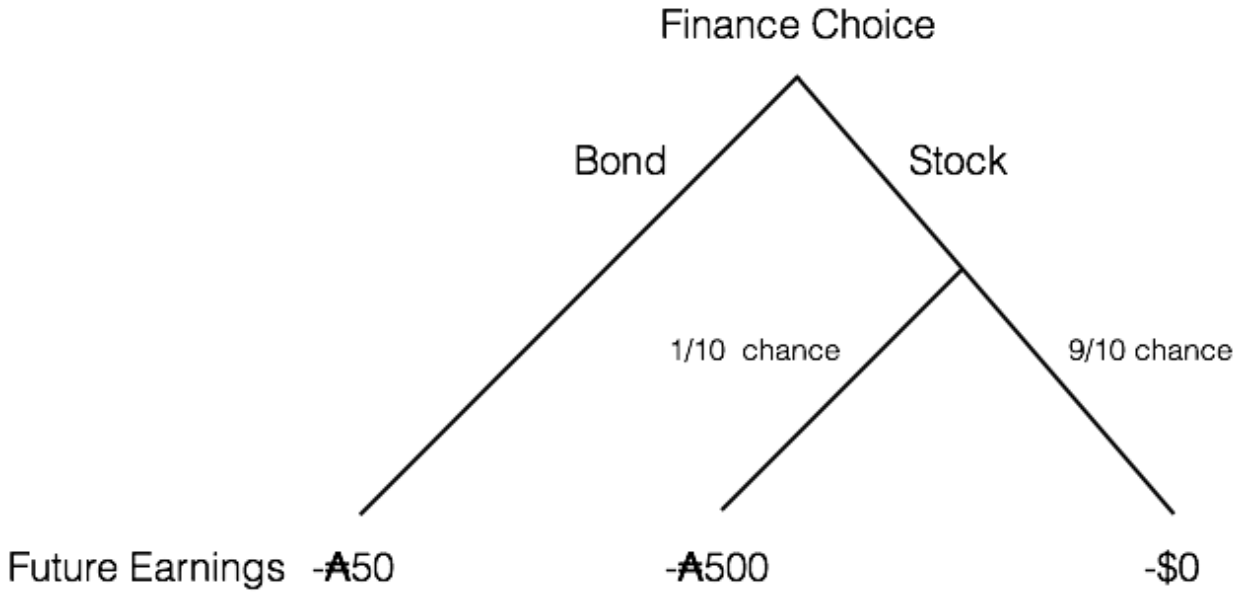
Third Choice (Circle One)

Bond Stock

Timer for Qualtrics

Fourth Choice (Finance):

Now, you are given a choice to borrow money from either issuing a bond (certain cost) or issuing a stock (uncertain cost). If you choose to borrow money from issuing the bond, your future earnings will be -₳50. If you choose to borrow money from issuing the stock, your future earnings will be either -₳500 with 1/10 chance or ₳0 with 9/10 chance. The following diagram helps to understand the financing process.



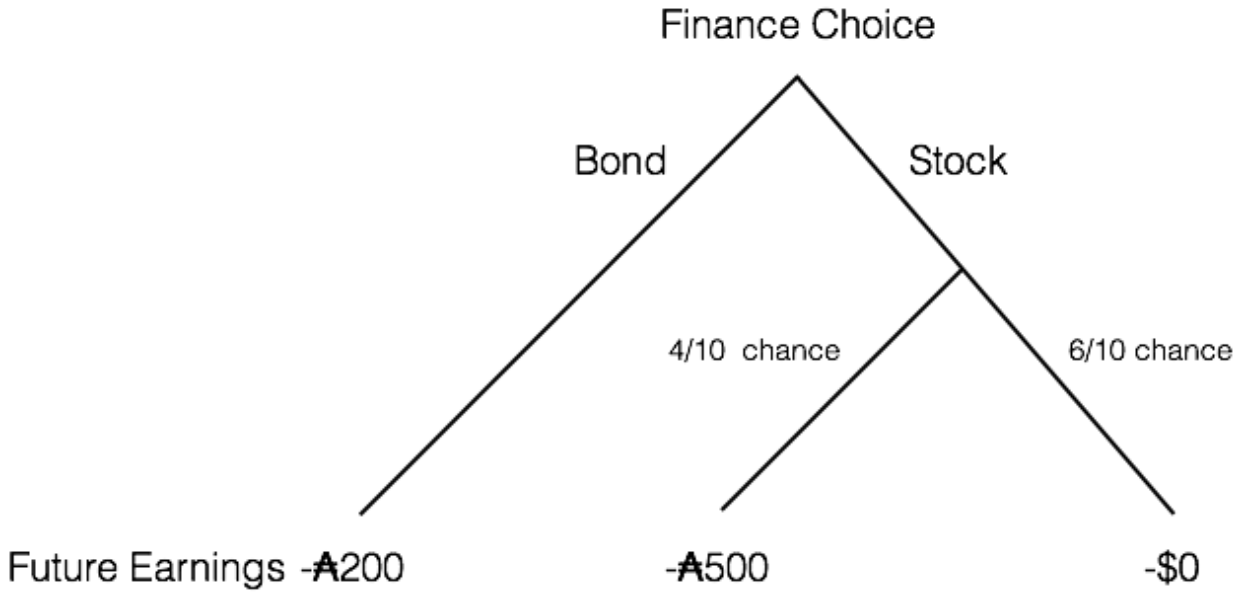
Fourth Choice (Circle One)

