An experiment about legalization of drugs and the investor behavior.

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Abstract

The illegal drugs market is one of the main issues in the political agenda in Colombia. Literature has focused on legalization in consumption (demand) but studies about legalization of production (supply) are scarce. Taking into account that Colombia is a country leading in drugs production but not drugs consumption in the world, it is relevant to understand illegal drugs supply. The elements that influence decisions about drugs production and the investor behavior under certain incentives have received few attention. In order to analyze the behavioral structure of investment decisions, this paper conducts a laboratory experiment. The aim is to analyze the effect of three different factors influencing the individual decision to invest when a business is related to (i) a criminal activity (illegal), (ii) drugs, or (iii) a negative social effect (negative externality) using a between subjects design. The experiment has two parts. Part I is a replication of the "Ten Paired Lottery-Choice Decisions" by Holt and Laury (2002) to measure individual's risk aversion level. Part II keeps the same structure but shows a frame that varies three elements along treatments: type of business (drugs-related or neutral), legal status (illegal or legal) and the presence of a negative externality. The experiment was applied on 141 undergraduate students of the Universidad del Rosario. Results show a robust gender effect meaning that women are more risk averse than men and they are more prone to increase their risk aversion level in Part II while they revealed more conservative attitudes in front of drugs policies in the post experiment survey. No evidence was found of any effects of illegality and the negative externality on investment decisions. Descriptive comparisons suggest an unwillingness to invest in a drugs-related business. These results suggest that neither illegality nor the existence of a negative externality are efficient elements to discourage investment.

1 Introduction

The laboratory experiment this paper presents is motivated by the relevance of illegal drugs market in Colombia, the largest producer of cocaine worldwide, icon of the global fight against drugs and a country affected by the current dynamics of the business under the prohibition. Colombia has come to provide up to 70% of world production of cocaine (Thoumi, 2005) and still being the biggest producer in the world[1] and is also a representative case where social costs derived from the war on drugs have deeply affected the political, social and economic structure of the country (Duncan, 2014).

Despite the international political consensus around drug prohibition, academic and political discussion about alternative policies to regulate this market is becoming increasingly important. There are several works addressing empirical evidence which points out (1) the inefficiency of the ban in reducing production and consumption of drugs globally; and (2) the negative externalities (extreme violence, political corruption and criminality) arising from the operation of the industry under a illegality context [2]. Despite evidence, institutional transformation towards legalization of drugs still seems distant in most of the world, especially when dealing with drugs other than marijuana and the majority of people in producer countries have a reluctant ideological position on drugs legalization (García and Ortiz, 2014).

The academic literature has focused on the study of legalization in consumption (demand side) but studies that deal with the legalization of production (supply side) are scarce. With regard to consumption, some cases are opium in China (Miron and Feige, 2008), alcohol in USA (Miron and Zwibel, 1991), and cannabis in Switzerland (Killias, et. al., 2011) and Netherlands (Marie et. al., 2015). The effect of drugs legalization on the supply has not received the same attention, in part because in Netherlands cannabis production is not exactly legal and it is very restricted, while the cases of Uruguay, Washington, and Colorado are very recent (and in the case of Uruguay it is more directed to *self-cultivation*). In the case of other drugs which need more industrilized processes for production, like cocaine, there is not any representative case of legalization.

Taking into account that Colombia is a country leading in production but not consumption in the world, it is relevant to understand illegal drugs supply. Social sciences have widely documented the institutional characteristics that have made Colombia a country that produces illegal drugs. Thoumi (2005) indicates that due to institutional characteristics, the cocaine industry has had a major level of settlement in Colombia, not in Peru or Bolivia, countries with a long tradition of coca crops. In line with the principles of the *New Trade Theory*, Thoumi (2005) states: "(...) before the ban for cocaine, Colombia did not export a single coca leaf or a kilo of cocaine. (...) To simplify, we can say that when a good or service is declared illegal everywhere, prohibition creates competitive advantages in countries and areas where the rule of law is weakest and have the physical resources or the necessary

[1] The country produced around 52% of pure cocaine production in 2008, (UNODC, 2014).

[2] Some of these works are Miron (2001), Miron and Feige (2008), Miron and Zwibel (1991), Becker, Murphy and Grossman (2004), Dell (2013), LSE Expert Group on the Economics of Drug Policy (2014) and UNODC (2014).

production factors (capital, labor, technology and natural resources)" (pp. 37, own translation)

However, the elements that influence individual drugs production decisions have received less attention than the institutional and historical elements studied by social and political sciences. There is a set of field experiments in Colombia such as Ibañez and Carlsson (2010), Ibañez and Vasquez (2014a) and Ibañez and Vasquez (2014b) designed to measure the impact of policy programs aimed at reducing coca crops. These studies are interested in examining investment decisions and behavioral variables of peasants living in coca growing areas. Ibañez and Carlsson (2010) conducted a survey-experiment where participants are faced with two types of crops, one legal and the other illegal (coca) under a risk context. In this case, the legal product (an alternative crop) is structurally different to the illegal one (coca)[3].

To my knowledge, an experiment to study investment decisions on drugs under a context of drugs legality has not been yet developed. The fact that a person is concerned that his/her product is illegal, or negatively affects the society has not been addressed by behavioral economics. Which are the determinants behind investment decisions? This paper studies the institutional elements affecting individual investment decisions on drugs. For that purpose, I performed a laboratory experiment aimed to analyze changes in the decision to invest under several treatments combining legality frames (illegal, legal or neutral) and an investment's negative externality, in a context of risk. It is not possible to obtain this information from observational data, since production of narcotics, in general, is illegal across the world. It could be possible to obtain information about (hypothetical) legal production amounts and prices using simulations, but the behavioral analysis of investment decisions is just possible through an experiment in the current situation.

