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The Decoy Effect and investors' stock preferences

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UNIVERSITY OF NEW HAMPSHIRE

The Decoy Effect

And Investors' Stock Preferences

Brittany Paris

12/20/2011

The decoy effect is a well-known phenomenon that has received a lot of attention in the field of marketing. This study's purpose is to discover whether or not the decoy effect applies to the finance. More specifically, whether the decoy effect has any influence on investor's stock preferences.

Introduction

Since the start of financial markets, people have been trying to explain why certain events occur. Why do stock prices move with such unpredictability? Why does speculation have such an effect on the market? Nobody knows for certain what is going to happen in the future, so why is the weight of what investors expect to happen so heavy? Over time, there have been many models developed to help predict these future occurrences pertaining to individual stocks and the market as a whole. But, how reliable are these models? After all, the majority of them are based on the assumption that investor will always act rationally.

If a person were to act rationally, it would fundamentally mean two things. “First, when [investors] receive new information, [they] will update their beliefs correctly, in the manner described by Bayes’s law” (Thaler). Bayes’s law is an equation that calculates the probability of an event occurring based on a certain set of circumstances. Here is the equation: $Pr(A|B) = Pr(B|A) * Pr(A) / Pr(B)$, where $Pr(A|B)$ is the probability of A occurring given that B is true, $Pr(B|A)$ is the probability of B occurring given that A is true, $Pr(A)$ is the probability of A occurring independently, and $Pr(B)$ is the probability of B occurring independently.

“Second, given their beliefs, agents make choices that are normatively acceptable, in the sense that they are consistent with Savage’s notion of Subjective Expected Utility” (Thaler). A very simplified description of what Savage’s notion of Subjective Expected Utility is as follows: “if a decision maker abides by a set of axioms she will behave as if she has a set of personal or subjective probabilities,” where an axiom is a universally accepted principle or rule or some type of self-evident truth that requires no proof. With that said, it seems that people are naturally irrationally beings. Something as simple as a person’s mood could affect the decisions he makes. Researchers, over time, have recognized this.

Behavioral finance, in general, is the study of how the irrationality of people affects the market. Georg Lichtenberg described the following:

“People don’t like lottery or raffle tickets bearing the number 1. On the one hand, reason tells us that it could win us the 12,000 dollars just as well as any other ticket; on the other hand, we can hear an inner voice exhorting us not to take it, for who has ever heard of such a small number winning a large prize?”

When uncertainty is involved in making a decision, it is very difficult to remain rational and it is sometimes difficult to ignore that little voice in your head trying to persuade you against reason (Goldberg and Nitsch). Some argue that a person can train his mind to bypass irrational behaviors. Robert Koppel wrote *Investing and the Irrational Mind*, a book designed to reveal to its audience how those in the investing sector are able to “master [their] irrational minds to gain the skills necessary to control [their] financial decisions” (Koppel 8). Maybe for some it is possible to gain some kind of control over their emotions, moods, preferences and inner voice, but for many others this is difficult to do. The majority of people are simply irrational. The human mind is irrational. Consequently, if financial models are to be accurate, they should reflect this.

There have been many studies conducted in the field of behavioral finance in the attempt to explain certain occurrences. There has been a lot of focus on topics such as the prospect theory, the disposition effect, and framing (which effects the way people perceive certain words, images, or phrases). Researchers use their findings to help explain why a large amount of investors make the decisions (more specifically the wrong decisions) that they do. Knowing about these studies can be very beneficial for an investor. The more an investor

knows about them, the less likely he will be to make the same mistake by giving into his emotions or preferences.

The behavior of humans and its effects on decision making and the market has been studied in many other fields as well, including marketing. The majority of research in marketing is focused on consumer preference and how or why they choose to purchase the products that they do. A commonly studied phenomenon in marketing is the decoy effect. The effect states that when a consumer is faced with two very similar choices (option A and option B), the introduction of a third option (option C), that is similar to option A, but also slightly inferior, will tend to sway the consumer's choice, subconsciously persuading him to purchase option A. The decoy effect has been studied and utilized in the market for decades.

