INVESTING WITH AN EXPERT:
DO YOU GET WHAT YOU PAY FOR?

By

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Introduction:

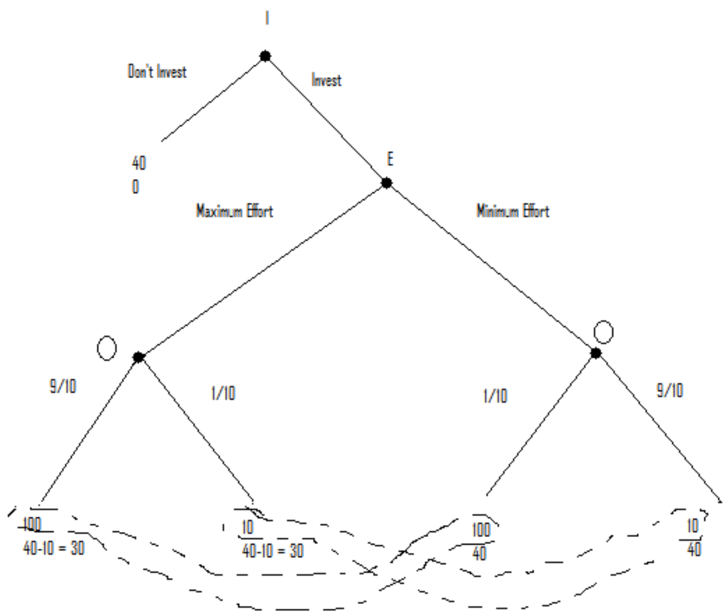
Many situations exist in the world where one has to invest blindly with an expert. Due to the quantity of knowledge in the world, most people remain rationally ignorant of certain information and therefore must trust that a paid expert will use his knowledge to one's advantage. Cases of this could include going to a doctor, a lawyer, or investing money with a market specialist. These professions share the trait of requiring specialized knowledge as well as the possibility that even the best expert doing his best work can have a bad outcome: a patient can become sicker, one could lose a case, or one could lose money in the stock market even with truly great experts. Thus, the investor in these cases may never know whether the expert expended full effort regardless of the outcome.

Investors in the marketplace generally pay experts to help them attain high returns. Only the highest paid hedge funds actually receive payment based on performance, which would seem to cause inefficient investment in the stock market as the investors and experts may not have aligned interests. This is only one example, as many cases require trusting an individual in good faith with no ability to know whether he did or did not betray that trust. In this paper I will examine the theoretical expectations of such a scenario by using a game I designed with the principles of game theory to model the situation. I also designed an experiment to test the theoretical predictions. The theoretical predictions will be based on several payoff schemes: the first is a set payoff with an effort cost for the expert, the second is a percentage payoff with an effort cost for the expert, the third is a set payoff for the expert with risk pooling amongst all the investors, and the fourth is a percentage payoff for the expert with risk pooling amongst all the investors.

I. Economic Theory

I modeled the aforementioned situation using the principles and tools of game theory and designed an extensive form game with four treatments. The treatments change the payoff schemes, but the game is designed so that effectively the investing player does not know based on his payoffs the effort of the expert due to the chance move that can result in the same payoffs regardless for the investor. All that changes from the expert's strategy is the probability of a good result. In game theoretical predictions, knowledge of the terminal move in a game by the other players should have no impact on the result, but with behavioral models one can assume an information set connecting the identical payoffs for the investor. This can be seen in Figure 1a, which is the game tree for the payment scheme of treatment 1. The impacts of the various payoff schemes will be discussed as follows, after discussing some limitations with the model.

