BACHELOR'S DEGREE FINAL PROJECT

ANALYSIS OF COGNITIVE BIAS "ILLUSION OF CONTROL" IN UNDERGRADUATE'S STUDENTS' FINANCIAL DECISION-MAKING.

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Table of Contents

Abstract

A considerable amount of literature has proved that, when it comes to illusion of control, there is a tendency to confuse a belief with skills for obtain an expected result has a high probability of occurring ignoring all the external factors. The illusion of control has received little attention in the literature, compared to other cognitive biases. This paper is first intended to cover a gap in which the starting point is the assumption of evaluating the effects of this bias in individuals' behaviour using an experimental methodology and therefore, analyse the possibility of moderate its effects for performing a risk analysis considering every factor and detail, and being close to an optimal financial decision. Results of this reviews confirm the previous studies about the relationship of the variables while exposing a special insight about the individuals' risk reaction when assessing the bias with the external elements that tends to increase its effects.

Keywords: Control**,** Risk perception, Belief, Investment decisions, Competitors influence, Previous experience.

1. Introduction

When it comes to confidence, the mind has the ability to make everything around seemingly reachable, meaning that, when a situation can be handled with a particular level of confidence, the negative factors that may affect the process and final result are hidden from individuals' sight and, instead, they focus their attention on the skills that the person affirms to have. Therefore, individuals are able to create this confidence during a certain period of time based on their skills, which already had been acquired assessing different situations.

Generating confidence is nearly uncontrollable, but when that confidence leads individuals to the assumption (or a most recognizable word, belief) that they are able to control every positive situation by changing and shaping the different variables to make them favourable, this perception "alters" the reality and make them believe that every negative result comes from random causes out of their control. Instead of confidence, individuals are under the influence of the bias of "illusion of control".

In the last decades, different studies, related to cognitive biases and their influence in the economic field, have shown how unaware individuals are about their effects, and this may become a thread for future research. This paper aims to deepen into the presence of the illusion of control in undergraduate students and the role of other features, mainly their financial knowledge and their risk aversion.

The rest of the paper is structured as follows: section 2 provide a brief literature review on the bias of illusion of control; section 3 describes the methodology and the sample; section 4 shows the main results; section 5 provides a discussion and finally section 6 details the main conclusions, limitations and future lines of research.

2. Literature review: illusion of control

The main feature to describe this cognitive bias would be "expectancy", as Ellen J. Langer (1975) defined: *"an illusion of control is defined as an expectancy of personal success probability inappropriately higher than the objective probability would warrant."*. The high expectancy is well related to individuals' skills, and how they adapt those skills to the different factors that influence the illusion of control, including the familiarity with a task, the involvement of the individual with a situation, how they react to their opponents, or the

perception of their freedom to act (Simon & Houghton, 1999). Therefore, people tent to confuse being skilled with being a situation where probability has a strong involvement, and therefore, people make decisions and act based on this mistake. The most predictable scenario in which the illusion of control is revealed comes when individuals focus on success and gain situations, showing the strong relationship with emotions that individuals, which found themselves in a positive mood, can develop in these circumstances (Thompson et al., 1998). This relationship with emotions generates a specific behaviour that make people unaware of the motivational factors affecting their behaviour. Moreover, adding the similarity between a scenario where luck has strong involvement and individuals' skills, create a tendency in which illusion of control is higher (Langer, 1975). There are different variables that can lead individuals to increase their illusion of control. As mentioned before, a situation focused on achieving success is one of them, but also in stressful circumstances.

This bias works in two different directions regarding the circumstances. When individuals are expecting positive outcomes, the judgement of control increase, and when the scenario tends to lead negative outcomes, it generates opposites feelings, increasing the feature of changing reality. Readers can relate this by imagining individuals' mind as a seesaw, in one side trying to obtain a positive outcome and on the other side avoiding a negative one. Nevertheless, no matter for which side the seesaw leans more, it will lead to the same results, producing insensitivity to feedback, impeding learning and predisposing toward greater risk-taking (Fenton-O'Creevy et al., 2003).

Skill, chances and motivation are the bases for creating strong beliefs on individuals. Rawsthorne and Bruce (1996) differentiated two kinds of control beliefs: realistic and unrealistic. The difference between them is that control is objectively possible in realistic belief, whereas in unrealistic belief the illusion of control is present in circumstances where control is not objectively possible (Zuckerman et al., 2004). The problem for individuals is distinguishing between these control beliefs and, when dealing with financial investments, the confidence on their skills is attached to a certain level of motivation, increasing in such a way that illusion of control appears as an unrealistic control belief. Surely this could be a threat.

3.1.Illusion of control and the relevance of data

Through the way of understanding the actions that lead illusion of control, all the main questions rely on the personality and individuals' way of thinking. Thereby, it is necessary to find some links of how individuals develop this kind of behaviour, what information and data are they ignoring, and why they react so blindly to variables.

Daniel Kahneman, in his book *"Thinking fast and slow"* (Kahneman, 2011), illustrate and explain how complex and tricky the mind can be, dividing the way of reaction in two systems: system 1 and system 2. The first system works faster and automatically with less effort than the second one, which demand operations and attention to every situation and is related with the experience of acting, choosing and focusing.

After reading the main definitions and features of illusion of control, and with a brief investigation on how the mind typically tends to react, it is found a relationship between this cognitive bias and the described "system one". Confidence make them trust in a limited number of samples to reduce their probabilities' estimations, performing simplest operations (Kahneman & Tversky, 1974). The wrong selection of sample size is a general illusion for individuals, creating a misunderstanding on results because they are only working with variables that seems more approachable to the outcome they want to obtain. In other words, when illusion of control is present, people ignore completely the functions of "system two", working with a faster and automatic system reaction, and increasing the risk in every decision made.

In statistics, when people is under illusion of control, data is not meaningful and probabilities become a higher frequency of positive cases (Thompson et al., 1998). Translating this information into a financial context, the illusion of control causes several mistakes, assuming higher risk based in previous experiences of success, and showing an excess of confidence (or overconfidence) in their knowledge and their ability to analyse information. In financial markets, this behaviour leads to overtrading and under diversified portfolios.

When is about strategic decisions, the extensive information may be difficult to evaluate and to determine what kind of information is needed, and one of the characteristics of acting under illusion of control is the simplification of individual's decision making. Therefore, the strategic methods needed in every business field are limited, giving that the illusion of control makes failures seems as immaterial (Simon & Houghton, 1999). Individuals tend to

persist in a failed strategy seeking to control, instead of adapting to situations and the different variables that may influence.

Henri Barki, after describing risk as *"a reality in our minds which disappears when an event occurs"*, explained that the best way to handle risk is managing tools that individuals think it would work best to their purpose (Barki, 2011). Thus, it is necessary to develop and apply the standpoint that, when people are working in any financial project, not only to learn about how well it could work, but also, how failure might be present, studying the most effective alternative to handle this possible event. It is very important to bear in mind a scenario of how any future decision for an investment, project, business, can go wrong (Gaba et al., 2009).

Framing the relationship between illusion of control and risk, strategy, data and probabilities, people could be aware of this bias. It is a chain that leads to minimize effort by overestimating probabilities, increasing confidence while decreasing positive results, trusting in probabilities that, pretty often, are less probable to happen. It is based mostly in a belief that skill will overcome negative outcomes, generating risk decisions for the satisfaction of feeling competent enough and being able to handle it. *"The feeling of competence from being able to control what seems uncontrollable"*(Langer, 1975). It is, indeed, a strong thought and desire, with a poorly strategical and methodical way to manage it, leading instincts and skills to the expression *"what we see is what it is"* (Kahneman, 2011)*.*

3.2.Illusion of control and decision-making

As mentioned before, one of the most predictable scenarios where illusion of control increase, is when individuals are under stress. Furthermore, knowing how this bias works in selecting relevant data and ignoring a large amount of information; it would help to build a view of decision-making process for individuals under illusion of control.

In business, frequently, most decisions are generated in complex situations (Thomas, 2018). Thus, the probability of making a decision under the influence of this bias is very predictable. Particularly, the investment decisions may be influenced by their own financial interest (König-Kersting et al., 2020).

In a decision-making situation, illusion of control makes individuals' mind to focus on finding related aspects with knowledge that they already known and success experiences that worked before. What they are not able to realize is that there are multiple variables that could be on their side, again, confusing skills with probability.

In the business field, people have much less control than they assume, working with models and tools to help them to make decisions as if they can control risk, instead of recognizing their lack of control to get a successful outcome (Gaba et al., 2009).

The individuals' perception regarding specific topics is different when they don´t have any information, rather than when they have information with no value (Kahneman & Tversky, 1974). Usually, they will work harder in tasks that they think are controllable.

As a general view, the previous statement does not seem illogic. People involve themselves in conversations, actions, environments in which they have some experiences in, talking about what they already know. The problem arise when individuals adapt those beliefs to every scenario, without recognizing the constant evolution, variables, reasons, findings, and ignoring other results and responses, thus causing that their previous thought lose strength, mostly because they only consider limited alternatives which can make them take a less comprehensive decision (Carr & Blettner, 2010).

At this point, there is one warning and two main questions to consider in every decision-making. In the financial field, first is necessary to be aware of how much individuals can trust in their investment, always bearing in mind the several aspects that slip through their hands and, therefore, their control. It is also very important the process of questioning themselves about which of their beliefs are still useful and which not, in order to generate a more successful outcome (Simon & Houghton, 1999). And finally, the most important factor on the decision-making process of individuals, is evaluating the way of perceiving risk.

Extensive research has provided important information about different situations in which illusion of control is present and, by assessing several experiments, it is found when this bias tends to increase. Nevertheless, much uncertainty still exists about the possibility of individuals to recognize the effects of the bias and to act so as to reduce the negative consequences.

Mark Simon and Susan Houghton found three essential aspects that could help to correct the effects that this bias produces. It is mostly based on using one of the main illusion of control's

problem and taking advantage of it. *"Underestimating risk may be necessary"* (Simon & Houghton, 1999). Not considering risk in a situation can cause, as a consequence, that individuals immerge themselves in a process of learning, becoming more flexible to adjust their future assumptions, develop deeply evaluations of the environment and competitors' skills and competences. Therefore, a solution for minimizing illusion of control could be examining the relevant factors, finding a balance between previous beliefs and the several variables that are constantly changing and create a highly possible way to affect what individuals think it would be a predictable and controllable positive outcome to them.

3. Hypotheses development

The main aim of this research is to explore whether risk perception could be managed to make individuals aware of the presence of illusion of control, in order to make better financial decisions. For such goal, it is necessary to evaluate some specific variables that individuals might find present in this situation.

Ideally, it would be essential to be completely aware of their own biases for a realistic assessment of any financial decision (Metilda, 2019). This is, for sure, a difficult task, because analysing their own-self is harder than analysing others. At first sight, individuals recognize others' mistakes without taking into consideration their owns, and when illusion of control materializes, individuals find themselves in a failure stage, too late for correction (Llorent et al., 2019).

There is one element that has been mentioned before and is able to be present in every decision. Risk is a warning variable that individuals need to evaluate carefully and is well related to illusion of control, since it may affect the level of the bias effects on individuals and take completely different directions in the decision-making process. The subject may become a risk-adverse or, instead, risk-seeker, based on a belief of being able to handle the situation and control the affecting aspects, in order to achieve a successful financial decision. Their preferences will lead them to invest more or less, considering if the offered method is well adapted to their level of control. It means they are less risk adverse when using well-known methods that already have been worked before, inducing an illusion of control of being skilful enough on that area (King King, 2011).