Bond Stock

Timer for Qualtrics

Fifth Choice (Finance):

Now, you are given a choice to borrow money from either issuing a bond (certain cost) or issuing a stock (uncertain cost). If you choose to borrow money from issuing the bond, your future earnings will be -₳200. If you choose to borrow money from issuing the stock, your future earnings will be either -₳500 with 4/10 chance or ₳0 with 6/10 chance. The following diagram helps to understand the financing process.



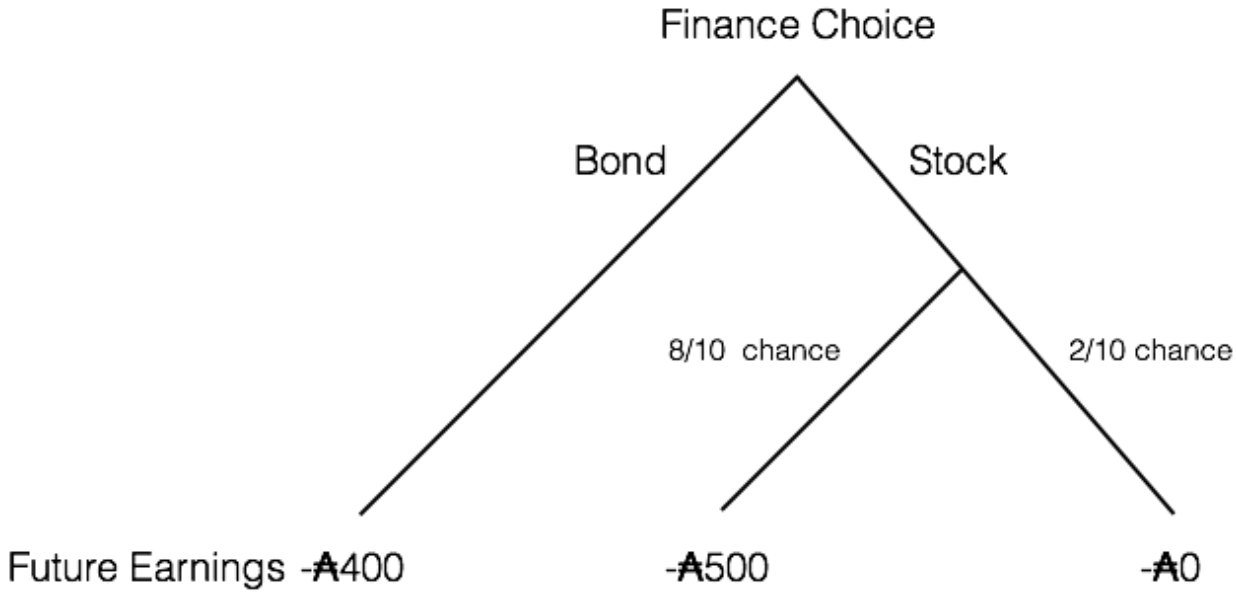
Fifth Choice (Circle One)

Bond Stock

Timer for Qualtrics

Sixth Choice (Finance):

Now, you are given a choice to borrow money from either issuing a bond (certain cost) or issuing a stock (uncertain cost). If you choose to borrow money from issuing the bond, your future earnings will be -₳400. If you choose to borrow money from issuing the stock, your future earnings will be either -₳500 with 8/10 chance or ₳0 with 2/10 chance. The following diagram helps to understand the financing process.