Figure 1



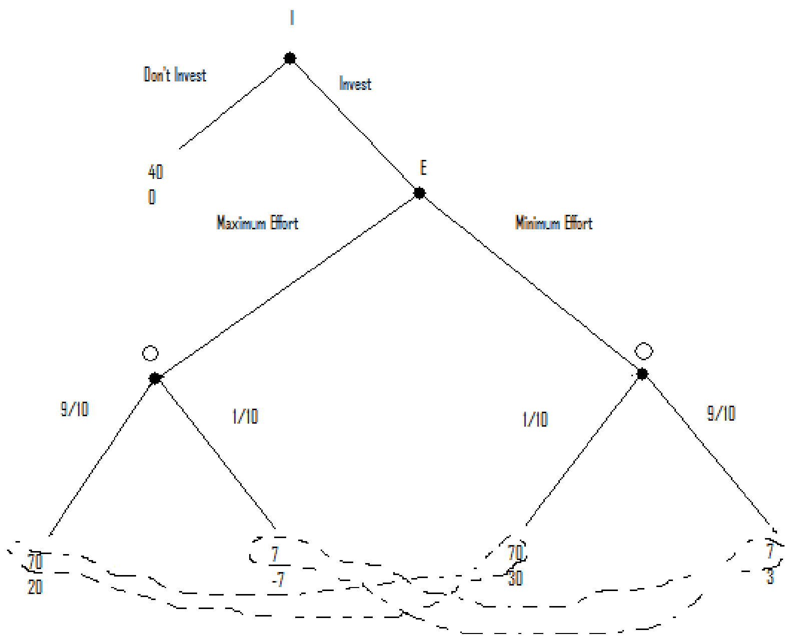
The modeled situation is a one shot game, which does not take into account the possible reputation effects that could influence the actions of experts, and this is a major assumption in the model to simplify the situation. Regardless, I feel for an opening paper on this situation it is a legitimate assumption to make and one that in many cases is justified. For instance, many people lack the knowledge to understand the investment history of firms. People sometimes simply place trust into a person which may be based on unreliable information, and there are many instances of anecdotal evidence where firms act in a way that appears to neglect the reputational impact of decisions, like the famous Allstate scandal where the firm refused to pay insurance after Katrina due to a professional analysis by the prestigious McKinsey consulting firm. Alternatively, firms can fabricate reputations, such as Bernie Madoff who proved that one can have the appearance of a good history while avoiding any real responsibility.

In the first treatment the payoffs are as shown in Figure 1. The way in which these payoffs are generated is as follows: the expert is paid a set fee from which he deducts effort if he chooses high effort as a strategy. As can be seen in the game tree, the payoffs are such that the expert is always paid 40 regardless of outcome, but if he expends maximum effort as his strategy, he also subtracts 10 as his effort cost. Thus he receives 30 in total if he expends maximum effort instead of 40 if he does not. The payoffs to the investor are 100 in a good outcome and 10 in a bad outcome. The expert selects which of these outcomes is more likely by choosing maximum effort, which gives a 90 percent chance of a good outcome. Minimum effort makes the chance 10 percent, and the investor cannot know which the expert selected.

Traditionally, solution concepts used by economists in game theory follow classical economic theories that state a rational decision-maker will maximize his own payoffs. The subgame perfect equilibrium can be solved in this game through simple backwards induction. If the investor opts to invest then the expert will choose to expend minimum effort because $40 > 30$. This means an investor, if he invests, expects to receive a payoff of $(100)(.1)+(10)(.9) = 19$. This is less than 40, which is the payoff of not investing, and since he knows the choice of the expert will be minimal effort, he will choose to not invest. The subgame perfect equilibrium is therefore (Not invest, minimum effort).

Treatment 2, takes into account this method of selfish decision-making, and should, based on this theory, reach a more efficient outcome, because the expert now gets paid a percentage of the amount that the investor receives.

Figure 2



The payoffs in this game reflect a situation in which the expert has a stake in the results of the investment. He is paid thirty percent of the payoffs to the investor, and the possibilities and probabilities of these payoffs are the same as in treatment one. Thus, if the investor expends maximum effort he has a ninety percent chance of receiving 30, with a deduction of ten for effort, and a ten percent chance of receiving 3 with a deduction of ten for effort. If he utilizes minimal effort he has a ten percent chance of receiving 30 with no deduction, and a ten percent chance of receiving 3 with no deduction. Expected values for these two strategies, maximum effort and minimum effort, are (20)(.9)+(-7)(.1) = 18.7 and (30)(.1)+(3)(.9) = 5.7. 18.7 is greater than 5.7 and therefore the prediction for the behavior of the expert is to use maximum effort, which the investor will be able to see and he too will invest, unless he is risk averse. After all, the investor can make 40 dollars by not investing. He expects to make (70)(.9)+(7)(.1) =