Usually, in a company, managers seek to predict the state of the external and internal environment of the organization. When an entrepreneur takes a risky decision, he/she is

applauded and recognized as being able to anticipate success, whereas the one who is more sensitive to risk is seen as shy and indifferent. Those are signs of focusing in the role of attitude, ignoring the role of luck, and easily incurring on illusion of control (Kahneman, 2011).

Before any financial decision, investors' first thought is related to benefits and costs, and the illusion of control is able to link these factors with risk perception. Working as a chain, the cognitive bias influence risk perception and, therefore, risk perception directly influence the process of decisions-making, finding an indirect relationship between the bias and the decisions through individuals' risk perception (Metilda, 2019).

The definitions of psychological benefits and psychological costs are described by Daniel Kahneman (2011): individuals are risk-adverse with earnings, and risk-searcher with losses. The psychological cost of losing is reflected when individuals prefer to secure a certain earning rather than a hypothetical bigger amount. On the other hand, the psychological benefit of receiving appears when they can avoid a certain loss by choosing a scenario with a consider higher level of risk. Therefore, reaching a balance point between the two psychological benefits and costs, individuals would be able to decrease the impact of perceiving risk by being influenced by illusion of control, reducing its effects for a better analysis of risks and a successful decision-making. The key for this variable relies on the following question: "¿are individuals aware about their aversion / affection to risk-taking when they plan to make decisions, or instead, they tend to ignore this feature, influenced by their illusion of control?"

From now on, risk perception is going to be the main connector for the assessment between illusion of control and the effect on the financial decision making. To evaluate the effect of the bias it is necessary to introduce some variables that directly affect individuals' risk perception: the competitors' influence and the trust that individuals have on their previous experiences.

The main intention for assessing illusion of control with these two variables is to measure the bias as an independent variable which is able to reduce its effects on individuals' risk perception, all of this by being affected for the two mentioned elements which are working as mediating variables. Therefore, the evaluation will lead the research to obtain the stage

where individual is not taking neither riskiest decisions nor being completely averse to risk, the point where they would be closest to achieve a successful financial decision-making.

H: Individuals recognizing their level of risk perception, may be able to reduce their illusion of control and achieve a successful financial decision-making.

3.1. Competitors' influence

One of the beliefs that illusion of control produce on individuals is that competitors' response will not affect their chance of success (Kannadhasan et al., 2014).

There is a difference in the way of individuals react when they have information about previous competitor's wins, compared to when they are not informed about it. Experiments have shown that having information about the competence or about a previous gain, will increase risk taking and illusion of control will work as a mediator between these two variables (Martinez et al., 2010).

At first sight, it seems that the variable of competitor's influence is present on individuals and their illusion of control effect will alter the situation assigned regarding their competence and competitors´ skills. Providing an insight into this effect, Langer (1975) explained, after carrying out some experiments, that subjects playing against a confidence competitor will manifest illusion of control by taking more risk to appear similar to his/her opponents, whereas, playing against an awkward competitor will also have an increase of risk, but this time to prove that the individual is different from his/her competitor (Langer, 1975). Within this interpretation it is easy to visualize how illusion of control works involving this new variable and there is also a strong connection between the main element (risk) and the introduced new factor (competitors' influence), while experimenting a situation under the bias. The main assumption is that this factor is directly related to risk and individuals will increase their illusion of control while reducing the chance of making a successful decision.

Extensive research has been carried out with the aim of proving the increase of illusion of control while having information about the individual competitor. However, this research seeks to obtain data that will help to address a research gap, providing extent information in which this new factor may be useful to reduce the illusion of control's influence on individuals.

In order to accomplish the investigation aim, it is necessary to perform an assessment and compare if illusion of control is affecting more drastically individuals who already have information about their competitors or the ones who don´t and they are just being affected for the bias whit their own belief of being skilful enough and have control to achieve a positive final result. Evaluating the difference between these two scenarios, it would make possible to find out in which case the illusion of control is affecting the most the individuals' possibilities of recognizing their risk perception, leading the investigation toward the main hypothesis (H) by applying the factor of competitors on the bias.

H1: Competitors' influence will moderate illusion of control's effect on individuals' risk perception.

Figure 3.1. Research Model 1
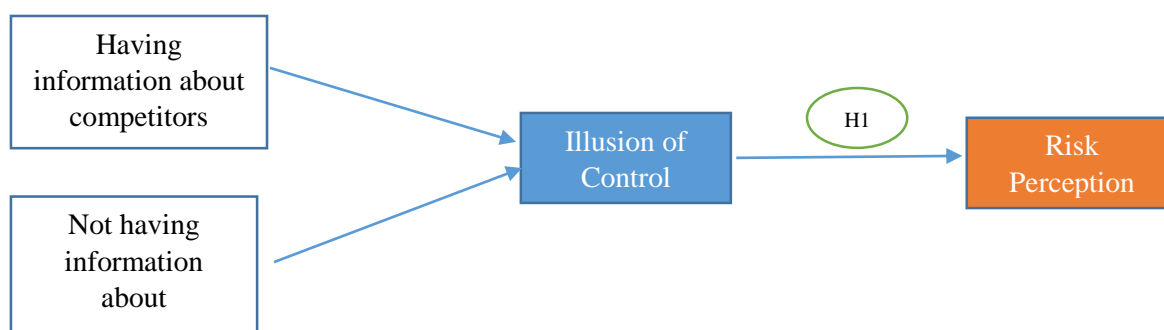
Source: own elaboration

3.2. Trust in previous investments

There are many questions wandering in individuals' mind before any financial decision-making, most of them related to external factors affecting the project, business, inversion, that is being carried out. But difficulties arise when analysing the internal/personal factors, qualifying their own skills in every new opportunity and the best methods to work with to develop the financial decision.

The main problem that leads to incur in illusion of control, and therefore, obtaining a lower-quality financial decisions, is assuming that it will be a successful outcome because it has been working like that in previews attempts. Instead of having this kind of assumption, individuals should proceed to analyse and evaluate how much they should trust in their previews successful experiences, considering all the elements involving in the situation, even

if it is similar to previous successful outcomes. However, it is essential, for making any financial decision, that individuals recognize in which degree they should increase their perception with the several variables affecting.

Talking about perception, the tendency of an individual who belief that he/she is able to control, or at least, to have an influence on the final results (when indeed it is not possible), shows an irrational behaviour on financial fields. Investors manage stock markets as if it were a game of chance (Carmona et al., 2019). Studies has shown that when the subject is in a decision-making situation, adding the illusion of control' effect, make them be less attentive since they tend to use their past experiences (Carr & Blettner, 2010). Therefore, the perception is playing a role of predicting a possible positive outcome, or that is what illusion of control make individuals' belief in, by ignoring all the elements that are able to lead the decision to the opposite direction, obtaining a negative outcome, because they rather to trust in previous successful attempts.

Again, illusion of control is a mediator through previous experiences and risk, this time increasing the perception of predicting an outcome regarding the trust individuals have on their previews investments, which is going to make them take riskier decisions and, therefore, individuals will not be able to reach the balance point for a successful decision-making.

Now, as this cognitive bias is capable of manifesting in both ways (chasing a successful outcome while avoiding a negative one), illusion of control tends the most for the belief of predicting a positive outcome. However, here is an assumption that this bias might be also apply its effect on individuals' perception for predicting negative outcomes (Rovira Faixa et al., 2000), this time increasing the subject's perception for a better evaluation of the situation based on their previous experiences and considering the possibility of how, a method that worked before, could take another direction and change for a negative result.

Implementing illusion of control for predicting a negative outcome will help for reaching the balance point between risk-adverse and risk-searcher, hence, it is necessary to assess if illusion of control is higher on individuals who try predicting a positive outcome based on previous experiences ore those who try to predict a negative one. As the previous experiment, and comparing the results between these two perspectives, it would make possible to find out in which case the illusion of control is affecting the most the individuals'

possibilities of recognizing their risk perception, leading the investigation toward the main hypothesis (H) by applying the factor of individuals' trusting in their previous investments on the bias.

H2. Previous experiences will moderate illusion of control effect on individuals´ risk perception.

Figure 3.2. Research Model 2
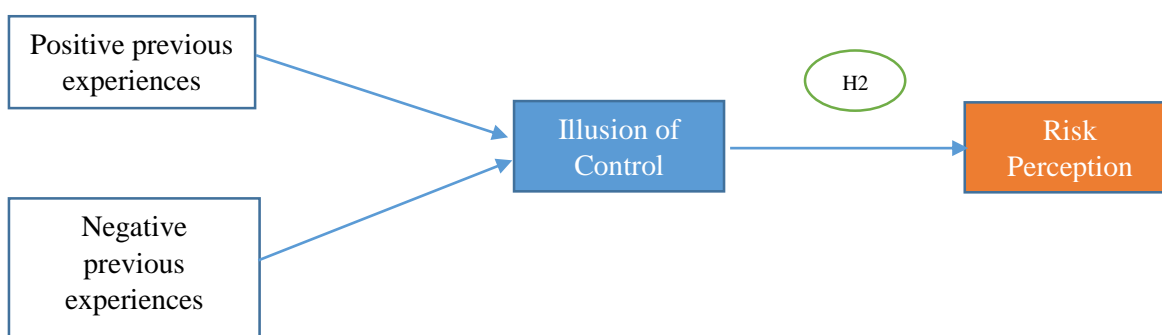
Source: own elaboration

Creating a general view, the overall structure of the investigation may be divided in two parts. The first one with the principal aim of reaching H1 and H2 by evaluating situations in which previous experiments already have shown that illusion of control appears when the two main elements of study (competitors' influence and trust in previous investment) are taking in consideration. But now, the idea is take advantage of the bias achieving a different direction of it effects by moderate it and reduce their consequence on individuals' risk perception.

The assessment will be conducted by the two mentioned variables, studying in which case the level of illusion of control is higher on individuals in specific scenarios where these two factors are present. The goal is reaching one first conclusion related to risk perception and individuals being less adversary/searcher of risk, that will make possible to accept or reject H1 and H2.

Consecutively, the second part will be lead the investigation to the main element (risk), that works as a connector, affecting directly the outcome of the decision-making while it's being influence by illusion of control's effects.

From this point on, the aim is using the bias influence on individuals, that already have been evaluate it in the first section of the investigation by mediating their illusion of control

effects, and confirm that individuals are able to recognize themselves as risk-adverse or risk-searcher having a better risk perception, which mean, they can lead their process of decision-making in an effective direction of reaching a balance point and, thus, a better successful decision-making. Reaching a second conclusion directly related with financial decision-making, it will make possible accept or reject H.

Figure 3.3. Research Model 3
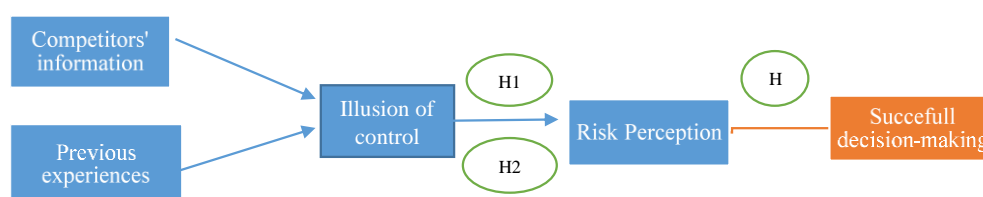
Source: own elaboration

It is well established that cognitive bias appears in several situations, and it makes difficult for a person under its effects to be aware and recognize that is being influence by this one. Therefore, the possibilities of taking action and being conscious enough for solving the way of reaction and taking decision is limited by a margin composed with less probability to happens.