The experimental design in this paper aims to simulate a context where participants can anonymously manifest their preferences to invest under different treatments, where they can maximize their payoff under uncertainty. The laboratory design is based on the "Ten Paired Lottery-Choice Decisions" by Holt and Laury (2002). This design allows to offer participants two options of portfolio to invest, one of which is profitable but riskier. This corresponds to the structure of drugs market as it is pointed in Ibañez and Carlsson (2010), because in an illegal investment there is a probability of being caught and losing life, freedom or personal capital. This is intended to simulate the actual decision of someone who faces the opportunity to invest in a criminal activity or in a business related to drugs. The experimental design in this paper conducts a between subjects design and six treatments applied on five groups. The first treatment is a neutral frame, which corresponds to a replication of Holt and Laury(2002) to measure individual risk aversion. The other five treatments keep the same structure of the first one but combine three framing elements: (1) The relation to the drugs' business, (2) Legality or illegality of the business and (3) Negative externality of the business. Each of the five groups decide in the neutral treatment (T1) and in one of the other five treatments (T2, T3, T4, T5 and T6).

[3]They are structurally different because fruits, for example, do not have the same purpose of consumption as coca, nor the same marketing strategies. Therefore, fruits and coca are not expected to have the same effect on society and do not have the same expected utility

This allows to measure risk aversion in the first treatment and compare this decision with the decision under a framed treatment.

By analyzing participants' decision under different frames this paper aims to answer several questions: How much do people care (individually and anonymously) about the legal status of a business related to drugs when deciding to invest in it? Specifically, considering two portfolios with identical expected utilities, would people change their investment decision if the legal status of the two is different? Are people reluctant to invest in drugs precisely because *they are drugs*, or just because *they are illegal*? Can a negative externality of a drug-related business repel an investor more than a negative externality of a neutral business? In other words, the "interaction" between several elements -negative externality, drugs-related business and ilegality- repels more than the effect of just the negative externality? In summary, which are the determinants behind investment decisions?

he experimental design in this paper allows for the first time to measure risk aversion in a neutral environment and to contrast it with decisions under some *non-neutral* contexts. It allows to compare decisions under different scenarios of legality (legal vs. illegal) for portfolios related to the same type of product (drugs). Also, it allows to parse the effect of an explicit negative externality derived from the riskier portfolio. The experiment was conducted on September-October 2015, using the experimental software Z-tree (Fischbacher, 2007). Participants were 141 undergraduate students at Universidad del Rosario.

Results show a robust gender effect meaning that women are more risk averse than men and they are more prone to increase their risk aversion level in Part II. This means women were more sensitive to the frame in Part II than men, while they revealed more conservative attitudes in front of drugs policies in the post experiment survey. There was no evidence of effects of illegality and negative externalities on investment decisions. Descriptive comparisons suggest an unwillingness to invest in a drugs-related business. These results suggest that neither illegality nor the existence of negative externalities are efficient elements to discourage investment.

After the introduction, this paper has four more sections. In order to motivate the experimental design, Section 2 is a literature review about drugs' production and compliance to law. Section 3 details the experimental design. Section 4 shows and analyzes results. Finally, section 5 presents the conclusions.

2 Literature Review

2.1 The drugs market and the debate on legalization

In relation to how society perceives illegal drugs, García and Ortiz (2014) makes opinion surveys in six Latin American cities. They find that the majority of people from San Salvador, Bogotá and La Paz, are in that order, significantly more "con-

servative"[4] in terms of opinions about drugs than people from Santiago de Chile, México D.F. and Buenos Aires. Accordingly, in the first three cities, consumption of the legal (alcohol and tobacco) and illegal substances (marijuana and cocaine) have a smaller incidence among the surveyed. They find that those who believe that illegal drugs are a public health problem are usually women, people of higher socioeconomic status and those who support the recreational use of marijuana. They conclude that support for legalization and recreational use of cannabis are positively associated with having used marijuana, having "liberal moral attitudes", and an environment in which there is a high incidence of drug use. Nevertheless, authors consider that this results could be driven by a social desirability bias, which explains the less liberal postures in countries which have been more affected by drug trafficking. Although García and Ortiz (2014) allows for conclusions about citizens' opinions and habits towards drugs, this does not allow to analyze how these may affect their investment decisions when economic benefit is at stake. The experiment in this paper, aims to analyze the latter.

On the other hand, there are some studies with randomized experiments about drugs consumption. Killias, et. al. (2011) present a recount of the findings of two field experiments with cannabis in Switzerland. Results suggest that prohibition reduced the available amount of the product, increased prices and decreased the level of cannabis use in younger consumers.