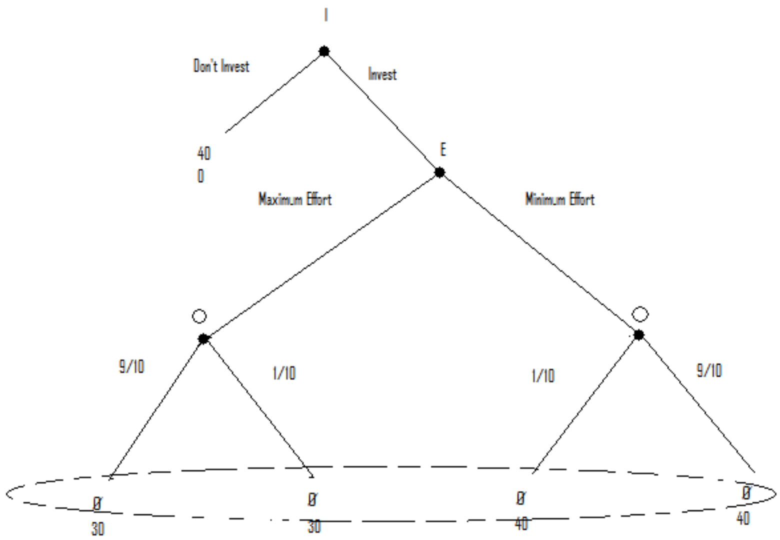
63.7, but with a ten percent chance of making only 7. This treatment, based on classical economic theory should reach efficient outcomes.

However, in many situations like in Figure 1, people do not act purely selfishly, and behavioral economics has many tools to explain this. Prior research and behavioral data would support that often when people put trust into another person, this person feels obligated based on possible feelings of guilt to cooperate. One such theory that explains players acting unselfishly is guilt. As explained in the paper “Guilt in Games” by Martin Dufwenberg and Pierpaolo Battigalli, it is related to the extent to which a player believes that he can be connected to blame. There is another effect that also has to do with more general effects of a player feeling bad about breaching trust placed into him by another. This has important implications for the aforementioned situation, since an investor places his money into the hands of an expert who can choose to cooperate or not cooperate.

Feelings of guilt, therefore, might lead to efficient outcomes in treatment 1 unlike the prediction of the theory of *homo economicus* who is purely selfish. The design of the game, though, may negate this fact since there is no accountability for the expert. The investor never knows what choice the expert made, since chance can give the investor the same payoffs regardless of the expert's strategy and he is denied knowledge of knowing the expert’s choice.

This effect could be even greater in a case that utilizes risk pooling for payoffs: treatment 3.

Figure 3



The third treatment therefore integrates risk pooling for the payoff of the investor. In this treatment, the expert is paid as before, but the investor is paid based on the function of everyone else's individual payoffs, which individually are the same as in the previous treatment as shown in Figure 1a. In Figure 3, ø is the result of the aforementioned function, which is equal to (1/n)*Total Payoff, where n is equal to the number of players who invested their money and total payoff is the sum of all investment payoffs, deducting payment to experts. The expert, however, has the same payoff scheme as before, where he is paid a set fee of 40 and subtracts an effort cost of 10 when opting to expend maximum effort. Thus in relation to the first treatment, one can expect two possible outcomes that conform to two opposing theories: one which views people as acting purely selfishly, and another that views people as being swayed by emotional pressures like guilt or altruism. If the investor fears that the expert will have no guilt and act selfishly, he will opt to not invest, and if the investor perceives this increased distancing he will invest less often than in treatment 1.

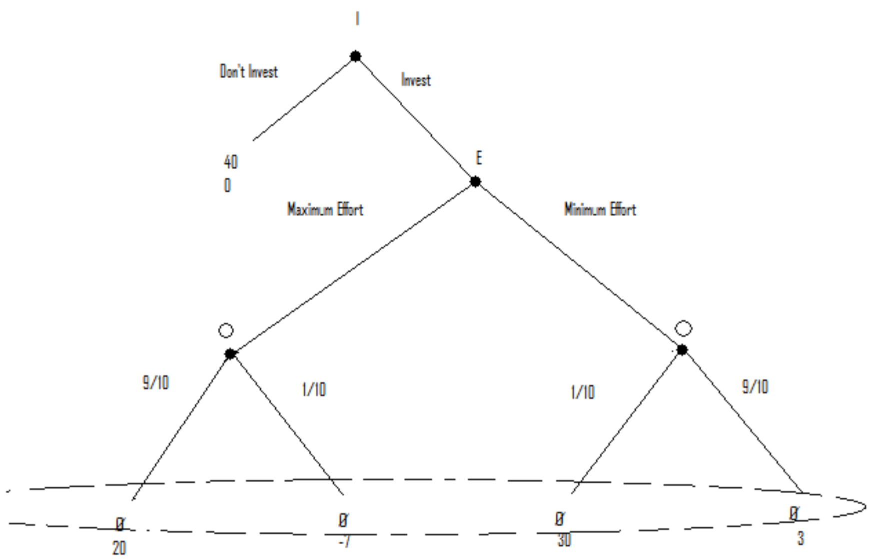
A third theory which has importance for all the treatments due to the chance move, and also explains one reason for risk pooling, is that of risk aversion. In situations such as the aforementioned that involve risk, often people seek some form of insurance. Insurance can be meted out against the probabilities of failure or betrayal by spreading risk out amongst the population to allow for the absorption of loss. Depending on the probability of loss, this method can reduce risk substantially for investors. This situation does not actually exist for investors in the real world, but it would be interesting to see if it can reduce inefficiency in investing, as it does in other uncertain situations that utilize insurance to align more frequently likeminded people hoping to make a transaction. After all, if two people have a positive expected value, and can expect to make more cooperating, but one person's risk aversion prevents this transaction, risk sharing could be seen as adding incentive to reach a more efficiently outcome.