It is beyond the scope of this study to demonstrate that individuals could be able to get rid of their cognitive biases, for the contrary, acknowledging how difficult the chances of completely eliminate the effects of illusion of control seems to occurs, the objective and reason of the investigation is find a new perspective of the situation and discover a solution where, usually, people tend to identify a problem, all this by performing experimental questionnaires and evaluating the possibility of taking advantage of the bias effects and lead individuals to taking better actions and increasing their perceptions for carry out deeper evaluations on the needed process of decision-making.

The evaluation model is composed by different variables. Each exposed hypothesis reflect how some of them connect directly with the bias and therefore indirectly affect the main studied variable (risk). However, it is necessary to explain the directly connection between risk and the financial decision-making, which are going to depend one from each other. Obtaining results from risk will directly throw results measuring the quality of the financial decision taken.

It is unquestionable that perceiving risk plays a significant role for taken decision and this variable is likely to being affected by illusion of control, usually because people try to simplify the amount of information related when a decision is needed to be taken (Keh et al., 2002).

In previous studies, there is a potential tendency of using risk as a mediated variable, able to increase the illusion of control regarding the level of risk on individuals. But this time, one of the purpose of the research is to add different mediating variables inferring directly on the bias and then achieve the risk stage with less illusion of control influence. Hence, if the investigation is able to obtain a clearest perception of risk, this will be follow with an evaluation of the different aspects affecting a situation and leading individuals to take a financial decision with carefully assessment. Thus, it is important for individuals to be able to minimize their illusion of control effects enough to develop a positive evaluation when taking financial decision.

By performing a main evaluation between risks and decision making processes, the probabilities of reducing illusion of control would be poorly. This is caused, mainly, for the large proportion of shared beliefs that reduce the recognition of the subject for questioning their skills (Houghton et al., 2000). Instead, they predispose themselves to incorrectly incurred in a conclusion of pursuing risky actions believing that their skills make a difference, reflecting the negative relationship between illusion of control and risk.

The key problem with this explanation is that the probability of having strong effects of illusion of control are likely to increase from the risk perception of individuals. That's why before reaching this scenario it is important to minimize the bias effects, and that's when the two previous assessment are needed and have the aim of making individuals aware of external factors so they could be able to examining the relevance and range of their skills.

The questions related with emphasizing in previous experiences are intendent to assets students in the scenarios of using both, positive and negative experiences on the field, obtaining results for comparing the bias level in both situations and confirm/deny that this element is able to mediate illusion of control by helping individuals to take in consideration factors that can lead their decisions to negative outcomes and, therefore, being more thoughtful when perceiving risk.

On the other hand, the questions related with how individuals perceive their competitors and how aware are they about the skills and competence that their opponents have, has as purpose measure the level of illusion of control when individuals, either, are well acknowledging about their competence or not. Hence, this studied variable should mediate the bias through the point of make individuals questioning their skills, performing better assessments of the risk involved and finding the best way of reaching a positive decision making.

Considering the already demonstrated results in previous studies regarding the negative effects of illusion of control, it is expected to obtain negative result while assessing the bias with the mediating variables and reach the scenario of evaluating risk perception with a high level of illusion of control. But also by working with two different scenarios to find out in which of them the effect of the bias is lower, it will be possible to achieve the aim of adding the perspective of how the bias affects from a different point of view in which it can be used as a positive achievement of better results in decision making by reducing the bias in the process.

This investigation could add a different perspective from what we already know about illusion of control and, as difficult as it seems to have a perfect balance for the perception of risk, at least try to minimize as much as possible the bias effects before reaching the evaluation stage of decision making, and from that point, being able to perform a better risk evaluation before taking any financial decision.

4. Data, methodology and experimental questionnaire

In order to perform the evaluation model, an experimental questionnaire was created to measure each variable (see appendix). With a sample of 101 students of the University of Almería, from different degrees and range of ages, the aim of the evaluation is to present situations where the participants will find themselves in the need of show their level of illusion of control and answer the questions related with the financial decision-making while being mediated by the bias.

For controlling the bias measurement, the introduction of illusion of control in the questions were composed with the aim of evaluate the bias as two factors. The first one analysing how individuals are manifesting their illusion of control before introducing the financial questions (structural), placing participants in basic situations in which they are able to expose the bias as a stable and long lasting manner. On the other hand, the second factor is presenting in

question for testing how the bias is shown by individuals when introducing the financial question, this time exposing a changing status of the bias whereby it tends to modify, for better or worse, the previous stable structure created by the structural factor.

Since the variables are strongly connected with each other, it is necessary to make questions to follow a sequence in order to create a relationship between each of the evaluations' sections. The idea is that individuals' execution of questions works as a chain, answering the next questions while considering the previous one.

The sections of the survey attempt to measure:

- Personal data: the control variables were collected in the first 3 questions, where students indicate their ages, gender and current study degree.

- Everyday actions - Illusion of control in everyday situations: Given that the investigation starting point is form the assumption of having illusion of control effect and trying to use it as advantage and achieve better results, this section is intended to measure the participant's illusion of control level as a general view, and start to determine which of them tend to be more predispose to this bias. As mentioned before, here, the different questions (4-8), were presented with the idea of measuring the bias from a structural point of view and evaluating the level at which students are considering the fact that luck is a relevant element and is present in daily actions that usually people tend to confuse with controllable situations.

- Risk profile: Before linking the independent (illusion of control) and dependent variable (risk), it is necessary to obtain a specific profile that describe how students are responding to each of its variables individually. The following questions (9-14) asked to participants have the main aim to rate how strongly they agree or disagree with each statement related with how they perceive risk considering a general points of views of the variable. From this section on, the investigation is able to distinguish between those participants presenting higher/lower level of illusion of control and being more adverse/searcher of risk.

- Gambling - illusion of control in games of chance: After testing illusion of control as a structural perspective and obtaining how individual react in those situations to the bias, the questions (15-18) were designed to study the tendency of the bias on

individuals presenting changes that increase or decrease their effects in situations that directly demand a stage of incurring in illusion of control.

Immediately, the next questions are related with the variable of competitor's influence while taking in consideration the previous results differentiating individuals from having more illusion of controls and increasing their risk taking willingness. Adopting the format used by Langer, questions 19-20 are presented as a case when individuals should distribute three lottery number between them and two other persons. In her work (Langer, 1975), Langer demonstrated with this experiment how subjects tend to relate their skills with the competitor who seems more confident and experimented, giving the closest number to their opponent.

This time, the investigation aim is to compare what they decide to do when there is not information about their opponents and when the features are presented, discovering if their want to change their previous answer. According the obtained results, the investigation is going to be able to find out in which scenario illusion of control increase, considering that there are some individuals already presenting levels of the bias effects from the previous analysed sections.

- Risk preference in monetary issues: For this section the idea is to measure the students' risk perception whit the aim of obtaining results that confirming the relationship between the bias and risk, validating that individuals that already are presenting higher level of illusion of controls, tends to reduce their risk perception and take more riskiest decisions; and those with lower level of its effects tends to consider risk as a relevant factor that needs to be evaluate before any decision. Exposing the influence of the bias on the main evaluation variable (risk). Questions 21 to 26 were created to measure at which level they are willing to assume certain level of risk for a hypothetical outcome. This time the assessment is an adaptation from the "Prospect Theory" developed by Amos Tversky and Daniel Kahneman, in which they assume that individuals have a different reaction regarding risk and, thus, they value losses and gains differently, making decisions based on perceived gains instead of perceived losses.

For this questions a case scenario was presented, placing individuals in a specific situation of choosing between one of the two options available in which, in both options, (secure amount or probability), quantities are mathematically equivalent.

Therefore, individuals will need to show their attraction to take risk considering if they are receiving or losing a hypothetical amount of money. Question 27 is intended to assess if individuals perceive themselves as risk searcher or risk adverse, exposing their preference to relate risk with gains or losses.

- Financial investment - previous experience and preferences about them: Consecutively, the last section was designed for analysing the trust that individuals have in their previous experiences, comparing between when the obtained results is a positive or negative outcome. The purpose for questions 28-36 was create a scenario considering that individuals develop a financial investment with the principal aim of testing the participants disposition to performing the same previous strategies, evaluating if the illusion of control effects allows them to consider the negative outcomes as a possibility to predict what can easily go wrong in future investments.

Finally, the last two questions were asked with the role of achieving the individuals' perception regarding H1 and H2. Question 37 was created to measure H1 and confirm or deny if individuals being influence by illusion or control and with a certain risk perception are able to consider the competitors' influence variable, which is recognized as easily being affected for the bias, as a positive factor for a better assessment of risk and, therefore, achieve a possible successful financial decision. Likewise, question 38 was created to measure H2 and confirm or deny if individuals being influence by illusion or control and with a certain risk perception are able to consider the trust in previous experiences variables, as a positive factor for a better assessment of risk and, therefore, achieve a possible successful financial decision. The different analyses were performed using the statistic tool SPSS (version 25).

5. Results

5.1. Descriptive Analysis

A descriptive analysis has been carried out to obtain an approach by summarizing the data. This methodology will help the investigation by synthesizing the information, providing precision, simplicity and to clarifying the results obtained in the experimental questionnaire.

The analysis follows the questionnaire sections' divisions. As all the questions were defined as categorical variables, distinguishing between nominal and ordinal, the descriptive analysis

will consider the information giving by the frequency tables, illustrating the data with charts and interpreting the mode as the most representative statistic for the sample.

The individuals sample is composing by a total of 101 students in which 61,4% are women and 38,6% men. Whiting an age range of 18 – 31, the mode indicate that the highest percentage of students are 20 years old and a 62,4% are currently students of finance and accounting at the university, being mathematics the second highest currently study degree, with a 32,7% of the students.

Table 4.1 Mode students' age, gender and degree

		students' age	Student's gender	Student´s degree
N	Valid	101	101	101
	Missing	0	0	0
Mode		20	0	3

Source: own elaboration

5.1.1. Section 1: Daily Actions

Based on some actions that individuals are able to incurred daily, the assessment elements on the questions were codify following a tendency from 1 to 5, where 1 reflex a lower level of illusion of control while doing the actions, and 5 the higher one.

Table 4.2 Mode elevator, sport event, internet, amulet, lucky number

		Elevator	sport event	Internet	Amulet	lucky number
N	Valid	101	101	101	101	101
	Missing	0	0	0	0	0
Mode		1	5	3	5	1

Source: own elaboration

The students' answers show a frequency in basic actions (as having an amulet for important events, special traditions to bring luck in sport events, hitting the laptop button several times to reload faster the pages, have a lucky number), in which the mode express an outcome of 5, indicating that individuals tend to have this behave "always". This may be seen in bellow

tables, with frequencies ranging from 52,5%; 58,4%; 33,7%. Thus, the second highest frequencies founded, belongs to the answer of doing the actions "sometime" or "often".