To study the supply side, Ibañez and Vasquez did several experiments with participants from rural families living in coca growing areas. Ibañez and Vasquez (2014a) examine the impact of an alternative development program named *Familias Guardabosques (FGB)* in Colombia[5] through an experiment of public bad game. The experiment consists of a game where the participants have to choose a product to grow between coca and cocoa under 4 different treatments related with social control and punishment. They find that the program increases coca reduction decisions and increases internal social control, concluding that positive incentives given to peasants to respect law has spill overs and may reduce the need to rely on costly external punishment. Ibañez and Vasquez (2014b) develop a die-type honesty experiment based on Fischbacher and Heusi (2008), where people roll a die 10 times without being seen and get paid according to what they report they got in each turn. They find that beneficiaries were more honest and generate spillovers to their neighbors, concluding that the FGB program improved ethical behavior, constructing more legal and honest communities. In the same line, Ibañez and Calrsson (2010), developes survey-based choice experiment to examine the effectiveness of two different policy programs in Putumayo. They examine three elements as determinants of law compliance in the particular case of coca cultivation: morality, legitimacy, and social interaction. The survey-experiment pretends to measure the responsiveness (in terms of the hypothetical quantity of hectares the farmer would use to grow

[4]More "conservative" opinion refers to postures like associating drugs consumption directly with criminality and addiction, considering it more as a problem of security and defense than one of public health, qualifying the current anti-drug policy as positive, regarding that prohibition is the most effective way to prevent consumption and disagree with marijuana legalization.

[5]The FGB consists of a strategy that shows legal economic alternatives to rural families in coca growing areas, gives them cash transfers conditional on their promise to keep their land coca-free and offers mandatory workshops with topics like the meaning of culture of legality.

coca) to changes in two elements: the relative profit of growing an alternative crop and the probability of eradication. They also formulate a simple model where coca, compared with the alternative crop, is more profitable and more risky; as it is going to be integrated to the drugs portfolio in the experimental design proposed in this paper. However, Ibañez and Calrsson (2010) does not include a way to control for the *pure* risk aversion before including the framing for drugs. The experiment in this paper allows to do it.

The cases studied by Miron and Feige (2008) and Miron and Zwibel (1991) can be considered as natural experiments about the impact of legislation on consumption. Miron and Feige (2008) examine the effect of legalization of opium in China in 1858. They do not find conclusive evidence that legalization increased the amount or reduced the price, suggesting that legalization of consumption had a minimal effect on opium consumption in China. Miron and Zwibel (1991) study the impact of alcohol prohibition in alcohol consumption in the United States (1920-1933). They find that the consumption fell steeply at the beginning of Prohibition (1920), but over the years, consumption increased until it reached pre-1920 levels. In sum, it was similar before the beginning of the Prohibition, in the last years of the Prohibition, and after the end of the Prohibition, suggesting that the ban is not a critical factor to influence consumption level in the long term.

On the other hand, several works conclude that drugs market's negative externalities are generated precisely because of drugs illegality. Becker, Murphy and Grossman (2005) develop a theoretical model of market for drugs, comparing a scenario of illegality (prohibition of production and public expenditure in pursuit and punishment) versus a regulation scenario (with a consumption tax). They conclude that the more inelastic the supply and demand[6], the less efficient is a policy of prohibition. They discuss the impact of prohibition on people according to their social class: the prohibition increases drugs' relative price for the upper and middle classes with respect to the poorest (because the micro traffic is concentrated in marginalized areas). In contrast, a consumption tax increases the relative price for the poor. They conclude that countries prefers prohibition instead of implementing a consumption tax because of the higher political power of upper classes, in order to discourage consumption among young people in the upper classes. In the same line, Miron (2001) argues that many of the negative social effects associated with drug use, are precisely due to dynamics generated by drugs prohibition and not due to the intrinsic properties of drugs. He argues that all consequences of prohibition are undesirable, with the possible exception of the reduction in consumption. After a recount of several cases of experimental and empirical evidence (specially the legalization of alcohol in the United States), the author shows that the prohibition is ineffective in reducing two types of effects: individual and social. For the individual effect, the reduction is modest compared to a context of legality and additional costs are introduced, such as the inability to control product quality. In the case of the social effect, the author argues that the global experience indicates that the prohibition adds more than it takes: feeds corruption; disputes over commercial

[6]The document cites several empirical studies that estimate the price and income elasticity of demand for cocaine, marijuana, and heroin, showing that there is evidence for these estimates to be smaller than one.

and production control are violent rather than governed by the laws of the market; complicates other political alliances, such as trade agreements; does not encourage respect for the law nor change consumer awareness and carries significant financial costs to the state-funded legal taxpayers. In sum, policy costs do not outweigh the negative externalities of the market.

3 Experimental Design

This paper conducts a laboratory experiment inspired by the Ten Paired Lottery-Choice Decisions designed by Holt and Laury (2002) to measure individual risk aversion. In Holt and Laury (2002) players must make 10 different pairwise choices between two lotteries, A and B, under different probability structures (Table 1).

The structure of a business under illegality generates the possibility of higher profit than a legal option. However, it also brings the possibility of being caught and losing all or much of their personal and productive capital, which makes this type of business more risky than a legal one. For that reason, the decision to invest in an illegal business is associated to individual risk aversion level. In this context, the lottery choice set turns out to be a suitable option to simulate this situation in the laboratory. In a lottery choice set, one of the options is more profitable but also more riskier than the other, what resembles the mentioned structure of an illegal or drug-related business. It is necessary to acknowledge that investing in an illegal business has a subjective probability of being caught. For that reason it might be more realistic to use ambiguity in this probability of being caught, but the experimental design would be more complicated. For this reason I use Holt and Laury's (2002)'s a lottery choice set, as it allows to make investment decisions under ten different probability structures.