Companies are constantly developing ways to make sure that their product is the one chosen more often by consumers. With the large amount of competition seen today, it is no surprise that many companies dedicate a large amount of time and resources to discovering the best way to reach potential customers. Knowing how consumers tend to make their purchasing decisions can have a huge affect on a business. This is why it is important to be aware of and research the different effects and phenomena, such as the decoy effect, that lend insight into consumers' purchasing decisions. For example, there are many different kinds of cereals available to consumers today. More than that, there are the same kinds of cereal offered by different brands. Kellogg's, a very well known cereal company, offers, among many other cereals, Lucky Charms. Another company, called Malt-O-Meal, offers Marshmallow Mateys. Both are very similar products, consisting of lightly frosted oat cereal and marshmallow shapes. Assuming the prices of the product are similar as well, it could be difficult for a customer to decide which to buy. Unfortunately for Malt-O-Meal, it is likely

that customers will recognize the Kellogg's brand name and choose their product over Malt-O-Meal's. In order to compete with Kellogg's, Malt-O-Meal could utilize the decoy effect by offering another product. This product would look exactly the same, but be less valuable in some way. For example, Malt-O-Meal could offer a smaller version of the same product. Therefore, when a customer is looking at his options on the shelf of a grocery store, he will see the Malt-O-Meal options and possibly view the larger box as a better value in comparison with the smaller box (ignoring the fact that the larger box is of almost equal value to the Kellogg's box). In a fashion similar to this, companies could use the decoy effect to their advantage, capturing the attention of consumers when there are similar products next to theirs on the shelf.

There are many theories about how a consumer makes a purchasing decision. "A common view in economics proposes that, when consumers evaluate an option, they tend to retrieve from memory their stable and coherent preferences, calculate its utility, and then make their purchase decision accordingly" (Carroll and Kramer). This view implies that a consumer disregards all irrelevant information. However, a consumer is simply a human being and as much as people try to behave rationally, most cannot help but be irrational at times. This point should be kept in mind because it could have an impact on the influential power of the decoy effect.

A very famous study about the decoy effect was conducted back in 1982 by Huber, Payne, and Puto. These three researchers asked participants of the study to choose between two options. Option A was a five-star restaurant, which was a 25 minute drive away and option B was a three-star restaurant, which was only five minutes away. The way they designed the experiment was that the first two options had equal subjective benefits. The

subjective benefits of the option A was that it had superior five-star restaurant service, while the subjective benefit of option B was that it was only a five minute drive away. They conducted two different experiments utilizing option A and B. In the first experiment, they introduced an option C that was a four-star restaurant with a 35 minute drive. Results showed that after introducing option C, the majority of the participants preferred option A, the five-star restaurant that was 25 minutes away. During the second experiment, option C was introduced as a two-star restaurant located 15 minutes away. The results of this experiment showed that participants tended to prefer the three-star restaurant five minutes away (Zhang and Zhang). This study performed by Huber, Payne, and Puto clearly exemplifies the decoy effect.

Many more studies were conducted following this one, including Pettibone and Wedell's study performed in 1996 that consisted of three different experiments set up to test the reasons why the decoy effect occurs (Pettibone and Weddell). Their experiments led them to believe that there are two major reasons why adding an asymmetrically dominated option into a set of options persuades an agent to select the corresponding option more times than not. The two reasons are shifts in dimensional value and relational value. These reasons touch upon how people make decisions, and how it's the way they make a decision that leads them to fall for the decoy. More times than not, when a person is given a choice, they compare the options based on the characteristics that all of them have. This is opposed to valuing each option independently, then choosing the option that was attributed with the most value. When comparisons are made, it is easier to fall for the decoy that is essentially set up to make one of the options look more attractive. For this reason, the decoy effect has proved to be very useful in reaching consumers. But why should the use of the decoy effect be limited to capturing the

attention of *consumers*? It seems to me that it could be versatile enough to be applied to other fields, such as financial investing.