Table 4.3 Frequency table "sport event"

When I attend a sporting event, I have some kind of tradition (e.g., I wear a special jersey) to make my favourite team or player more likely to win or to bring them luck

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	8	7,9	7,9	7,9
	Rarely	6	5,9	5,9	13,9
	Sometimes	14	13,9	13,9	27,7
	Often	20	19,8	19,8	47,5
	Always	53	52,5	52,5	100,0
	Total	101	100,0	100,0	

Source: own elaboration

Table 4.4 Frequency table "amulet"

At important events in my life, I try to wear a lucky charm or have some custom to help everything go well

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	9	8,9	8,9	8,9
	Rarely	17	16,8	16,8	25,7
	Sometimes	24	23,8	23,8	49,5
	Often	17	16,8	16,8	66,3
	Always	34	33,7	33,7	100,0
	Total	101	100,0	100,0	

Source: own elaboration

Table 4.5 Frequency table "lucky number"

I have a lucky number

	Frequency	Percent	Valid Percent	Cumulative Percent
no	42	41,6	41,6	41,6
yes	59	58,4	58,4	100,0
Total	101	100,0	100,0	

Source: own elaboration

There was one of the questions in which the students' answers gave the highest percentage to being disagree with these habits by a shortly difference in compare with being agree. In this case a 26,7% were disagree and continuously as the second highest percentage represent that 23,8% of the students were agree. Considering that this happened at the first question, the following questions helps the investigation to reveal the tendency that most of the students would have on their daily actions relating the bias, and visualize how they perceive the factor of "luck".

Table 4.6 Frequency table "elevator"

To call an elevator, I press the button several times so it comes sooner

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	27	26,7	26,7	26,7
	Disagree	20	19,8	19,8	46,5
	Neither agree or disagree	17	16,8	16,8	63,4
	Agree	24	23,8	23,8	87,1
	Strongly Agree	13	12,9	12,9	100,0
	Total	101	100,0	100,0	

Source: own elaboration

5.1.2. Section 2: Risk Attitude

Regarding the risk attitude of the students, the codes for the answer were, again, from 1 to 5, intending to express their level of agree and disagree with the situations. Some of the questions were made to present an inverted order to follow the line that is already created from the first section taking in consideration if the asked question is seems as a negative or positive statement (to take more or less risk).

Table 4.7 Mode safety, health, avoid risk, take risk, uncertainty, like to

		safety	health	avoid risk	take risk	uncertainty	I like to...
N	Valid	101	101	101	101	101	101
	Missing	0	0	0	0	0	0
Mode		5	4	3	4	2	3

Source: own elaboration

In every question the mode tends to take values that indicate being agree on taking risk or assume some risk and disliking not knowing what is going to happen. And also, students' answers express being strongly disagree with the statement of the safety as main relevance in any field.

Table 4.8 Frequency table "safety"

In any field, safety comes first

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	1	1,0	1,0	1,0
	Agree	2	2,0	2,0	3,0
	Neither agree or disagree	17	16,8	16,8	19,8
	Disagree	32	31,7	31,7	51,5
	Strongly Disagree	49	48,5	48,5	100,0
	Total	101	100,0	100,0	

Source: own elaboration

Studying the frequency tables, all the highest percentage show how 28,7% disagree about avoiding risk and 40,6% of the students like to take risk. On the other hand, 48,7% of the individuals are strongly disagree in considering safety first in any field and just 1% agree with this situation.

Table 4.9 Frequency table "avoid risk"

I prefer to avoid risks

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	1	1,0	1,0	1,0
	Agree	16	15,8	15,8	16,8
	Neither agree or disagree	30	29,7	29,7	46,5
	Disagree	29	28,7	28,7	75,2
	Strongly Disagree	25	24,8	24,8	100,0
	Total	101	100,0	100,0	

Source: own elaboration

Nevertheless, the students show an attitude less risky when the factor "health" appears, and 33,7% agree on not taking risk when it comes to their health.

Table 4.10 Frequency table "health"

I don't take risks when it comes to my health.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3,0	3,0	3,0
	Disagree	7	6,9	6,9	9,9
	Neither agree or disagree	26	25,7	25,7	35,6
	Agree	34	33,7	33,7	69,3
	Strongly Agree	31	30,7	30,7	100,0
	Total	101	100,0	100,0	

Source: own elaboration

When is about uncertainty, 34,7% agree on disliking not knowing what is going to happen and 12,9% disagree with the statement.

Table 4.12 Frequency table "uncertainty"

I dislike not knowing what is going to happen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	25	24,8	24,8	24,8
	Agree	35	34,7	34,7	59,4
	Neither agree or disagree	23	22,8	22,8	82,2
	Disagree	13	12,9	12,9	95,0
	Strongly Disagree	5	5,0	5,0	100,0
	Total	101	100,0	100,0	

Source: own elaboration

So, as general view of the student's risk profile, the majority will tend to take risk with frequency, as they express in the last questions with a percentage of 21,8% assuming risk often and 43,6% sometimes.

Table 4.13 Frequency table "like to"

I like to...

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Do not assume any risk	2	2,0	2,0	2,0
	assume risk rarely	26	25,7	25,7	27,7
	assume risk sometimes	44	43,6	43,6	71,3
	assume risk often	22	21,8	21,8	93,1
	always assume risk	7	6,9	6,9	100,0
	Total	101	100,0	100,0	

Source: own elaboration

5.1.3. Section 3: Gambling

In order to assess how individuals react under gambling situations the information given by the frequency tables demonstrate that the majority of the students with a 36,6% do not participate in gambling, therefore, those one who does represent a 32,7% of the subjects, consecutively sport bets and giveaways are the most frequently in which they use to take part of.

Table 4.14. Graph "Have you gambling with real money during the last year?"
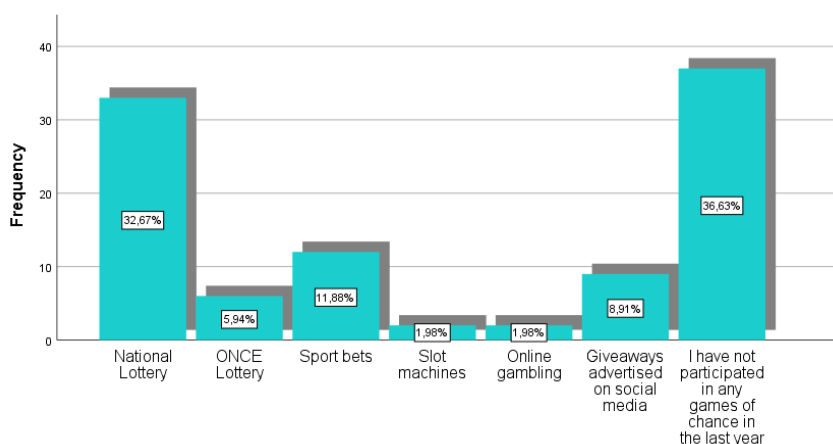
Source: own elaboration

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Table 4.15. Mode gambling, frequency, techniques, specific system case 1, case 2

|		Gambling	frequency	techniques	specific system	Case 1	Case 2
N	Valid	101	101	101	101	101	101
	Missing	0	0	0	0	0	0
Mode		7	1	3	6	0	0

Source: own elaboration

Whiting this section, the most common answer in every questions throw a representative mode that indicate that most of the students do not participate in gambling and they are neither agree or disagree about the assumption that those games have some specific techniques that can be learned. Moreover, the second most representative percentage of the students, 25,7%, participate in gambling several times per year and agree on the statement that techniques can be learned.

To assess how they perceive the competence, the 92,1% of the students decided to keep their first option after revelling the attitude of their competence in the two imaginary cases exposed.
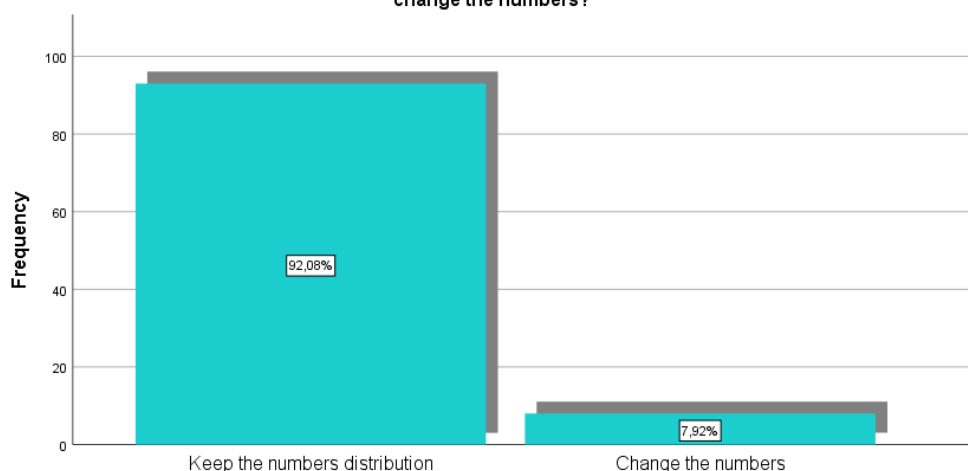
Table 4.16. Graph "case 1"
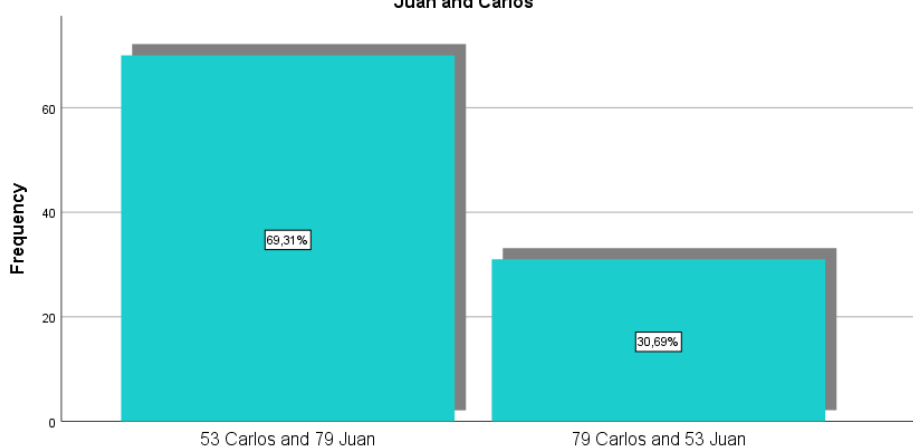
Source: own elaboration

Table 4.17. Graph "case 2"

Now, knowing that Juan is a person who has a very self-confident attitude and tends to buy lottery tickets regulary , while Carlos shows a more insecure attitude, would you keep the same distribution or would you change the numbers?

Source: own elaboration

5.1.4. **Section 4: Preferences**

Recreating the experiment made by Daniel Kahneman and Amos Tversky, the frequency tables confirm that the students have the tendency of being more adversaries to risk whit loses and, for the contrary, take risk when is about winning a certain amount.

Table 4.18. Mode preference 1, preference 2, preference 3, preference 4, preference 5, preference 6, opinion

		Preference 1	Preference 2	Preference 3	Preference 4	Preference 5	Preference 6	opinion
N	Valid	101	101	101	101	101	101	101
	Missing	0	0	0	0	0	0	0
Mode		0	0	0	1	1	1	0

Source: own elaboration

For the first three questions in this sections related with earnings the mode expresses the willingness of individuals for venturing in probabilities composed by 50%, 80% and 10% of receiving greater amount of money instead of secure a specific one. This frequency is represented with highest percentages of 93,1%; 91;1% and 63,4% of the students.