The experimental design consists on six variations of the Ten Paired Lottery-Choice Decisions designed by Holt and Laury (2002) using a between subjects design to avoid biases from sequential or learning effects. The objective is to measure the framing effect, where the frames interact association of the risky portfolio with drugs, illegality and a negative externality. The experiment was conducted on September-October 2015, using the experimental software Z-tree (Fischbacher, 2007). All the treatments have the same structure of choices. The first treatment, which is the baseline to construct the frames in the other treatments, is the replication of Holt and Laury (2002) to measure each individual's risk aversion. The experiment was applied on five groups, and each one of them will take the neutral treatment (T1) followed by one of the other five treatments (from T2 to T6), in order to measure risk aversion individually and compare this decision in the neutral context in T1, with the decision under the framed contexts. The experiment for each group has two parts, the first one is T1 and the second one is one treatments between T2 and T6.

3.1 Baseline Treatment. Measuring risk aversion (T1)

This is the "neutral" treatment from where the settings for the following treatments are originated. It is instructed to individuals to assume the role of an investor who holds **15 Experimental Currency Units** (ECU) and needs to decide in which of the portfolios to invert them: the investment portfolio A or the investment portfolio B.

In the instructions it is pointed to the participants that as in all businesses in the real economy, unexpected events beyond investor control may happen within each portfolio. So within each of the portfolios, there exists a likelihood (Lottery I) of a "favorable" scenario (scenario I) and a likelihood (Lottery II) of an "unfavorable" one (scenario II). The participant has to choose in which portfolio s/he wants to invest, under different probability structures in each situation as it is shown in Table I.

To better illustrate the idea of probabilities, these are expressed to the participants in terms of a lottery that randomly chooses a number between 1 and 10 (Lottery I and Lottery II), as it is shown in Table I. It also allows to show to the player the mechanism the computer uses to determine the scenario.

Table 1: Ten Paired Lottery-Choice Decisions

Situation	**Portfolio A**				**Portfolio B**			
	Scenario I	**Lottery (I)**	**Scenario II**	**Lottery (II)**	**Scenario I**	**Lottery (I)**	**Scenario II**	**Lottery (II)**
1	25	1	20	2-10	45	1	5	2-10
2	25	1-2	20	3-10	45	1-2	5	3-10
3	25	1-3	20	4-10	45	1-3	5	4-10
4	25	1-4	20	5-10	45	1-4	5	5-10
5	25	1-5	20	6-10	45	1-5	5	6-10
6	25	1-6	20	7-10	45	1-6	5	7-10
7	25	1-7	20	8-10	45	1-7	5	8-10
8	25	1-8	20	9-10	45	1-8	5	9-10
9	25	1-9	20	10	45	1-9	5	10
10	25	1-10	20	-	45	1-10	5	-

The set of choices works in the following way: for example in the first situation, Scenario I will happen if the lottery (which have to choose a random number between 1 and 10) chooses the number 1. This is equivalent to say that Scenario I has a 10% likelihood of happening. On the other hand, Scenario II will happen if the lottery chooses any number between 2 and 10 (90% likelihood).If the participant chooses the Portfolio A and Scenario I happens, then the gain is 25 ECU (10 ECU added to the investment of 15 starting ECU, for a yield rate of 66.66% of the investment). While if the unfavorable scenario (II) happens, the gain will be 20 ECU (5 ECU of return over the 15 starting ECUs, which corresponds to 33.33% yield rate).But if the participant decides to invest in portfolio B, and Scenario I happens, the total payment will be 45 ECU (30 ECU of return over the 15 starting ECU, which corresponds to 200% yield rate); while if the unfavorable scenario (II) happens, the total profit will be 5 ECU (10 ECU are subtracted from the initial 15 ECU, indicating a yield rate of - 66.66%).

As Table I shows, the probability structure varies 10% from situation *s* to situation *s+1*. Scenario I's probability of occurrence increases on 10% from situation *s* to situation *s+1*, while Scenario II's probability decreases in the same fashion. This structure ends in the tenth situation, where the favorable scenario will take place with certainty (with probability 1). In this last situation, even the most risk averse player is expected to choose B. For example, in situation 3, if the lottery randomly chooses a number between 1 and 3, Scenario I will happen, and if the chosen number is between 4 and 10, Scenario II will happen. Therefore the possible payment in each situation depends on participant's choice.

The expected utilities of portfolios are given by the following expressions, where ρ represents the probability associated with the Lottery I in every situation, and $(1-\rho)$ represents the probability associated with the Lottery II in every situation:

- $E(U_A) = 25^*(\rho) + 20^*(1-\rho)$
- $E(U_B) = 45^*(\rho) + 5^*(1-\rho)$

Expected utilities for each situation are shown in Table II. Under the expected utility theory, it is expected that risk neutral participants start choosing portfolio B from situation 5 (Holt and Laury, 2002), because from there the expected payment of B is greater than that of A (see Table 2).

Table 2: Expected utilities

Situation	**Portfolio A**	**Portfolio B**	**Difference** *Expected Utility (A-B)*
1	21	9	11,5
2	21	13	8
3	22	17	4,5
4	22	21	1
5	23	25	-2,5
6	23	29	-6
7	24	33	-9,5
8	24	37	-13
9	25	41	-16,5
10	25	45	-20

3.2 Treatments

The following is the list of the treatments. The first three treatments have different framings related to portfolio B, using associations with the legal status of a market for drugs. The other three treatments have the same elements of the three first but with a negative externality associated with the number of investors in portfolio B. In all cases the structure of probabilities and payments remains identical:

T1. *Neutral frame*
It is the baseline described above. The details about the characteristics of portfolios are not given to the participants.