Even if a person trusts the expert, there remains the element of chance where one can either invest in the bad state of the world or the good state of the world. This places risk on the investment, and despite the expected value of investing being greater (given trust and a cooperative expert) when one invests, this may not always happen due to the discount effect risk averse individuals place on future gains that have risk versus present amounts they currently have. This relates to loss aversion, but essentially depends on the risk aversion coefficient of the individual. This can be reduced through insurance, but also through risk pooling. Risk pooling is a technique to reduce risk by diminishing the importance of any singular outcome, especially in a case where the bad outcome is unlikely. The concept is that everyone pays into a pool with the results of their respective gambles, and they are then paid equally from this pool. This has been proven to reduce the effects of risk aversion and help to increase investment. Risk aversion has not been used as an incentive itself; however, treatment 3 also tests how it affects trust in a situation that involves an element of added risk from the expert's decision-making.

This treatment adds risk pooling to examine if the investor feels any less fearful about being betrayed with a large number of possible investors who could also be investing. While individually the expected actions of the players remain the same, with risk pooling it could make investors either more likely to invest based on the perceived lowering of risk to assuage risk aversion, or also make cooperation even less likely as the distancing effect between the expert and investor is even greater since everyone else's payoffs matter for the payoff received by the investor. However, if the investor has faith that his expert will help him, then this could help him overcome risk aversion. He expects to make (70)(.9)+(7)(.1) = 63.7, but with a ten percent chance of making only 7. Thus with a risk aversion coefficient of 1.5925 or greater the investor will choose to not to invest, which is inefficient and will not meet the subgame perfect equilibrium of (invest, max effort), which is also Pareto optimal. Therefore there are several possible outcomes from the treatment. There may be more investment if investors are risk averse and have faith in the experts. However, they may have less faith simply because they have more distance from the investor, which may result in less cooperation from experts who select minimal effort more frequently than in the first treatment.

Thus fourth and final treatment once again tests the effects of risk aversion by introducing risk pooling to the percentage payoff scheme, where once again the investor is paid based on ø which is calculated the same way as before.

Figure 4



This should give insurance to investors and negate risk aversion. The experts are paid with the same percentages as in the previous treatment, as can be seen in the game tree in Figure 2.b. They are paid from the amount of money they add to the pool. This treatment seeks to reach total efficiency by giving insurance to investors who are then all paid based on risk pooling now used to add incentive to invest. This should, based upon the previous treatment's predictions achieve complete investment and cooperation from the investors and the experts. It adds risk pooling to the second treatment, and theoretically should achieve the Pareto efficient outcome. As aforementioned, initially in the second treatment, with a risk aversion coefficient of 1.5925 or greater the investor will choose to not to invest, which is inefficient and will not meet the subgame perfect equilibrium of (invest, max effort), which is also Pareto optimal. However, risk pooling spreads the risk out over more investors, which should decrease the risk of a bad outcome and therefore make more investors likely to invest.

II. Experimental Design

In order to test the theory, I split half the test subjects into the “investor” group and the second half into the “expert” group. They were randomly matched over the four treatments of the four different games so as to avoid selection bias where people choose their friends in order to maximize payoffs. They were also held to one role so that they do not bias the results by feeling additional sympathy for one side or the other. In the real world, people most often do not switch places with their expert and that wasa voided in this experiment. This would then give results that make sense for the modeled scenario without additional possibilities for error and unaccounted for behavioral models.