26

Table 4.19. Graph "preference 1"

Project A. 50% probability of earning 800 million and 50% of earning nothing.Project B. To earn 400 million for sure.
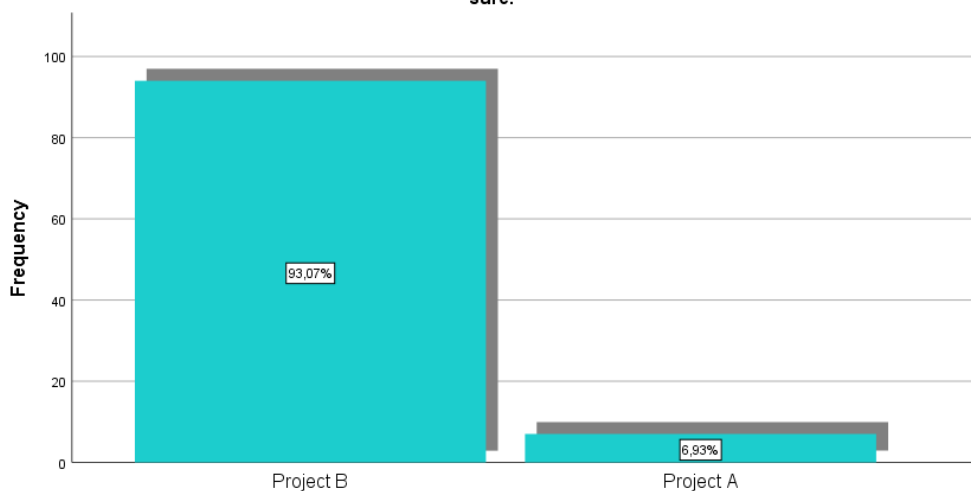
Source: Data obtained by SPSS version 25

Table 4.20. Graph "preference 2"

Project A. 10% probability of earning 800 million and 90% of earning nothing.Project B. Win 50 million for sure.

Source: Data obtained by SPSS version 25

Table 4.21. Graph "preference 3"
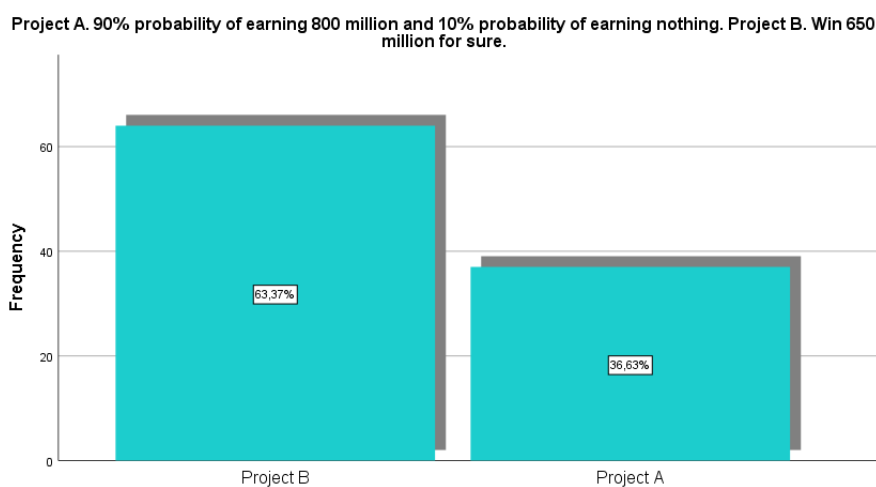
Source: own elaboration

For the contrary, the mode for the next three questions, represent how individuals decide to have an adversary attitude with risk, and decide to lose and specific amount of money instead of having probabilities of 50% ,90% and 10% for loosing biggest amounts. This time, the highest frequencies are composed for 66,3% 60,4% and 64,4% of the students
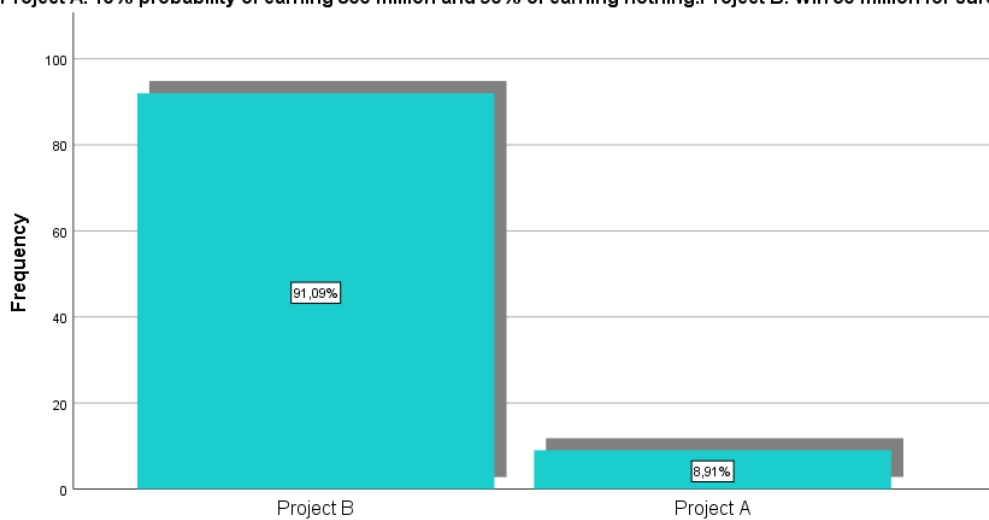
With a slide difference, a 57,4% of the students agree on the opinion that higher risk carries a higher probability of obtaining a negative outcome, while 42,6% of them think that taking more risk means having more probabilities of obtaining a positive outcome.

Table 4.22 Frequency table "opinion"

According to your opinion, higher risk carries a higher probability of

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	negative outcomes	58	57,4	57,4	57,4
	positive outcomes	43	42,6	42,6	100,0
	Total	101	100,0	100,0	

Source: own elaboration

5.1.5. **Section 5: Financial Investment**

Analysing how the students react under financial investment situations and considering all the studies' elements, the investigation is able to summarize that a few portion of individuals

investing with financial assets are represented by a 9,9% investing on stock or indexes, 5,9% on cryptocurrencies and 2% foreign exchange.

Table 4.23 Graph "Have you invested with real money in any of the following financial assets?"
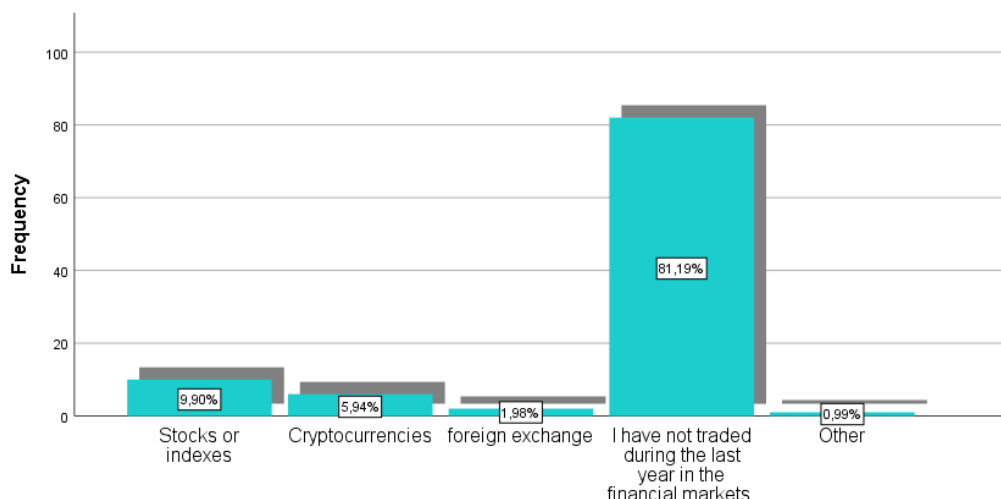
Source: Data obtained by SPSS version 25

Table 4.24 Mode investment 1, investment 2, investment 3, investment 4, investment 5

		Investment 1	Investment 2	Investment 3	Investment 4	Investment 5
N	Valid	101	101	101	101	101
	Missing	0	0	0	0	0
Mode		2	2	4	4	2

Source: Data obtained by SPSS version 25

Regarding the 5 cases, the students' answer reveals a mode in which they prefer to keep the same strategy when they have been previously succeeding in their investment and considering that their opponents have been succeeding as well (this action can be related with the comparing element and the assumption of the tendency for being similar as their competition). The percentage is founded as a 61,4% and 54,5% of students related with this options.

On the other hand, when they are asked about failing most of their investment, the mode change for using different strategies for future operations. The frequencies change in the

opposite side almost at the same percentages of the students (60,4%, 45,5%), confirming that they are willing to change their outcomes based on negative results and 82,2% of them agree on obtaining better results considering more their previous fails than their success. Although, the influence of their opponents is reflected on their answer as they decide to change when their competence is falling as well and keep the same strategy when falling is affecting their opponents the most than them. This time, the comparing element has the tendency of seems different from them.

Finally, there is 80,2% of the students that still considering skill as main factor on these actions, which means, that they are avoiding the strong representation of "luck" as taking part on their outcomes, but, is the average percentage that also agrees on focus on negative obtained results on previous experiences and comparing their skills with the one of their opponents for obtaining better results and thus, have more probabilities of develop a better risk analysis for their future new investments.

Table 4.25 Frequency table "predict results"

I can predict better results

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Based on previous fails	83	82,2	82,2	82,2
	Based on previous positive results.	18	17,8	17,8	100,0
	Total	101	100,0	100,0	

Source: own elaboration

Table 4.26 Frequency table "skills"

I believe that comparing my skills with those of others will help me develop a better risk analysis for new investments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	5	5,0	5,0	5,0
	disagree	10	9,9	9,9	14,9
	neither agree or disagree	30	29,7	29,7	44,6
	agree	33	32,7	32,7	77,2
	strongly agree	23	22,8	22,8	100,0
	Total	101	100,0	100,0	

Source: own elaboration

Table 4.27 Frequency table "experience"

I believe that having experience in past investments will help me develop a better risk analysis for new investments.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	disagree	1	1,0	1,0	1,0
	neither agree or disagree	8	7,9	7,9	8,9
	agree	32	31,7	31,7	40,6
	strongly agree	60	59,4	59,4	100,0
	Total	101	100,0	100,0	

Source: own elaboration

5.2. Reliability and Likert Scale

In order to increase the confidence on the different questions and obtained answers, it is necessary to apply a reliability test to measure which of them have the proper significant level to work whit regarding the items' correlation. This measurement will be given by the Cronbach Alpha.

Considering the previous described investigation structure, the reliability test was created by combining first the questions relate it with risk, and then the ones exposing illusion of control. Therefore, the main idea is to create new variables based on the items presented as reliable.

Table 4.28 Reliable questions assessing general illusion of control

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,582	,591	2

Source: own elaboration

Table 4.29 Reliable questions assessing illusion of control with the two main factors competitors and previous experiences

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,629	,639	5

Source: own elaboration

Table 4.30 Reliable questions assessing general risk

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,706	,706	5

Source: own elaboration

Table 4.31 Reliable questions assessing risk when considering profit and loss

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,567	,550	7

Source: own elaboration

In order to summarize the information generated for the reliable questions and to evaluate the individuals' reactions and behave through their answer, it is necessary to create the Likert Scale to provide the specific classification of their level of risk and bias effect. Generating 4 new variables that combine the previous questions.

ILLUSION 1: involves the 2 questions related with general illusion whit a scale range from 0-25 and, hence, the following scale in which the items were codified as Deficient representing a lower level of illusion of control and Excellent a high level of illusion of control.