T2. *Illegal Drugs*
Participants are provided with the same options and the same role of investor than in T1. But this time participants are informed that B is a portfolio of businesses involved in production and trafficking of drugs, whose market is illegal. It is expected that if a participant is averse to any of the elements of the new context (drugs or illegality or both), s/he will begin to choose portfolio B in later situations compared with T1. For example, if in T1 a participant chose A in situations 1 to 5 and began to choose B from the situation number 6, and s/he cares about the attributes associated to B, in T2 s/he will begin to choose B in the situation number 7 or after.

T3. *Legal Drugs*
Participants are informed that B is is a portfolio of businesses involved in production and trafficking of drugs, whose market is legal. Under this treatment, it is expected that if a participant is averse to illegality but not to drugs, s/he begins to invest in portfolio B in earlier situations in comparison with individuals in T2.

T4. *Neutral with negative externality*
The context is the same than in T1, but this time participants are informed that portfolio B has a negative externality to society: in each one of the situations, for each person who chooses B, all participants lose an ECU from their profit. No additional information on the characteristics of the portfolios is provided.

T5. *Illegal drugs with negative externality*
The context is the same than in T2: participants are informed that B is a portfolio of businesses involved in production and trafficking of drugs, whose market is illegal. In addition, B has a social cost, like in T4: in each one of the situations, for each person who chooses B, all participants lose a ECU from their profit. This negative externality arises from the existence of the illegal drug market (could be related with violence, expenses in security against the business, and trafficking in streets) and affects all the participantes, independently of their individual decision between A and B. The aim of this treatment is to look for the interacted effect of the illegal drugs' market frame with the existence of a negative externality and compare it with T2 and T4.

T6. *Legal drugs with negative externality*
The options are A and B under the same conditions than in T3: B is a portfolio of businesses involved in production and trafficking of drugs, whose market is legal.

Additionally, in each one of the situations, for each person who chooses B, all participants lose an Experimental Currency Unit (ECU) from the gain. In this case the negative externality could be related with, for example, expenses in public health, regulation and quality control. The objective of this treatment is to compare it with T3, T4 and T5, to look for the power of the association of a social cost with drugs' market.

To better illustrate the structure of treatments and the elements interacting in this experiment, the following table describes a *"2 x 3"* design. The elements in each treatment only affect portfolio B.

Table 3: Summary of Treatments

	Neutral	**Illegal Drugs**	**Legal Drugs**
Without externality	T1	T2	T3
With negative externality	T4	T5	T6

In summary, this paper conducts the experiment using 5 groups, each with a couple of different treatments as well: T1-T2, T1-T3, T1-T4, T1-T5 and T1-T6.

3.3 Payment and others

In the general instructions, participants are informed that just one of the two parts of the experiment is going to be randomly chosen by the experimental software Z-tree (Fischbacher, 2007), to represent the final gain. Each part has ten situations to decide. Participants are informed that once Z-tree (Fischbacher, 2007) randomly chooses one of the two parts of the experiment, it will choose one of the 10 situations within the selected part to represent the final payment. Thus, each of the total 20 situations for each group is independent from the others and has the same probability of being selected, so that the participant is expected to take each situation seriously and independent. Once Z-tree (Fischbacher, 2007) selects the situation to calculate payment, it plays the lottery. To play the lottery, Z-tree (Fischbacher, 2007) chooses a random a number between 1 and 10 to determine the scenario, according to the probability structure of the selected situation. Finally, Z-tree (Fischbacher, 2007) determines each participant's payment according to each participant's investment decision in the respective part, situation and scenario that have been randomly chosen by the program.

In order to establish individual characteristics influencing decisions, a post-experiment survey is conducted. This survey gets variables related to socioeconomic attributes, opinions and social habits around drugs, taking as models some topics in the questionnaires used by Garcia and Ortiz (2014) and tests of morality and honesty used by Ibañez and Carlsson (2010). See the complete post-experiment survey in the Appendix.

3.4 Hypotheses

The following hypothesis are proposed to be tested:

H1. People are averse to invest in drugs.

Participants are expected to be averse to invest in a drug-related business for several reasons, including:

- Advertising against drugs in Colombia. For decades, Colombia has been an icon of anti-drug policies, including the use of mass commercials against drugs' use and against participation in drugs' production activities.
- Extreme violence related to drug trafficking in Colombia. Since the mid-eighties, the mafias have fought hard between them for the control of the business and the control of strategic zones. They have also fought against the state to avoid being captured and dismantled (Thoumi, 2005). During the 1990s and 2000s, drug trafficking financed and aggravated the existing internal armed conflict between guerrillas, paramilitaries, and the state (Duncan, 2014). The civilian population, and especially peasants living in remote regions, have been the most affected by the cross-fire among the involved war parts (UNODC, 2014).
- The majority of people have a reluctant ideological position on drugs legalization, especially in producing and transit countries with strong fighting policies against drugs (García and Ortiz, 2014).

For these reasons, participants are expected to have a negative image of drugs and are expected not to be willing to invest in a drug-related business. If this hypothesis is true, the average participant should increase his/her risk aversion when portfolio B is drug related. This is is true if, in Part II of the experiment, participants choose B, on average, in later situations than in the neutral treatment (Part I).

H2. People are averse to invest in a portfolio that generates a *negative externality*.