The treatments were administered in the order of treatment 1, treatment 3, treatment 2, and treatment 4. The first treatment will be the simplest, involving a set payoff for the expert, then before changing the game and the idea of payoffs to the expert, there will be a set payoff treatment with risk pooling. Following this treatment, the percentage payoff treatment will be run, followed by the final treatment of percentage payoff with risk pooling. The design of this order is to keep both investors and experts considering the payoff scheme before the more complicated risk pooling in order to minimize complexity in the thinking process, and since they are the most similar pairings of any treatments it would be best to compare the two while the subjects remember the previous case.

The players were allowed to briefly speak with each other, as often occurs in the real world, but the investor cannot see the choice of the expert, which means that communication should not in theory change the result, though it may increase guilt effects. Appendix A contains the instructions that are given to participants. The investors and experts each received their own separate instructions. The investors selected a strategy and then handed the paper off to the expert who then chose a strategy. Then the expert submitted the paper to the experimenter without revealing the choices to the investor. The experimenter rolled for both the minimum and maximum effort scenarios to determine whether there is a high payoff or low payoff for the investor, which can be viewed as a good or bad state of the world. The investors learned of their payoffs, but by design they will never know what choice the expert made.

III. Data

The experiment was run on April 12, 2010 in the Economic Science Laboratory at the University of Arizona’s Eller College of Management. The subjects were economics students in a game theory class taught by Professor Martin Dufwenberg. As stated in the design, there were four treatments run on the students. There were 30 students present for the experiment, creating 15 pairs and thus 15 realizations of data. The following charts are the results for the four treatments, in the order of the set payoff treatment, the set payoff with risk pool treatment, the percentage payoff treatment, and the percentage payoff treatment with risk pool. For all the treatments I rolled a bad state of the world for the case where the expert exercised minimum effort and I rolled a good state of the world for when the expert chose maximum effort. All the data for each specific treatment and all the choices by the players are in appendix B.

The proportions for the choices in each of the treatments are as follows.

A. Set payoff with pool
   - Proportion that invest: .42
   - Proportion of these that had experts co-operate: 0.16667

B. Set payoff
   - Proportion that invest: .57
   - Proportion of max effort: .25

C. Percentage Payoff:
   - Proportion that invest: .42
   - Proportion of those max effort: .57

D. Percentage Payoff with risk pool:

- Proportion who invest: .57
- Proportion of those max effort: .75

IV. Results

Some results follow my hypotheses from theory, and some do not. It appears that between the set payoff without a pool and the set payoff with a pool, the investors did perhaps feel that their experts would feel like they had less accountability, and the experts did act this way. The shift in expert and investor decisions shows that the distancing effect on guilt, between these two games, does account for less expert effort. Likewise, the risk pooling between the percentage payoff schema and the percentage payoff with risk pooling treatment increased the number of investors who invested, which follows logically from the theoretical analysis. Thus, in the first case when the expert has no monetary incentive to cooperate the investors trust them less when there is risk pooling, and the experts are less cooperative, while the exact inverse occurs when the experts have monetary incentive to cooperate.

A vexing result is that there were more investors who invested in the set payoff case than in the percentage payoff case. The theory not only expected more experts to apply maximum effort, it stated that *every* expert would apply maximum effort in the percentage case, which means that at least every investor who invested in the set payoff case should trust the expert to invest since they have the same level of risk aversion and a greater assurance the expert will apply maximum effort. Instead, there was an anomalous movement, in that more people invested in the set payoff case, which gives the expert no monetary incentive for the expert to expend maximum effort. Investors may have not fully understood the instructions, but the experts did adjust their strategy accordingly in that more experts selected maximum effort, which theory predicted.

Between the percentage payoff without risk pooling and percentage payoff with risk pooling, there was the expected increase in investment since that should account for risk aversion. Risk averse investors should have their fears assuaged by the insurance effect of risk pooling, which should theoretically increase investment. This occurred. Even so, there was an unexplained increase in experts choosing maximum effort, which can be attributed to a learning effect as this treatment was run last and more subjects may have solved the expected value of their selecting maximum effort as opposed to minimum effort. There should not have been an upward movement of maximum effort frequency, since it should have already been one hundred percent.