Sixth Choice (Circle One)

Bond Stock

Timer for Qualtrics

[Group A]

PART 3

Not Applicable.

[Group B]

PART 3

See Attachment 1.

[Group C]

PART 3

See Attachment 2.

[Group D]

PART 3

See Attachment 3.

[Group E]

PART 3

See Attachment 1 and Attachment 3.

[Group F]

PART 3

See Attachment 4.

[Group G]

PART 3

See Attachment 2 and Attachment 4.

Attachment 1:

A Family in the U.S. During the Roaring Twenties

Source: http://www.nydailynews.com/new-york/new-york-city-roaring-twenties-gallery-1.1338580?pmSlide=1.1338567

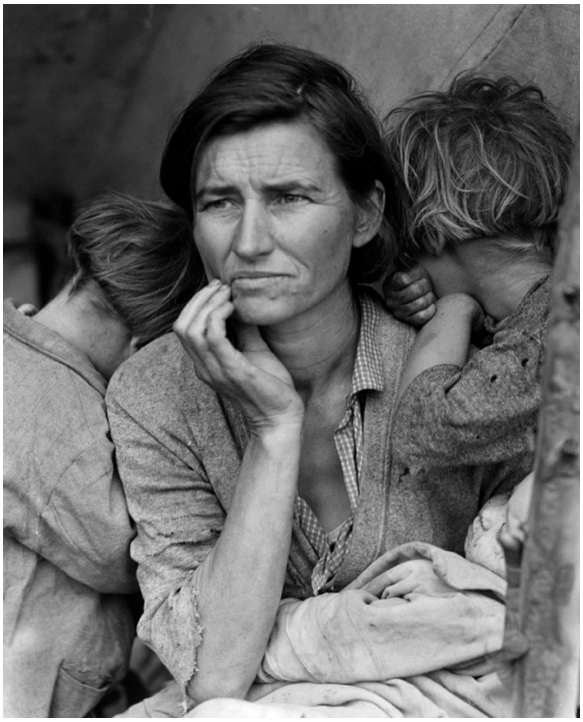
The U.S. During the Roaring Twenties

Source: http://www.nydailynews.com/new-york/new-york-city-roaring-twenties-gallery-1.1338580?pmSlide=1.1338576

Timer for Qualtrics

Attachment 2:

A Family in the U.S. During the Great Depression



Source: https://en.wikipedia.org/wiki/File:Lange-MigrantMother02.jpg

The U.S. During the Great Depression

Source: http://all-that-is-interesting.com/great-depression-new-york-city#11

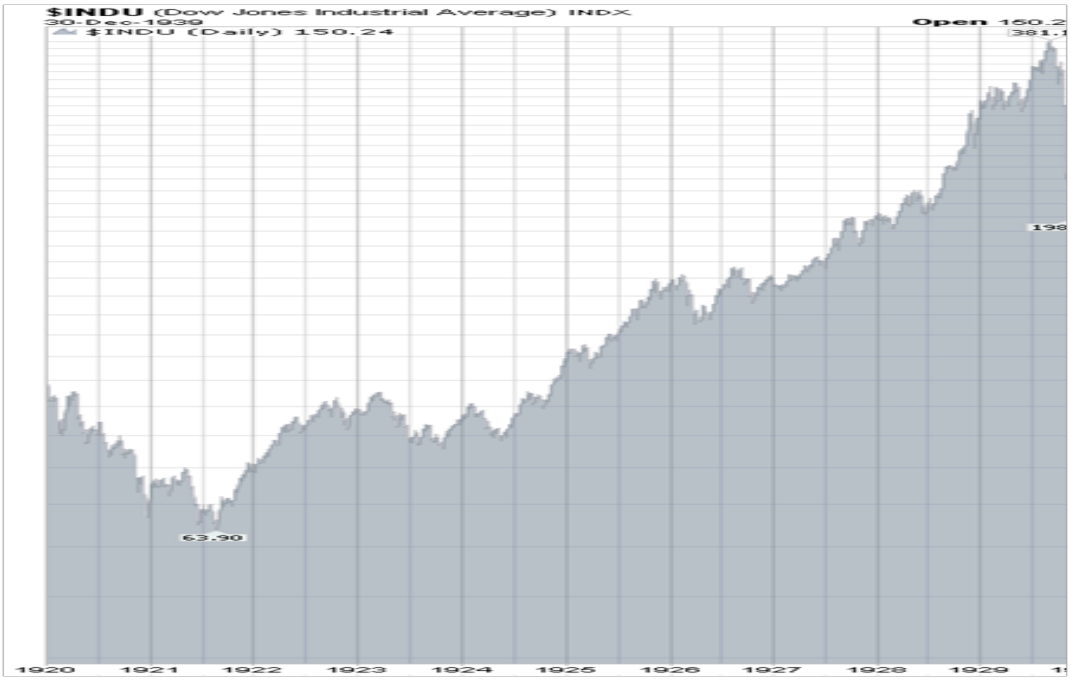
Timer for Qualtrics

Attachment 3:

Description about the Roaring Twenties

"At the same time, stockholders were experiencing a boom. The prices of stocks soared to record heights. Between 1925 and 1929 the total value of the New York Stock Exchange increased from $27 billion to $87 billion. Stock fever swept throughout the country."
Source: http://www.thebubblebubble.com/roaring-twenties-bubble/

Dow Jones Industrial Average During the Roaring Twenties



Source: https://www.littletradersgame.com/blog/2016/1/7/1920s-stock-market

Timer for Qualtrics

Attachment 4:

Description about the Great Depression

"On October 24, 1929, the stock market bubble finally burst, as investors began dumping shares en masse. A record 12.9 million shares were traded that day, known as "Black Thursday." Five days later, on "Black Tuesday" some 16 million shares were traded after another wave of panic swept Wall Street. Millions of shares ended up worthless, and those investors who had bought stocks "on margin" (with borrowed money) were wiped out completely."
Source: http://www.history.com/topics/great-depression

Dow Jones Industrial Average During the Great Depression

Source: http://www.businessinsider.com/stock-market-bottom-fishing-great-depression-edition-2011-9

Timer for Qualtrics

[Common to all the groups]

PART 4

Brief Survey I:

Check the lottery you prefer in the following 10 questions. The expected payoff difference is positive if the expected payoff for lottery A is higher.

Question Number	Lottery A		Lottery B		Expected Payoff Difference
1	1/10 of \$2.00, 9/10 of \$1.60		1/10 of \$3.85, 9/10 of \$0.10		\$1.17
2	2/10 of \$2.00, 8/10 of \$1.60		2/10 of \$3.85, 8/10 of \$0.10		\$0.83
3	3/10 of \$2.00, 7/10 of \$1.60		3/10 of \$3.85, 7/10 of \$0.10		\$0.50
4	4/10 of \$2.00, 6/10 of \$1.60		4/10 of \$3.85, 6/10 of \$0.10		\$0.16
5	5/10 of \$2.00, 5/10 of \$1.60		5/10 of \$3.85, 5/10 of \$0.10		-\$0.18
6	6/10 of \$2.00, 4/10 of \$1.60		6/10 of \$3.85, 4/10 of \$0.10		-\$0.51
7	7/10 of \$2.00, 3/10 of \$1.60		7/10 of \$3.85, 3/10 of \$0.10		-\$0.85
8	8/10 of \$2.00, 2/10 of \$1.60		8/10 of \$3.85, 2/10 of \$0.10		-\$1.18
9	9/10 of \$2.00, 1/10 of \$1.60		9/10 of \$3.85, 1/10 of \$0.10		-\$1.52
10	10/10 of \$2.00, 0/10 of \$1.60		10/10 of \$3.85, 0/10 of \$0.10		-\$1.85

Timer for Qualtrics

Brief Survey II:

1. What is your age? _____

2. What is your gender?

Male ____ Female ____ Other ____

3. Which do you consider your race?

White ____ Hispanic or Latino ____ Black or African American ____
Asian/Pacific Islander ____ Other ____

4. What is the highest level of education you have completed?

Less Than High School ____ High School ____ Bachelor's Degree ____
Master's Degree ____ Ph.D. Degree ____

Timer for Qualtrics