Participants are expected to invest less in something that generates a negative externality affecting the payment for all the participants, under the assumption that the average participant has a pro-social behaviour and empathy. As empathy can be defined as the capacity to put yourself in the shoes of others (Kirman et. al., 2010) it is expected that participant i does not want participant j to invest in a business which diminshes participant i's payment. In this case, if participant i is empathetic, he or she does not want to invest in a portfolio which affects all participants' payments. If this hypothesis is true, the average participant should increase his/her risk aversion when portfolio B generates the negative externality. This is is true if in the second part of the experiment, when the portfolio B generates a negative externality, participants choose B, on average, in later situations than in the neutral treatment.

H3. People are averse to invest in an *illegal* portfolio.

As education ans social interaction are expected to teach law compliance, it is expected that the average participant is not willing to invest in an illegal business or, at least, that the average participant increases his/her risk aversion level in front of an illegal portfolio. If this hypothesis is true, the average participant should increase his risk aversion when portfolio B is illegal. This is true if, in Part II of the experiment, when portfolio II is illegal, participants are expected to choose B, on average, in later situations than in the neutral treatment (Part I).

H4. People are more averse to invest in a portfolio that generates a *negative externality* than in something *illegal* .

It is expected that the average participant cares more about not affecting society than just respecting the law. It can be expected that for some participants, enforcing a law is not so important if this does not explicitly affect someone. In this way, it can be expected that the average participant, being empathetic, will be more averse to invest in something that will negatively affect the payment of all participants, including himself.

If this hypothesis is true, the average risk aversion should be greater for participants who face the option of choosing a portfolio B that generates negative externalities, when they are compared to participants who have the option of choosing an illegal B portfolio. Note that in this case it would be a "between subjects" comparison. This is true if when comparing decisions between these two groups of participants, there are significant differences between the average number of situations in which participants choose A and B, and participants facing the option of choosing a portfolio B with a negative externality, choose "A" a greater number of times.

H5. People are more averse to invest in *drugs* that generate a *negative externality* than in a "neutral" portfolio that generates a *negative externality*.

It is expected that the average participant is not willing to invest in a drugs related business, due to the reasons presented in the Hypothesis 1 of this section. Because of this anti-drug bias opinion (documented by García and Ortiz, 2014) and according to the anti-drug bias expected behavior, it is possible to expect people tend to assign a more severe effect to a negative externality of a drug-related business than to a negative externality related to an undetermined or "neutral" business. This is true if when comparing decisions between these two groups of participants, there are significant differences between the average number of situations in which participants choose A and B, and participants facing the option of choosing a drug-related portfolio with a negative externality, choose "A" a greater number of times than participants facing just the negative externality.

3.5 Sample of the Experiment

The laboratory experiment was conducted on September-October, 2015. 8 sessions with 141 participants were conducted. Participants were undergraduate students

at Universidad del Rosario in Bogotá, Colombia, from several careers: Economics, Finance, History, Medicine, Sociology, Law and Journalism.

In treatments with negative externality, decisions may be affected by the expectation of the number of participants who choose B in every situation. In order to control for this expectation, for each one of the three groups with this externality (T1-T4, T1-T5 and T1-T6) two sessions were performed, each one with 15 participants. For the other two cases (T1-T2 and T1-T3), in which the expectation of those who chose "B" does not need to be controlled, 2 sessions, each one planned for 30 participants were performed[7].

Table 4 summarizes the total sample (141 participants) and the consistent sample (105 participants who did not come back to A after choosing B) per group. The consistent sample consists on removing 36 participants who made "multiple switching"[8]. As Table 4 shows, each group maximum loses a third of the sample, and a quarter of the total sample (36/141 is about 25,5%) is lost in the consistent sample.

Table 4: Total and consistent samples per treatment

Group	Number of Sessions	Total Sample Participants	Consistent Sample	
			Participants	% of participants who were ruled out
T1-T2	1	24	17	7/24
T1-T3	1	27	18	9/27
T1-T4	2	30	20	10/30
T1-T5	2	31	26	5/31
T1-T6	2	29	24	5/29
Total	8	141	105	36/141

[7]The expectation of the number of investors in B per situation is asked in the post experiment survey but is not included in the regressions presented because in some cases it is omitted by the specifications and in others it does not show any significance. Several ways of including these expectations were tested, such as the expectation in the switch point situation and an average of the expectation of the 10 situations.

[8]Multiple switching consists in switching more than once between the options A and B along the 10 situations. To do multiple switching is understood as an lack of consistence in rational terms of risk perception or it is understood as indifference between options. Multiple switching makes it difficult to interpret the risk aversion change between treatments (Dave et al., 2010; Holt and Laury, 2002; Andersen et al., 2006).

4 Results

This section has two parts. The first part shows analyzes of the risk aversion classification of the sample and comparisons within and between subjects. The second part conducts regression analyzes.

4.1 Risk Aversion Classification

The variable this paper uses to measure the risk aversion classification is the individual number of *Safe Choices in PI*. This variable is equal to the total number of times each participant chooses A in T1 (equivalent to Part I), both for the whole sample and the consistent sample. For participants in the consistent sample, all safe choices are together, one after the other, because participants do not do multiple switching, that is, once they start choosing B, they do not return to choosing A. In the case of participants that do multiple switching, the variable safe choices is equal to the total number of situations in which they choose A, as Holt and Laury (2002) do. The maximum possible number of safe choices is 10, if the participant i chooses A in all situations, which shows that i has the maximum possible level of risk aversion. The minimum possible number of safe choices is 0, which means participant j chooses B in all situations and s/he is strongly risk loving.