In order to determine if there was statistical significance between the likelihood of choices in the treatments in the data, I ran several Z tests with the null hypothesis of the difference in the proportions equal to zero. There was no significant difference between the strategies played in any of the two tests compared to each other for either actions taken by the expert or the investor. That said, there was a very small group to test, and it would be hard to find statistical significance in such a case. Also, the same people played the same roles in each test, so their differing choices may have more relevance than a random statistical test would indicate. With that in mind, their actions did follow the directions I predicted change to follow, despite the lack of statistical significance and a much smaller effect than I imagined. For instance, all theories said that all experts would invest in the percentage payoff treatments, and this did not occur.

There were most likely very large problems in my experimental design and my instructions, since it is possible that the students did not completely understand the game, which would reflect inadequacy in my instructions both on the written sheets as well as during the administering of the experiment. Furthermore, it is also possible that the solution for the games, particularly with the added complexity of risk pooling and the equation that explained the risk pooling result along with the percentage games that required an expected value calculation, were too complex for the students to perform in the allotted time, and thus students may have played in an arbitrary fashion. Regardless, the change in percentages, however slight, did fit the theory, except for the number of investors who invested in the percentage case compared to the set payoff case, but as previously stated most students may have been unprepared or incapable to actually perform the test. The increased number of investors who invested and experts who expended maximum effort in the percentage case with risk pooling, which was run after the percentage payoff treatment with no risk pooling, may represent a learning effect in the subjects. I conclude that the theory is sound, but better experiments could be run that use more clarity to correct for these errors for a more trustworthy result.

Appendix A: The instructions given during the experiment.

INVESTOR

You are an investor who has set aside 40 dollars for investing in the stock market, however, due to you lack the knowledge necessary to make what you believe are responsible financial decisions, and therefore you have the option to hire a stock market expert to invest your money for you. If you do not hire the expert, you will choose to not invest in which case you will simply keep your 40 dollars. If you choose to invest, the expert has two choices. One choice is to put maximum effort into his analysis and investing of your money, in which case you have a 90 percent chance of a payoff of 100 dollars, and a 10 percent chance of receiving 10 dollars due to fluctuations in the market. You pay your expert your 40 dollars for this service, and he receives a 10 dollar deduction for his effort, reducing his net payment to 30 dollars. If the expert chooses to apply minimum effort, then you have a 10 percent chance of receiving a payoff of 100 and a 90 percent chance of a payoff of 10, and the expert receives your full 40 dollars as payment since he deducts no effort cost. You will not receive information that reveals which choice the expert selected, such as the expert's payoffs.

Do you choose to invest?

This game is represented in the following game tree.

Figure 1 was copied here.

EXPERT

You are a financial expert working in the stock market, and an investor is thinking of hiring you to invest his money for him. If you do not get hired by the investor, you will receive nothing. If the investor chooses to invest, you, the expert, have a choice between putting maximum or minimum effort into his analysis. In the case of maximum effort the investor will have a 90 percent chance of a payoff of 100 dollars, and a 10 percent chance of receiving 10 dollars due to fluctuations in the market, this, however will deduct a 10 dollar effort cost from your 40 dollar payment, and you receive 30 dollars. If you choose to apply minimum effort, then you have a 10 percent chance of receiving a payoff of 100 and a 90 percent chance of a payoff of 10, and since you have no effort cost you receive 40 dollars. Your client will not receive information that reveals which choices you, the investor, selected or any information, like your payoffs that could reveal your choice.

Do you choose maximum or minimum effort?

The game is represented in the following game tree

Figure 1 was copied here.

INVESTOR

You are an investor who has set aside 40 dollars for investing in the stock market, however, you lack the knowledge necessary to make what you believe are responsible financial decisions, and therefore you have the option to hire a stock market expert to invest your money for you. If you do not hire the expert, you will choose to not invest in which case you will simply keep your 40 dollars. If you choose to invest, you receive a payoff based on a pool created by all payoffs to all others who have chosen to invest. All participating investors receive an equal share of the payoffs. The payoffs you contribute to the pool follow this scheme: the expert has two choices that determine the probability of the amount you add to the investor pool. The expert has the choice of maximum effort into his analysis and investing of your money, in which case you have a 90 percent chance of a payoff of 100 dollars, and a 10 percent chance of 10 dollars due to fluctuations in the market. You pay your expert 40 dollars, and if he selects maximum effort he deducts a 10 dollar effort cost from this payoff. If the expert chooses to apply minimum effort, then you have a 10 percent chance of receiving a payoff of 100 and a 90 percent chance of a payoff of 10, and he receives your full 40 dollars as payment since he deducts no effort cost. You will not receive information that reveals which choice the investor selected.