Deficient (0-5) / Poor (6-10) / Average (11-15) / Good (16-20) / Excellent (>20)

ILLUSION 2: involves the 5 questions related with general illusion whit a scale range from 0-20 and, hence, the following scale in which the items were codified as Deficient representing a lower level of illusion of control and Excellent a high level of illusion of control.

Deficient (0-4) / Poor (5-8) / Average (9-12) / Good (12-16) / Excellent (>16)

RISK 1: involves the 5 questions related with general risk whit a scale range from 0-25 and, hence, the following scale in which the items were codified as Deficient representing a risk adverse attitude and Excellent a risk searcher attitude.

Deficient (0-5) / Poor (6-10) / Average (11-15) / Good (16-20) / Excellent (>20)

RISK 2: involves the 7 questions related with the perception of risk regarding profit and loss whit a scale range from 0-10 and following a scale in which the items were codified as Deficient representing a risk adverse attitude and Excellent a risk searcher attitude

Deficient (0-2) / Poor (3-4) / Average (5-6) / Good (7-8) / Excellent (>8)

5.3. Crosstabs Analysis

The crosstabs analysis is particularly useful to identify the level of association between the variables and analyse the results of one variable based on the behave of the other one.

The illusion of control variables work as independent and the risk variables as dependent, therefore, regarding the students' gender the final analysis will perform different tables combining the individuals' level of risk, whether if it is considering general aspects (risk1) or situations that represent profit and loss (risk2), distinguishing between the illusion of control when it is presented as a structural point of view (illusion 1) and when it is adjusted for the competitors and the previews experiences (illusion 2).

By obtaining an approach percentage that express the association between the risk and the illusion of control, the investigation is able to throw results about the students' risk attitude and tendency to change regarding the bias situation, combining those percentages with two last questions that directly affects the students view of making a successful financial decision.

The first results represent the most significant percentage within the tables (see appendix), evaluating the students disposition to change their general view of risk whether the bias is seeming as static situation or considering the investing scenarios.

Independent variables: students' gender and illusion 1

Dependent variable: risk 1

Closer inspection of the tables shows that, from the 62 women of the sample, 40 of them have a representation of 75% within a range of high level of illusion of control (Good) and preference to avoid risk (Poor). On the other hand, from the 39 men, 26 of them represent a 57,7% of the sample within a range of the lowest illusion of control level (Deficient) and preference to take risk (Good).

Independent variables: students' gender and illusion 2

Dependent variable: risk 1

This time, tables express that from the 62 women of the sample, 33 of them have the most significant representation of 51,5% within a range of high level of illusion of control (Good) and preference to take risk (Good). And from the 39 men, 23 of them represent a 60,9% of the sample within a range of moderate illusion of control level (Average) and preference to take risk (Good).

The next results represent the most significant percentage within the tables, evaluating the students disposition to change their view of risk when profit and loss are involved, whether the bias is seeming as static situation or considering the investing scenarios.

Independent variables: students' gender and illusion 1

Dependent variable: risk 2

From the 62 women of the sample, 40 of them have a representation of 45% within a range of low level of illusion of control (Poor) and preference to avoid risk (Poor). On the other hand, from the 39 men, 26 of them represent a 42,3% of the sample within a range of the lowest illusion of control level (Deficient) and preference to avoid risk (Poor).

Independent variables: students' gender and illusion 2

Dependent variable: risk 2

From the 62 women of the sample, 33 of them have a representation of 60,6% within a range of high level of illusion of control (Good) and preference to avoid risk (Poor). On the other hand, from the 39 men, 23 of them represent a 60,9% of the sample within a range of moderate illusion of control level (Average) and preference to avoid risk (Poor).

Moreover, what is also interesting about the tables is the tendency that follows the classification of the risk and illusion level regarding the individuals answers. When evaluating risk 1 whit the two independent illusion of control variables, the students answer places them between the range of average as minimum and risk searcher as maximum, reflecting the tendency of increasing risk. And for the independent variables illusion 1 is different from illusion 2 by exposing individuals on having highest levels of the bias when

the investment questions are presented and the competitor and previous experiences is being evaluating.

Table 5.1. Graph "risk1, illusion1, female"
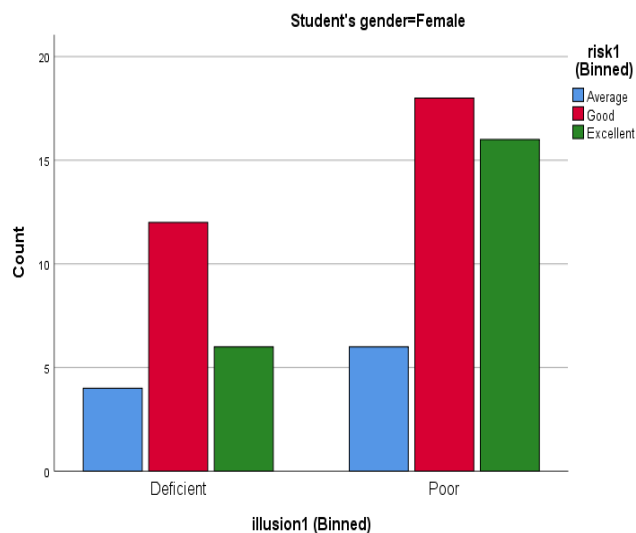
Source: own elaboration

Table 5.2 Graph "risk1, illusion2, female"
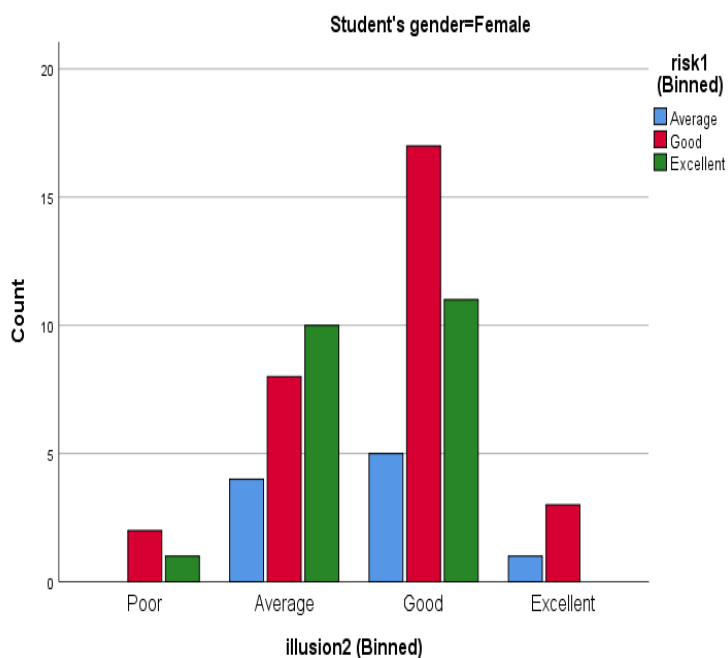
Source: own elaboration

Surprisingly, when evaluating risk 2 whit the two independent variables, the risk changes the tendency of the range of answer whit deficient as minimum and average as the maximum, and the illusion of control variables keep its tendency of expressing highest effects of the bias when the investing scenarios are involved.

Table 5.3 Graph "risk2, illusion1, female"
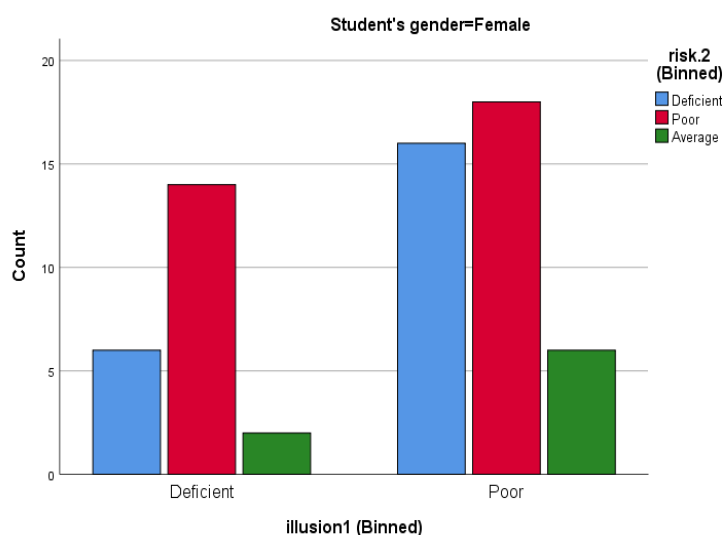
Source: own elaboration

Table 5.4 Graph "risk2, illusion2, female"
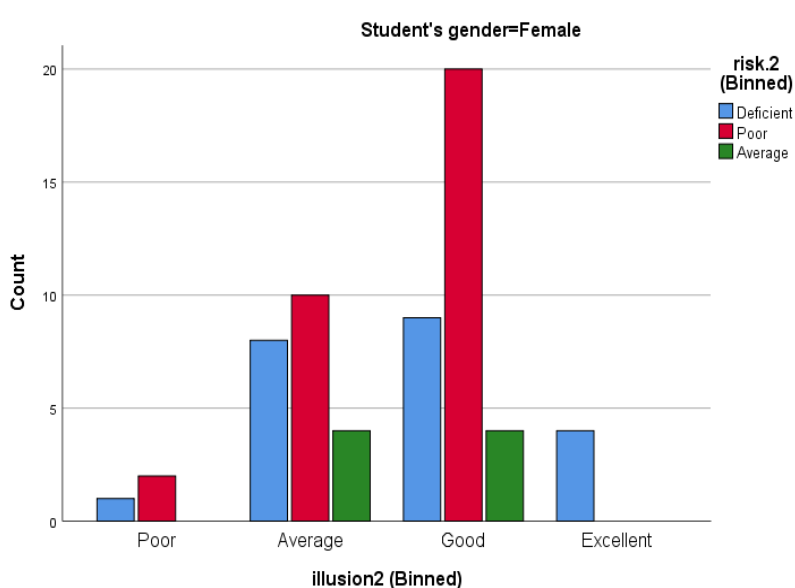
Source: own elaboration

6. Discussion and conclusions

These results provide important insights into the students' risk reactions when they find themselves in any investment scenario. As independent variable, the results confirm the increase of the bias effects on individuals when they need to answer the questions not only as a general luck or skills factor, bus as taking in consideration their past experience in investing, last strategies, and how they visualize their competitors' skills levels and confidence.

The dependent variable and main element of study (risk), tends to decrease when students' found themselves in an investment scenario, even if the illusion of control is increasing. Placing individuals in a range of taking values of risk that start from an average point and it doesn't' reach completely the adverse or searcher to risk scenario.

This finding is providing a contrary point of view of the previous studies that had been determined the direct relationship of increase in risk while increasing illusion of control. However, the items and data create it by the students' answer was not able to demonstrate a correlative relation between the variables to complete the investigations by performing a lineal regression analysis and confirm or deny the raised hypothesis.

The present study was designed to determine the degree in which the bias effects is useful to reduce the individuals' tendency to reach extreme levels of risk regarding their illusion of control's influence, and, therefore, complement the assumption of considering more aspect when taking financial decisions.

By introducing external factors that implement a cognitive bias increase and comparing their effects on risk when the bias is presented as a general structural form (testing students' illusion of control by recognising their strong involvement of luck in their outcomes), or executing cases scenarios that place them in investment situations; the investigations strengthens the idea that individuals' are able to ignore the bias effects and perform a proper risk analysis before taking a financial decision.