Table 5 presents the whole and consistent sample's distribution of risk aversion based on risk preference classification proposed by Holt and Laury (2002), using a range of relative risk aversion level according to an utility function

Table 5: Risk aversion classification based on lottery choices (structure by Holt and Laury, 2002)

Number of safe choices (A)	Range of Relative Risk Aversion for $U(x) = x^{1-r}/(1-r)$	Risk Preference Classification	*Whole sample*		*Consistent sample*	
			N	%	N	%
0-1	$r < -0.95$	Highly risk loving	7	0.050	6	0.057
2	$-0.95 < r < -0.49$	Very risk loving	0	0.000	0.000	0
3	$-0.49 < r < -0.15$	Risk loving	8	0.057	5	0.048
4	$-0.15 < r < 0.15$	Risk neutral	19	0.135	14	0.133
5	$0.15 < r < 0.41$	Slightly risk averse	29	0.206	19	0.181
6	$0.41 < r < 0.68$	Risk averse	26	0.184	20	0.190
7	$0.68 < r < 0.97$	Very risk averse	27	0.191	19	0.181
8	$0.97 < r < 1.37$	Highly risk averse	10	0.071	8	0.076
9-10	$1.37 < r$	Stay in bed	15	0.106	14	0.133
N			141	1	105	1

Figure 1 shows the proportion of participants for risk classification categories in Table 5. For the whole sample, the majority of participants are classified in *Slightly risk averse* (5 safe choices, 20.6% of participants), *Risk averse* (6 safe choices, 18.4% of the participants) and *Very Risk Averse* (7 safe choices, 19.1% of participants). These three categories account for 58% of the whole sample and 55% of consistent

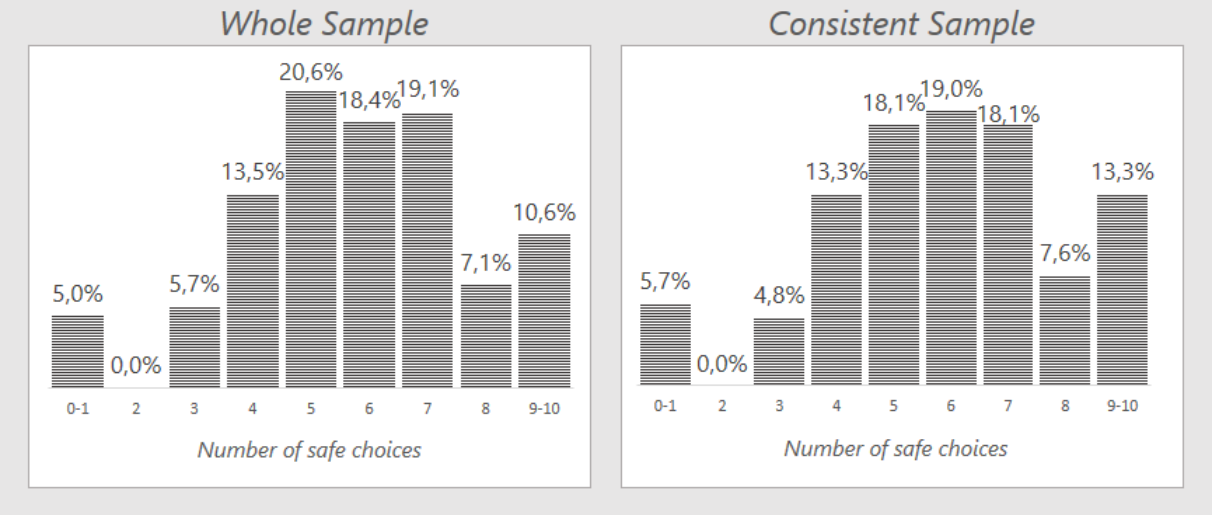

Figure 1: Safe Choices in T1

sample. The first three categories representing risk lovers just account for about 10% for both whole and consistent sample. 13% of participants are considered *Risk neutral* (4 safe choices) in the two cases. The last category representing the maximum risk aversion level accounts for 10% of the whole sample and 13% of the consistent sample. In conclusion, more than the half of the sample is risk averse.

In order to compare risk aversion in this paper with Holt and Laury (2002), Table 6 shows a comparison between the participants' risk aversion distribution by categories.

Table 6: Risk Aversion Distribution of Holt and Laury (2002) and this paper

Risk Classification	Holt and Laury (2002) (Treatment *20x Real*)	This experiment (T1)
	N=93	N=141
Highly risk loving	0.010	0.050
Very risk loving	0.010	0.000
Risk loving	0.040	0.057
Risk neutral	0.130	0.135
Slightly risk averse	0.190	0.206
Risk averse	0.230	0.184
Very risk averse	0.220	0.191
Highly risk averse	0.110	0.071
Stay in bed	0.060	0.106
	1	1

The *Two-sample Kolmogorov-Smirnov test for equality of distribution* allows to

conclude that the distribution of the two samples has no significant differences (p-value=0,989, see the Stata output of the test in the appendix). This means the average risk aversion behavior (T1) found in this paper is consistent with the original laboratory experiment in Ibid (2002) developed in USA.

4.1.1 Within subjects risk aversion comparison

Table 7 shows the mean of the number of safe choices[9] for all the groups, and the comparison between Part I and Part II within each group (where the variable *Change=Safe Choices in Part II − Safe Choices in Part I*). In this way, table 7 shows a within subjects comparison showing the average framing effect (in Part II) on participants decisions. For both the whole and the consistent sample, all of the averages of the number of safe choices jump up from Part I to Part II in the risk aversion classification, except in the case of T1-T4 for the whole sample, where the size of the change is less than 1 (0.53). The differences are significant using the *t-test mean differences for paired observations* (used for two variables in the same sample).