Investors are like consumers in the sense that they shop around for a product that is appealing to them and purchase it. Instead of the product being a shirt or cereal, it is something that is essentially intangible, like stock. Investors are comparing stocks every day to find what looks to be the most promising. The purpose of this study is to see if the decoy effect applies to financial theory, specifically investors' stock purchasing decisions. Based on the effect of this phenomenon in marketing, it seems that if an investor is presented with two different stocks that are almost identical in value, then the introduction of a decoy stock should influence the investor's purchase decision accordingly.

Data and Methodology

For the purpose of background knowledge and designing the survey, I gathered research utilizing a broad range of resources, including the internet, books, and encyclopedias. Because there have been very few studies related to the decoy effect as it pertains to finance, I focused primarily on experiments conducted in the field of marketing. I paid close attention to how the experiments were set up and analyzed the options given to the participants of the study. I noticed that the majority of the experiments followed the same basic format. The researchers first offered two choices that were very similar in overall value, but each individual choice consisted of a comparative advantage. For example, choice A would have a strong characteristic, X, and a "weak" characteristic, Y; whereas, choice B would have a strong characteristic, Y, and a weak characteristic, X. Even though choice A and B have comparative advantages, neither option has absolute advantage over the other. This can be

seen clearly in Huber, Payne, and Puto's experiment. The two characteristics that they choose to focus on were restaurant "star value" and driving distance.

I used this format, as well, to setup the first of three surveys. The two stock characteristics I use are growth and dividend income. In choosing these characteristics, I hoped that about fifty percent of the students surveyed would prefer growth, while the other fifty percent would prefer dividend income. I asked students to consider only the information I provided in the surveys. Stock A had a long-term growth rate equal to twenty percent and a cash dividend yield equal to two percent. Stock B had a long-term growth rate of ten percent and a cash dividend yield of seven percent (see appendix A for survey #1). Along with the experiment, I asked students to answer several other questions pertaining solely to demographics. These questions include what was their current year or class, major, cumulative GPA, knowledge about stocks, and whether they are male or female. This survey acted as the control survey.

Next, I designed another two surveys that include decoys. These surveys consist of the same questions about demographics as the first one. The only difference between these surveys and the first one is that a decoy stock is introduced, stock B. I keep the same long-term growth rate and cash dividend yield for stock A and B from the first surveys (stock B from the first survey is renamed stock C in both surveys #2 and #3). The decoy in experiment #2 was designed to persuade participants into choosing stock A, the stock with the comparative advantage of long-term growth. This decoy has a long-term growth rate of 15% and a cash dividend yield of only 1%. Based on prior experiments, I believe that the majority of participants will be persuaded by this decoy stock to choose stock A.

The decoy in experiment #3 was designed to attract participants to stock C, the stock with the comparative advantage of cash dividend yield. The long-term growth rate of this stock is set at eight percent and the cash dividend yield is 4.5%. Being that this stock is slightly inferior to stock C, I expect that the majority of participants will select stock C as the stock in which they would prefer to invest.

After designing each of the three surveys, I sent them to the University of New Hampshire's Research Integrity Services to be approved. After gaining approval, I passed out the surveys to students in one of my classes, Derivative Securities and Markets taught by Professor William Johnson. There were roughly 30 students in attendance on the day I passed out the surveys. Likewise, Professor Stephen Ciccone, my thesis sponsor, passed out the surveys to his undergraduate class of roughly 80 students. This allowed for a total sample of 107 college students. Broken down further, a total of 35 students took survey #1, 37 students took survey #2, and 35 students took survey #3. Each student took only one survey. A very brief summary of the demographics shows that about 62% of the students surveyed are male. The majority of the students had at least a moderate knowledge about stocks and all students were either currently in their junior or senior year of college, with the exception of one non-traditional student who is expected to graduate in 2013. To encourage students to answer the questions honestly, I passed out a consent letter to each student and asked that they read it before taking the survey (please see appendix D to view the consent letter). This letter stated, among other things, that the results will remain anonymous and that their participation is solely voluntary.