A limitation of this study is that the main idea of confirm or deny the hypothesis was not possible to carry out whit the experimental questionnaire due to the randomness of the answers, nevertheless, the findings obtained by the descriptive and crosstabs analyses have

significant implications for the understanding of individuals' expected tendency of reaction whit the bias in the financial field.

Whist the investigation did not confirm (*H*), it offers a base of study for starting future research within suitable circumstances that may be possible the implement of the experimental proposed model.

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Appendix 1: Experimental questionnaire

Personal data:

1. Age

2. Gender
   Female
   Male

3. Currently study degree
   Business Administration and Management
   Finance and Accounting
   Economic
   Tourism
   Marketing
   Labour Relations and Human Resources
   Mathematics
   Other

Everyday actions - Illusion of control in everyday situations: Please answer the following questions by deciding how much you agree with the statements.

4. To call an elevator, I press the button several times so it comes sooner
   Strongly Disagree -Disagree -Neither agree or disagree –Agree- Strongly Agree

5. When I attend a sporting event, I have some kind of tradition (e.g., I wear a special jersey) to make my favourite team or player more likely to win or to bring them luck
   Never – Rarely - Sometimes - Often – Always

6. When I'm surfing the Internet, if a page won't load or a file won't download, I hit the button several times to make it load sooner
   Never – Rarely - Sometimes - Often – Always

7. At important events in my life, I try to wear a lucky charm or have some custom to help everything go well
   Never – Rarely - Sometimes - Often – Always

8. I have a lucky number
   Yes –No

Risk Profile: Please answer the following questions by deciding how much you agree with the statements

9. In any field, safety comes first

Strongly Disagree -Disagree -Neither agree or disagree –Agree- Strongly Agree

10. I don't take risks when it comes to my health
    Strongly Disagree -Disagree -Neither agree or disagree –Agree- Strongly Agree

11. I prefer to avoid risks
    Strongly Disagree -Disagree -Neither agree or disagree –Agree- Strongly Agree

12. I take risks regularly
    Strongly Disagree -Disagree -Neither agree or disagree –Agree- Strongly Agree

13. I dislike not knowing what is going to happen
    Strongly Disagree -Disagree -Neither agree or disagree –Agree- Strongly Agree

14. I like to take risk
    Never – Rarely - Sometimes - Often – Always

Gambling - illusion of control in games of chance:

15. Have you gambling with real money during the last year?
    National Lottery
    ONCE Lottery
    Sport bets
    Slot machines
    Online gambling
    Giveaways advertised on social media
    I have not participated

16. How often do you participate in any of the above games?
17. Never – Rarely - Sometimes - Often – Always

18. Gambling have techniques of success that can be learned
    Strongly Disagree -Disagree -Neither agree or disagree –Agree- Strongly Agree

19. When I participate in gambling, I have a specific system for picking the numbers or placing the bet.
    Never – Rarely - Sometimes - Often – Always

20. Imagine that you have to distribute 3 lottery numbers between two people (Juan and Carlos) and you. The numbers are 77, 79 and 53. You decide to keep the number 77 and you must decide which numbers to give to Juan and Carlos.
    53 Carlos and 79 Juan - 79 Carlos and 53 Juan

21. Now, knowing that Juan is a person who has a very self-confident attitude and tends to buy lottery tickets regularly, while Carlos shows a more insecure attitude, would you keep the same distribution or would you change the number.
Keep the numbers distribution - Change the numbers

Risk preference in monetary issues: Imagine you are the owner of a company and you are facing decision of choosing between two different projects. Which one would you choose in each of the following cases? (each case is independent of the previous ones).

22. Project A. 50% probability of earning 800 million and 50% of earning nothing. Project B. To earn 400 million for sure.

23. Project A. 10% probability of earning 800 million and 90% of earning nothing. Project B. Win 50 million for sure.

24. Project A. 90% probability of earning 800 million and 10% probability of earning nothing. Project B. Win 650 million for sure.

25. Project A. 50% probability of losing 600 million and 50% of losing nothing. Project B. Lose 300 million for sure.
Project B - Project A

26. Project A. 90% probability of losing 600 million and 10% of losing nothing. Project B. Lose 560 million for sure.

27. Project A. 10% probability of losing 600 million and 90% of losing nothing. Project B. Lose 70 million for sure.

28. According your opinion, higher risk carries a higher probability of: negative outcomes - positive outcomes

Financial investment - previous experience and preferences about them: Answer the following financial investments questions. If you have not made any, imagine that you have decided to invest in the stock market.

29. Have you made, in the last year, investment or speculation operations with real money with any of the following financial assets?

30. Imagine that you have carried out 5 investments, 4 of which have gone well and 1 badly. You have the opportunity to make another one with similar characteristics to the previous ones.
use the same strategy- most likely use the same strategy- most likely use different methods- use different methods

31. Imagine that you have made 5 investments, 4 of which have gone well and 1 badly. A friend has made 5 investments, succeeding in all of them and is very confident. In the next operation you carry out...
use the same strategy- most likely use the same strategy- most likely use different methods- use different methods

32. Imagine that you have made 5 investments, of which 1 has gone well and 4 have gone badly. A friend has made 5 investments, succeeding in all of them and is very confident. In the next operation you carry out...
use the same strategy- most likely use the same strategy- most likely use different methods- use different methods

33. Imagine that you have made 5 investments, of which 1 has gone well and 4 have gone badly. A friend has made 5 investments, failing in all of them, and has little confidence in himself/herself. In the next operation you carry out.
use the same strategy- most likely use the same strategy- most likely use different methods- use different methods

34. Imagine that you have made 5 investments, 4 of which have gone well and 1 badly. A friend has made 5 investments, failing in all of them, and has little confidence in himself/herself. In the next operation you carry out...
use the same strategy- most likely use the same strategy- most likely use different methods- use different methods

35. If I obtain a positive result when making an investment, it is mainly due to...
My skills – luck

36. I can predict better results
Based on previous fails - Based on previous positive results.

37. I believe I can succeed in an investment in which others have failed
Strongly Disagree -Disagree -Neither agree or disagree –Agree- Strongly Agree

38. I believe that having experience in past investments will help me develop a better risk analysis for new investments.
Strongly Disagree -Disagree -Neither agree or disagree –Agree- Strongly Agree

39. I believe that comparing my skills with those of others will help me develop a better risk analysis for new
Strongly Disagree -Disagree -Neither agree or disagree –Agree- Strongly Agree

Table 4.28 Reliable questions assessing general illusion of control

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
elevator	3,33	1,322	,419	,176	.
internet	2,76	1,983	,419	,176	.

Source: own elaboration

Table 4.29 Reliable questions assessing illusion of control with the two main factors competitors and previous experiences

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Investment 1	10,61	3,779	,599	,527	,479
Investment 2	10,41	4,044	,393	,430	,571
Investment 3	8,89	4,618	,253	,281	,631
Investment 4	9,16	3,995	,284	,313	,636
Investment 5	10,59	3,724	,436	,402	,547

Source: own elaboration

Table 4.30 Reliable questions assessing general risk

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I like to...	15,27	7,838	,466	,341	,656
health	14,50	8,232	,291	,255	,729
safety	14,08	7,994	,464	,305	,658
avoid risk	14,72	6,082	,739	,559	,523
take risk	14,73	7,858	,392	,341	,686

Table 4.31 Reliable questions assessing risk when considering profit and loss

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Preference 1	2,79	2,366	,190	,124	,560
Preference 2	2,77	2,378	,137	,094	,571
Preference 3	2,50	2,092	,181	,104	,573
Preference 4	2,20	1,880	,364	,306	,497
Preference 5	2,26	1,793	,415	,239	,473
Preference 6	2,22	1,912	,328	,168	,512
Preference 7	2,44	1,808	,393	,203	,483

Table 5.5 Cross tabulation "risk1, illusion1, gender"

					risk1 (Binned)		
Student's gender				Poor	Average	Good	Excellent
Female	illusion1 (Binned)	Deficient	Count		4	12	6
			Expected Count		3,5	10,6	7,8
			% within illusion1 (Binned)		18,2%	54,5%	27,3%
		Poor	Count		6	18	16
			Expected Count		6,5	19,4	14,2
			% within illusion1 (Binned)		15,0%	45,0%	40,0%
	Total		Count		10	30	22
			Expected Count		10,0	30,0	22,0

			% within illusion1 (Binned)		16,1%	48,4%	35,5%
Male	illusion1 (Binned)	Deficient	Count	0	7	15	4
			Expected Count	,7	6,0	15,3	4,0
			% within illusion1 (Binned)	0,0%	26,9%	57,7%	15,4%
		Poor	Count	1	2	8	2
			Expected Count	,3	3,0	7,7	2,0
			% within illusion1 (Binned)	7,7%	15,4%	61,5%	15,4%
	Total		Count	1	9	23	6
			Expected Count	1,0	9,0	23,0	6,0
			% within illusion1 (Binned)	2,6%	23,1%	59,0%	15,4%
Total	illusion1 (Binned)	Deficient	Count	0	11	27	10
			Expected Count	,5	9,0	25,2	13,3
			% within illusion1 (Binned)	0,0%	22,9%	56,3%	20,8%
		Poor	Count	1	8	26	18
			Expected Count	,5	10,0	27,8	14,7
			% within illusion1 (Binned)	1,9%	15,1%	49,1%	34,0%
	Total		Count	1	19	53	28
			Expected Count	1,0	19,0	53,0	28,0
			% within illusion1 (Binned)	1,0%	18,8%	52,5%	27,7%

Source: own elaboration

Table 5.6 Cross tabulation "risk1, illusion2, gender"

Student's gender				risk1 (Binned) Poor	Average	Good	Excellent
Female	illusion2 (Binned)	Poor	Count		0	2	1
			Expected Count		,5	1,5	1,1
			% within illusion2 (Binned)		0,0%	66,7%	33,3%
		Average	Count		4	8	10
			Expected Count		3,5	10,6	7,8
			% within illusion2 (Binned)		18,2%	36,4%	45,5%
		Good	Count		5	17	11
			Expected Count		5,3	16,0	11,7
			% within illusion2 (Binned)		15,2%	51,5%	33,3%
		Excellent	Count		1	3	0
			Expected Count		,6	1,9	1,4
			% within illusion2 (Binned)		25,0%	75,0%	0,0%
	Total		Count		10	30	22
			Expected Count		10,0	30,0	22,0
			% within illusion2 (Binned)		16,1%	48,4%	35,5%
Male	illusion2 (Binned)	Poor	Count	0	0	3	0
			Expected Count	,1	,7	1,8	,5
			% within illusion2 (Binned)	0,0%	0,0%	100,0%	0,0%
		Average	Count	1	6	14	2

49

			Expected Count	,6	5,3	13,6	3,5
			% within illusion2 (Binned)	4,3%	26,1%	60,9%	8,7%
		Good	Count	0	2	6	4
			Expected Count	,3	2,8	7,1	1,8
			% within illusion2 (Binned)	0,0%	16,7%	50,0%	33,3%
		Excellent	Count	0	1	0	0
			Expected Count	,0	,2	,6	,2
			% within illusion2 (Binned)	0,0%	100,0%	0,0%	0,0%
	Total		Count	1	9	23	6
			Expected Count	1,0	9,0	23,0	6,0
			% within illusion2 (Binned)	2,6%	23,1%	59,0%	15,4%
Total	illusion2 (Binned)	Poor	Count	0	0	5	1
			Expected Count	,1	1,1	3,1	1,7
			% within illusion2 (Binned)	0,0%	0,0%	83,3%	16,7%
		Average	Count	1	10	22	12
			Expected Count	,4	8,5	23,6	12,5
			% within illusion2 (Binned)	2,2%	22,2%	48,9%	26,7%
		Good	Count	0	7	23	15
			Expected Count	,4	8,5	23,6	12,5