Do you choose to invest?

This game is represented in the following game tree.

Figure 3 was copied here.

EXPERT

You are a financial expert working in the stock market, and an investor is thinking of hiring you to invest his money for him. If you do not get hired by the investor, you will receive nothing. If the investor chooses to invest, you, the expert ,contribute with all other experts to a pool of money that pays to all investors equally. Your choice determines how much money is paid into this pool, and you have two choices. The first is maximum effort into the investor’s analysis, in which case the investor’s payoff will contribute to a pool, and has 90 percent chance of a payoff of 100 dollars, and a 10 percent chance of 10 dollars due to fluctuations in the market. Selecting maximum effort instead of minimum effort, however, will deduct a 10 dollar effort cost from your 40 dollar payment, and you receive 30 dollars (you do not get paid from a pool). Minimum effort gives a ten percent chance of 100 dollars being contributed to the pool, and a 90 percent chance of 10 dollars being contributed to the pool, and you have no effort cost. The investor’s payoff is pooled, so that he and all other investors will be paid equally from this pool, so you contribute to a pool based on your advice. Your client will not receive information that reveals which choices you, the expert, selected or any information, like your payoffs that could reveal your choice.

Do you choose maximum or minimum effort?

The game is represented in the following game tree

Figure 3 was printed here.

INVESTOR

You are an investor who has set aside 40 dollars for investing in the stock market, however, you lack the knowledge necessary to make what you believe are responsible financial decisions, and therefore you have the option to hire a stock market expert to invest your money for you. If you do not hire the expert, you will choose to not invest in which case you will simply keep your 40 dollars. If you choose to invest, the expert has two choices. The expert may use maximum effort into his analysis and investing of your money, in which case you have a 90 percent chance of a payoff of 100 dollars, and a 10 percent chance of receiving 10 dollars due to fluctuations in the market. You pay your expert with a percentage of your earnings, which is always 30 percent, but he also deducts a ten dollar effort cost from his own payoff if he chooses maximum effort. If the expert chooses to apply minimum effort, then you have a 10 percent chance of receiving a payoff of 100 and a 90 percent chance of a payoff of 10, and the expert is paid 30 percent of your payoff, and he deducts no effort cost. You will not receive information that reveals which choice the investor selected, such as his payoffs.

Do you choose to invest?

This game is represented in the following game tree.

Figure 2 was printed here.

EXPERT

You are a financial expert working in the stock market, and an investor is thinking of hiring you to invest his money. If you do not get hired by the investor, you will receive nothing. If the investor chooses to invest, you, the expert, have a choice between putting maximum effort and minimum effort into his analysis. In the case of maximum effort the investor will have a 90 percent chance of a payoff of 100 dollars, and a 10 percent chance of receiving 10 dollars due to fluctuations in the market. If you choose to expend minimum effort then the investor has a ten percent chance of receiving a payoff o f 100 and a 90 percent chance of receiving 10 dollars. You receive 30 percent of the client's payoffs, and if you select maximum effort you deduct 10 dollars from your own payoff. Your client will not receive information that reveals which choices you, the investor, selected or any information, like your payoffs that could reveal your choice.

Do you choose maximum or minimum effort?

The game is represented in the following game tree

Figure 2 was printed here.

INVESTOR

You are an investor who has set aside 40 dollars for investing in the stock market, however, you lack the knowledge necessary to make what you believe are responsible financial decisions, and therefore you have the option to hire a stock market expert to invest your money for you. If you do not hire the expert, you will choose to not invest in which case you will simply keep your 40 dollars. If you choose to invest, you receive a payoff based on a pool created by all payoff to all investors. All participating investors receive an equal share of the pooled payoffs. The payoffs you contribute to the pool follow this scheme: the expert has two choices. He can choose to put maximum effort into his analysis and investing of your money, in which case you have a 90 percent chance of a payoff of 100 dollars, and a 10 percent chance of receiving 10 dollars due to fluctuations in the market and the expert can also choose to apply minimum effort, then you have a 10 percent chance of receiving a payoff of 100 and a 90 percent chance of a payoff of 10. You pay your expert 30 percent of your contribution to the pool, before it is pooled, and if he selects maximum effort he deducts a 10 dollar effort cost from this payoff, and he receives your full 30 percent as payment if he selects minimum effort since he deducts no effort cost. You will receive no information indicating which option the expert selected.