After collecting all of the surveys and compiling the results into an excel document, I analyzed their significance. I put the results into a table format, showing overall results and

differences in male versus female responses. I then used an excel document created previously by my thesis sponsor to find the two-tailed p-values based on the overall results, males only, females only and the participants' grade point averages. I used these p-values to determine, if there were any significance to the survey results. In addition to determining significance, I looked solely at the raw data to determine if there was any evidence showing that the decoy effect has influence on the students' stock preferences. The following section pertains to the results of the surveys.

Results

Please see the tables in the back for reference throughout this section.

In the control group, there are a total of 35 people surveyed. Twenty (57.14%) of whom selected stock A and the remaining 15 (42.86%) selected stock B. Considering the number of people surveyed, Professor Ciccone and I felt that these results were very close to what we wanted, which was fifty-fifty. The group that was surveyed with the decoy for stock A consisted of 37 people. The majority of the group, at 51.35% selected stock A. Two people, 5.41%, selected stock B and the remainder, 16 people or 43.24%, selected stock C. Pertaining to the survey with the decoy for stock C, the majority of participants, 51.43% or 18 out of 35, chose stock C. 40% chose stock A and three of the participants chose stock B. Based on these results, there seems to be evidence supporting that, overall, the decoy effect had influence over the participants' stock preferences.

Next, we examined if the decoy effect had more influence over males or females. In the control group, 60% of males chose stock A and 40% chose stock B. For the females, the results were fifty-fifty. Out of those surveyed with the decoy for stock A, 56.52% of males chose stock A; whereas, only 42.86% of females chose stock A. Out of those surveyed with

the decoy for stock C, both 50% of males and 50% of females chose stock C. While these differences may appear insignificant (please refer to the tables for the p-values), overall, they lend evidence that the decoy effect had a greater influence on the males' stock preference, than the females' stock preference.

We also investigated whether a student's grade point average had an effect on the influence of the decoy phenomenon. These results were not as clear as the ones for male versus female. GPAs were split into three different categories: low, average, and high. The low GPA group consisted of all students with a GPA less than 2.99. The average GPA group consisted of all students with a GPA between 3 and 3.49. Likewise, the high GPA group consisted of all students with a GPA greater than 3.5. Out of the participants that took the control survey, 71.43% of students in the low category selected stock A, 55% of the average category selected stock A, and 50% of the high category selected stock A.

Out of the students who took the survey with the decoy for stock A, the majority in both the low GPA and the high GPA category selected A. Only 43.48% of students selected stock A, opposing the 52.17% that selected stock C. In the study with the decoy for stock C, no participants that fall into the low GPA group were surveyed. Fourteen of the 25 students in the average group chose stock C and nine of them chose stock A. On the other hand, only four of the ten students in the high GPA group chose stock C, while five of them chose stock A. These results do not lend any evidence to whether a student's GPA affects the influence of the decoy phenomenon.

It actually appears that those with a GPA less than 2.99 prefer long-term growth, stock A, over cash dividend yield, stock B, despite the decoy. This is the same for those with a GPA greater than 3.5. Those that fell into the average GPA category and who took the control

survey, preferred stock A, long-term growth, while those that fell into the average GPA category and took either of the decoy surveys, preferred stock C, cash dividend yield. There is just not enough evidence in these results to say that GPA has an effect on the amount to which a student is influenced by the decoy effect.