				0,0%	15,6%	51,1%	33,3%
		% within illusion2 (Binned)					
	Excellent	Count	0	2	3	0
		Expected Count	,0	,9	2,6	1,4
		% within illusion2 (Binned)	0,0%	40,0%	60,0%	0,0%
	Total	Count	1	19	53	28
		Expected Count	1,0	19,0	53,0	28,0
		% within illusion2 (Binned)	1,0%	18,8%	52,5%	27,7%

Source: own elaboration

Table 5.7 Cross tabulation "risk2, illusion1, gender"

				risk.2 (Binned)			
Student's gender				Deficient	Poor	Average	Good
Female	illusion1 (Binned)	Deficient	Count	6	14	2	
			Expected Count	7,8	11,4	2,8	
			% within illusion1 (Binned)	27,3%	63,6%	9,1%	
		Poor	Count	16	18	6	
			Expected Count	14,2	20,6	5,2	
			% within illusion1 (Binned)	40,0%	45,0%	15,0%	
	Total		Count	22	32	8	
			Expected Count	22,0	32,0	8,0	
			% within illusion1 (Binned)	35,5%	51,6%	12,9%	
Male	illusion1 (Binned)	Deficient	Count	10	11	4	1

			Expected Count	8,0	14,0	3,3	,7
			% within illusion1 (Binned)	38,5%	42,3%	15,4%	3,8%
		Poor	Count	2	10	1	0
			Expected Count	4,0	7,0	1,7	,3
			% within illusion1 (Binned)	15,4%	76,9%	7,7%	0,0%
	Total		Count	12	21	5	1
			Expected Count	12,0	21,0	5,0	1,0
			% within illusion1 (Binned)	30,8%	53,8%	12,8%	2,6%
Total	illusion1 (Binned)	Deficient	Count	16	25	6	1
			Expected Count	16,2	25,2	6,2	,5
			% within illusion1 (Binned)	33,3%	52,1%	12,5%	2,1%
		Poor	Count	18	28	7	0
			Expected Count	17,8	27,8	6,8	,5
			% within illusion1 (Binned)	34,0%	52,8%	13,2%	0,0%
	Total		Count	34	53	13	1
			Expected Count	34,0	53,0	13,0	1,0
			% within illusion1 (Binned)	33,7%	52,5%	12,9%	1,0%

Source: own elaboration

Table 5.8 Cross tabulation "risk2, illusion2, gender"

	Student's gender			risk.2 (Binned) Poor	risk.2 (Binned) Average	risk.2 (Binned) Good
Female	illusion2 (Binned)	Poor	Count	2	0	
			Expected Count	1,5	,4	
			% within illusion2 (Binned)	66,7%	0,0%	
		Average	Count	10	4	
			Expected Count	11,4	2,8	
			% within illusion2 (Binned)	45,5%	18,2%	
		Good	Count	20	4	
			Expected Count	17,0	4,3	
			% within illusion2 (Binned)	60,6%	12,1%	
		Excellent	Count	0	0	
			Expected Count	2,1	,5	
			% within illusion2 (Binned)	0,0%	0,0%	
	Total		Count	32	8	
			Expected Count	32,0	8,0	
			% within illusion2 (Binned)	51,6%	12,9%	
Male	illusion2 (Binned)	Poor	Count	0	1	1
			Expected Count	1,6	,4	,1
			% within illusion2 (Binned)	0,0%	33,3%	33,3%

		Average	Count	14	2	0
			Expected Count	12,4	2,9	,6
			% within illusion2 (Binned)	60,9%	8,7%	0,0%
		Good	Count	6	2	0
			Expected Count	6,5	1,5	,3
			% within illusion2 (Binned)	50,0%	16,7%	0,0%
		Excellent	Count	1	0	0
			Expected Count	,5	,1	,0
			% within illusion2 (Binned)	100,0%	0,0%	0,0%
	Total		Count	21	5	1
			Expected Count	21,0	5,0	1,0
			% within illusion2 (Binned)	53,8%	12,8%	2,6%
Total	illusion2 (Binned)	Poor	Count	2	1	1
			Expected Count	3,1	,8	,1
			% within illusion2 (Binned)	33,3%	16,7%	16,7%
		Average	Count	24	6	0
			Expected Count	23,6	5,8	,4
			% within illusion2 (Binned)	53,3%	13,3%	0,0%
		Good	Count	26	6	0
			Expected Count	23,6	5,8	,4

			57,8%	13,3%	0,0%
		% within illusion2 (Binned)	57,8%	13,3%	0,0%
	Excellent	Count	1	0	0
		Expected Count	2,6	,6	,0
		% within illusion2 (Binned)	20,0%	0,0%	0,0%
	Total	Count	53	13	1
		Expected Count	53,0	13,0	1,0
		% within illusion2 (Binned)	52,5%	12,9%	1,0%

Source: own elaboration

Table 5.9 Graph "risk1, illusion1, male"
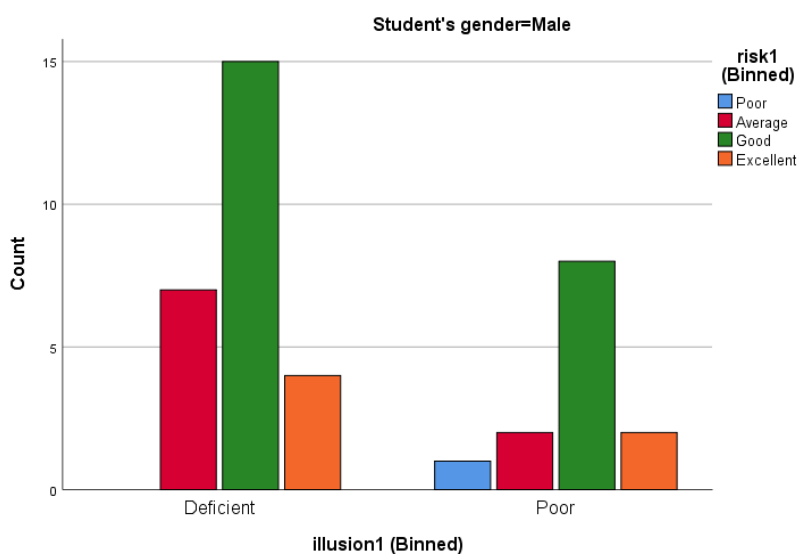
Source: own elaboration
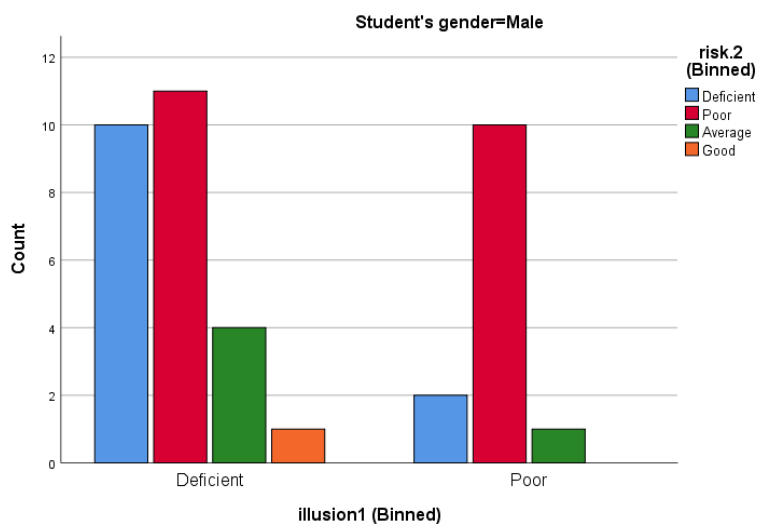
Table 5.10 Graph "risk1, illusion2, male"
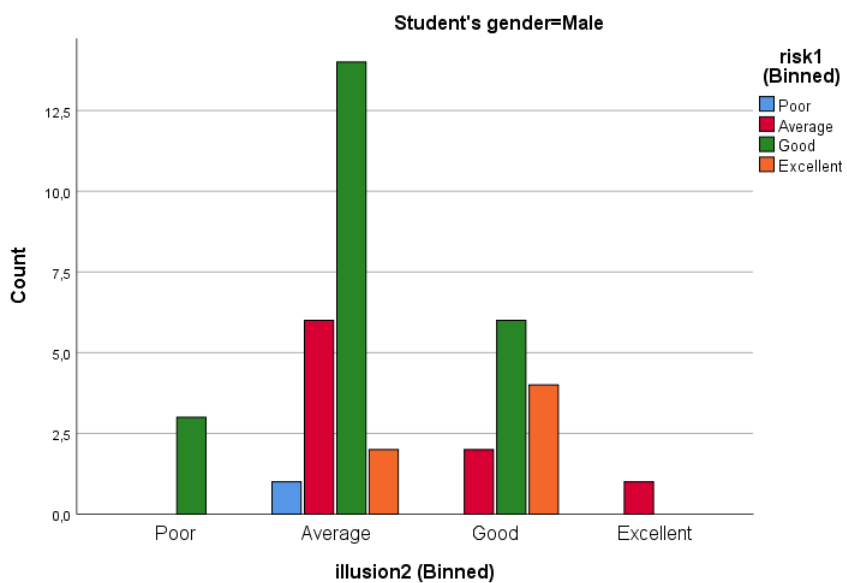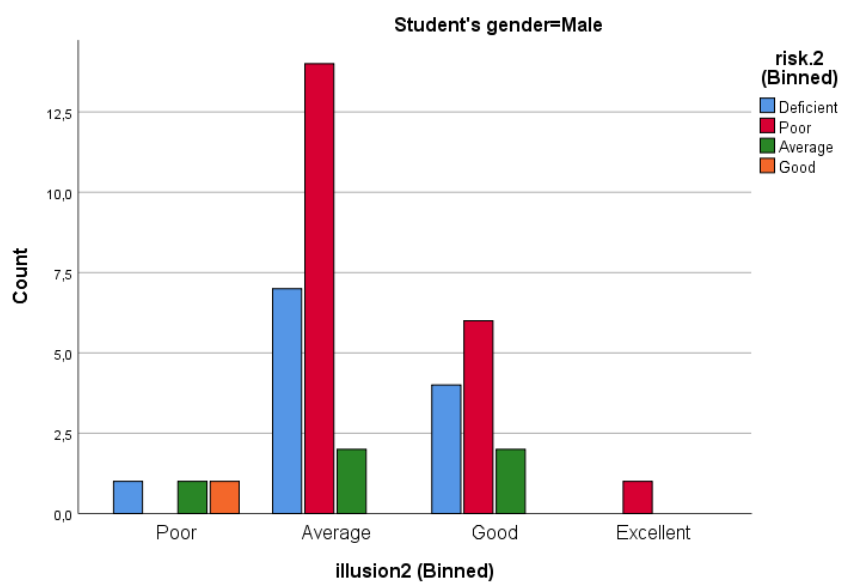

Source: own elaboration

Table 5.11 Graph "risk2, illusion1, male"

Source: own elaboration

Table 5.12 Graph "risk2, illusion2, male"

Source: own elaboration