Do you choose to invest?

This game is represented in the following game tree.

Figure 4 was printed here.

EXPERT

You are a financial expert working in the stock market and an investor is thinking of hiring you to invest his money for him. If you do not get hired by the investor, you will receive nothing. If the investor chooses to invest, you, the expert, contribute with all other experts to a pool of money that pays to all investors and you have a choice between putting maximum effort and minimum effort. You are paid 30 percent of the amount that is contributed to the overall pool by your decision. If you select maximum effort into the investor's analysis s/he has 90 percent chance of a payoff of 100 dollars, and a 10 percent chance of 10 dollars due to fluctuations in the market. Selecting maximum effort instead of minimum effort, however, will deduct a 10 dollar effort cost from your 30 percent payment (you do not get paid from a pool). Minimum effort gives a ten percent chance of 100 dollars being contributed to the pool, and a 90 percent chance of 10 dollars being contributed to the pool. The investor's payoff is pooled, so that he and all other investors will be paid equally from this pool, so you contribute to the pool based on your advice. Your client will not receive information that reveals which choices you, the investor, selected or any information, like your payoffs that could reveal your choice.

Do you choose maximum or minimum effort?

The game is represented in the following game tree

Figure 4 was printed here.

Appendix B - The strategies selected by all players for each treatment.

a. Set Payoff with Risk Pool

Investor	Choice	Expert	Choice	Payoffs
1	No Invest	1	Minimum	40,0
2	No Invest	2	Maximum	40,0
3	No Invest	3	Maximum	40,0
4	No Invest	4	Minimum	40,0
5	Invest	5	Minimum	10,40
6	Invest	6	Maximum	100,30

7	Invest	7	Minimum	10,40
8	Invest	8	Minimum	10,40
9	Invest	9	Minimum	10,40
10	No Invest	10	Maximum	40,0
11	No Invest	11	Maximum	40,0
12	Invest	12	Maximum	100,30
13	Invest	13	Minimum	10,40
14	Invest	14	Minimum	10,40

b. Set Payoff

Investor	Choice	Expert	Choice	Payoffs
1	Invest	1	Minimum	25,40
2	Invest	2	Maximum	25,40
3	No Invest	3	Maximum	40,0
4	No Invest	4	Minimum	40,0
5	No Invest	5	Maximum	40,0
6	Invest	6	Minimum	25,40
7	No Invest	7	Minimum	40,0
8	No Invest	8	Minimum	40,0
9	No Invest	9	Minimum	40,0
10	Invest	10	Minimum	25,40
11	Invest	11	Minimum	25,40
12	Invest	12	Minimum	25,40
13	No Invest	13	Minimum	40,0
14	No Invest	14	Minimum	40,0

c. Percentage Payoff

Investor	Choice	Expert	Choice	Payoffs
1	No Invest	1	Maximum	40,0
2	No	2	Maximum	40, 0

	Invest			
3	Invest	3	Maximum	70, 20
4	No Invest	4	Maximum	70,20
5	No Invest	5	Minimum	40,0
6	Invest	6	Minimum	7,3
7	No Invest	7	Maximum	70,20
8	Invest	8	Maximum	70,20
9	No Invest	9	minimum	7,3
10	Invest	10	Maximum	70, 20
11	Invest	11	Minimum	7,3
12	No Invest	12	Minimum	40,0
13	Invest	13	Minimum	7,3
14	Invest	14	Maximum	70, 20

d. Percentage Payoff with Risk Pool

Investor	Choice	Expert	Choice	Payoffs
1	No Invest	1	Maximum	40,0
2	Invest	2	Maximum	54.25, 20
3	Invest	3	minimum	54.25, 3
4	No Invest	4	minimum	40,0
5	No Invest	5	minimum	40,0
6	Invest	6	minimum	54.25, 3
7	Invest	7	Maximum	54.25, 20
8	No Invest	8	Maximum	40,0
9	Invest	9	Maximum	54.25, 20
10	Invest	10	Maximum	54.25, 20
11	Invest	11	Maximum	54.25,20
12	No Invest	12	minimum	40,0
13	Invest	13	Maximum	54.25, 20
14	No Invest	14	minimum	40,0

References:

Dufwenberg, Martin, and Pierpaolo Battigalli. "Guilt in Games." *American Economic Review: Papers and Proceedings* 97 (2007): 170-76.