Conclusion

Past research clearly shows that consumers are influenced by the decoy effect. A consumer's choice of product or decision of where to eat dinner is evidently influenced when a third option that is asymmetrically valued is introduced to a set of two choices. Following the experiment design used by past researchers of the decoy effect, the survey I created was set up to analyze the decoy effect's influence on investors' stock purchasing decisions. Based on overall results, it appears that the decoy effect does apply to financial theory, in that it has some influence over the stock selection decisions made by investors.

The insignificance of the results and differences could be due, in part, to the small sample size. I calculated new p-values utilizing the percentages from the survey, but changed the sample size. When the sample size was tripled, the p-values proved that the differences are significant for both the overall results and the male and female results. Therefore, it is possible that the insignificances in the results are solely due to the sample size and can be overlooked in regards to this experiment.

Several of the calculated percentage results of the survey show that the majority of students preferred stock A, and the long term-growth of 20%. Upon reflection, I have to wonder if this percentage was set too high in comparison with stock B's high cash dividend yield of 7%. Lowering the 20% long-term growth yield to about 17% could have resulted in less of a "pull" towards stock A. This in turn, could have resulted in a stronger decoy effect.

Despite the insignificances in differences and small variations in percentage results, the fact remains that overall there is evidence that the decoy effect has some influence on investors' stock preferences. Just looking at the percentages in overall results, it is clear that the majority of participants selected stock A when the decoy for stock A was introduced and the majority of participants selected stock B when the decoy for stock B was introduced. This leads me to believe that my hypothesis that the decoy effect can be applied to financial theory, specifically the stock decisions made by investors, is true.

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Table 1

n = 107	Overall	Male	Female	Difference (Male – Female)
Control				
A	57.14% (20)	60.00% (15)	50.00% (5)	10.00%
B	42.86% (15)	40.00% (10)	50.00% (5)	-10.00%
Decoy for A				
A	51.35% (19)	56.52% (13)	42.86% (6)	13.66%
B	5.41% (2)	4.35% (1)	7.14% (1)	-2.80%
C	43.24 (16)	39.13% (9)	50.00% (7)	-10.87%
Decoy for C				
A	40.00% (14)	44.44% (8)	38.89% (7)	5.56%
B	8.57% (3)	5.56% (1)	11.11% (2)	-5.56%
C	51.43% (18)	50.00% (9)	50.00% (9)	0.00%
Decoy for A in comparison with Decoy for C				
A-A Difference	11.35	12.08	3.97	8.1
p-value (two-tailed)	0.1670	0.2213	0.4103	0.1231
B-B	-3.16	-1.21	-3.97	2.76
p-value	0.2991	0.4249	0.3511	0.2784
C-C	-8.19	-10.87	0	-10.87
p-value	0.2433	0.2423	0.5000	0.0224

Table 2

GPA	Low (less than 2.99)	Average (3-3.49)	High (3.5-4)
Control			
A	71.43% (5)	55.00% (11)	50.00% (4)
B	28.57% (2)	45.00% (9)	50.00% (4)
Decoy for A			
A	57.14% (4)	43.48% (10)	71.43% (5)
B	14.29% (1)	4.35% (1)	0.00% (0)
C	28.57 (2)	52.17% (12)	28.57% (2)
Decoy for C			
A	0.00% (0)	36.00% (9)	50.00% (5)
B	0.00% (0)	8.00% (2)	10.00% (1)
C	0.00% (0)	56.00% (14)	40.00% (4)
Decoy for A in comparison with Decoy for C			
A-A Difference	57.14	7.48	21.43
p-value (two-tailed)	-	0.2983	0.0020
B-B	14.29	-3.65	-10.00
p-value	-	0.3009	0.3954
C-C	28.57	-3.83	-11.43
p-value	-	0.3951	0.3137

1. Male or Female? _____

2. What is your current class/year?

Freshman

Sophomore

Junior

Senior

Non-Traditional

If non-traditional, in what year do you expect to graduate? _____

3. What is your major (and option if applicable)? _____

4. What is your cumulative GPA? _____

5. How would you rate your knowledge about stocks?

Very low

Low

Moderate

High

Very high

You are looking to invest in a single company. You have narrowed your stock choices down to Stock A and Stock B (below). You will base your stock-purchasing decision on two stock statistics: the long-term growth rate of earnings and estimated cash dividend yield.

Based solely on the information below, please select which stock (A, B or C) you would prefer to invest in and write your response on the line:

Stock A

Long-term Growth Rate = 20%

Cash Dividend Yield = 2%

Stock B

Long-term Growth Rate = 10%

Cash Dividend Yield = 7%

STOCK _____

Thank you for your participation.

1. Male or Female? _____

2. What is your current class/year?

Freshman

Sophomore

Junior

Senior

Non-Traditional

If non-traditional, in what year do you expect to graduate? _____

3. What is your major (and option if applicable)? _____

4. What is your cumulative GPA? _____

5. How would you rate your knowledge about stocks?

Very low

Low

Moderate

High

Very high

You are looking to invest in a single company. You have narrowed your stock choices down to Stock A, Stock B, and Stock C (below). You will base your stock-purchasing decision on two stock statistics only: the long-term growth rate of earnings and estimated cash dividend yield.

Based solely on the information below, please select which stock (A, B or C) you would prefer to invest in and write your response on the line:

Stock A

Long-term Growth Rate = 20%

Cash Dividend Yield = 2%

Stock B

Growth Rate = 15%

Cash Dividend Yield = 1%

Stock C

Growth Rate = 10%

Cash Dividend Yield = 7%

STOCK _____

Thank you for your participation.

1. Male or Female? _____

2. What is your current class/year?

Freshman Sophomore Junior Senior Non-Traditional

If non-traditional, in what year do you expect to graduate? _____

3. What is your major (and option if applicable)? _____

4. What is your cumulative GPA? _____

5. How would you rate your knowledge about stocks?

Very low Low Moderate High Very high

You are looking to invest in a single company. You have narrowed your stock choices down to Stock A, Stock B, and Stock C (below). You will base your stock-purchasing decision on two stock statistics only: the long-term growth rate of earnings and estimated cash dividend yield.

Based solely on the information below, please select which stock (A, B or C) you would prefer to invest in and write your response on the line:

Stock A

Long-term Growth Rate = 20%

Cash Dividend Yield = 2%

Stock B

Growth Rate = 8%

Cash Dividend Yield = 4.5%

Stock C

Growth Rate = 10%

Cash Dividend Yield = 7%

STOCK _____

Thank you for your participation.

Dear Student:

I am conducting a research project to find out about how individuals make stock selection decisions. I am writing to invite you to participate in this project. I plan to work with approximately 60 participants in this study.

If you agree to participate in this study, you will be asked to take a survey requiring about five minutes.

The potential risks of participating in this study are minimal. This study will help give an understanding of how individuals make stock selection decisions.

Participation is strictly voluntary; refusal to participate will involve no prejudice, penalty, or loss of benefits to which you would otherwise be entitled. If you agree to participate and then change your mind, you may withdraw at any time during the study without penalty.

I seek to maintain the confidentiality of all data and records associated with your participation in this research. Results will be used as a part of my Honors thesis and will be available to myself, Professor Steven Ciccone, and the Honors Program Board.

The work will be conducted by me, Brittany Paris, and my sponsor, Professor Ciccone. I am a senior at the Whittemore School of Business who is currently writing my Honors thesis as a requirement for the University Honors Program.

If you have any questions about this research project or would like more information before, during, or after the study, you may contact me at bmu32@unh.edu. If you have questions about your rights as a research subject, you may contact Julie Simpson in the UNH Research Integrity Services at 603-862-2003 or Julie.simpson@unh.edu to discuss them.

Sincerely,

Brittany Paris
Student at the Whittemore School of Business