Table 7 shows that the frames in Part II (except for T4) lead to an increase in the risk aversion level revealed by participants in Part I. The effect is not robust for T1-T4. In T4 B has a negative externality but the kind of business is not specified. This suggests that the negative externality alone does not increase participants' risk aversion level and that this increase may be more motivated by the association of portfolio B with drugs. This is surprising because it means that for that group, participants do not mind the possibility of negatively affecting the whole group's profit.

Another way of analyzing the change in decisions from Part I to Part II is to divide the sample in three categories: move towards risk loving, stay the same and move towards risk averse. Table 8 shows the number and proportion of participants classified in these three categories, which are constructed comparing the number of safe choices in Part I with respect to Part II. If a participant chooses a greater number of safe choices in Part II than in Part I, it means the participant becomes more risk averse in Part II, which is the expected attitude. However, if a participant chooses a smaller number of safe choices in Part II than in Part I, it means the participant becomes more risk lover in Part II. If the participant chooses the same number of safe choices in Part I and in Part II, the participant is classified in the category *Stay the same*. For both the whole and the consistent sample, most of the participants *move towards risk averse* in Part II (55% in the whole sample and 50% in the consistent sample), which was expected. The next largest category is *Stay the same* (33% of the participants for the whole sample and 38% for the consistent sample) and the smallest category is *Move towards risk loving* with 12% in the two cases. This trend is similar in all groups, except for the group T1-T5. In this case, the proportion of participants in the category *Move towards risk averse* diminishes while the proportion in *Move towards risk loving* increases. For the consistent sample, 42% of the sample stays the same, 35% moves toward risk averse and 23% moves towards risk lover. This is surprising because in T5 the frame includes the three "negative" elements: negative externality, drugs and illegality, and in this group,

[9]Remember that the number of safe choices for both the whole and consistent sample is the total number of times each participant chooses "A".

Table 7: Average Number of Safe Choices per group and Change (PII−PI)

Whole sample

		Part I (T1)		**Part II (T2 to T6)**		**Change**$^{\alpha}$
Group	N	Mean	Classification (aprox.)	Mean	Classification (aprox.)	$(PartII - PartI)$
T1-T2	24	5.71	Risk averse	7.25	Very risk averse	1.54***
		(1.73)		(2.40)		(0.38)
T1-T3	27	5.37	Slightly risk averse	7.30	Very risk averse	1.93***
		(2.42)		(2.15)		(0.51)
T1-T4	30	5.63	Risk averse	6.17	Risk averse	0.53
		(1.96)		(1.91)		(0.33)
T1-T5	31	6.16	Risk averse	7.29	Very risk averse	1.13**
		(2.05)		(2.52)		(0.40)
T1-T6	29	5.83	Risk averse	7.21	Very risk averse	1.38**
		(2.39)		(2.26)		(0.42)

Consistent sample

		Part I (T1)		**Part II (T2 to T6)**		**Change**$^{\gamma}$
Group	N	Mean	Classification (aprox.)	Mean	Classification (aprox.)	$(PartII - PartI)$
T1-T2	17	5.82	Risk averse	7.00	Very risk averse	1.18**
		(1.91)		(2.55)		(0.42)
T1-T3	18	5.78	Slightly risk averse	7.44	Very risk averse	1.66**
		(2.62)		(2.18)		(0.59)
T1-T4	20	5.35	Slightly risk averse	5.95	Risk averse	0.60*
		(1.79)		(1.57)		(0.3)
T1-T5	26	6.31	Risk averse	6.96	Very risk averse	0.65*
		(2.09)		(2.60)		(0.37)
T1-T6	24	5.83	Risk averse	7.21	Very risk averse	1.38**
		(2.58)		(2.30)		(0.5)
Total	105	6.85	Very risk averse	7.91	Highly risk averse	1.06***
		(2.21)		(2.3)		(0.19)

$^{\alpha}$ Significance of differences also remains using the Wilcoxon signed-rank test; except for the group T1-T5.

$^{\gamma}$ Significance of differences also remains using the Wilcoxon signed-rank test.

most of the participants prefer to stay the same.

From Table 8, one could say that frames in Part II lead to an increase in the the risk aversion level for the majority of participants. This trend is smoothed in the case of the group T1-T5. For this group, those who become more risk averse are not the majority, but the ones who become more risk loving are still the minority.

Table 8: Direction of the change from Part I to Part II

Whole Sample

	All treatments		T1-T2		T1-T3		T1-T4		T1-T5		T1-T6	
	N	%	N	%	N	%	N	%	N	%	N	%
Move towards risk loving	17	0.12	1	0.04	2	0.07	5	0.17	6	0.19	3	0.10
Stay the same	47	0.33	9	0.38	8	0.30	10	0.33	11	0.35	9	0.31
Move towards risk averse	77	0.55	14	0.58	17	0.63	15	0.50	14	0.45	17	0.59
N	141		24		27		30		31		29	

Consistent Sample

	All treatments		T1-T2		T1-T3		T1-T4		T1-T5		T1-T6	
	N	%	N	%	N	%	N	%	N	%	N	%
Move towards risk loving	13	0.12	1	0.06	1	0.06	2	0.10	6	0.23	3	0.13
Stay the same	40	0.38	7	0.41	7	0.39	8	0.40	11	0.42	7	0.29
Move towards risk averse	52	0.50	9	0.53	10	0.56	10	0.50	9	0.35	14	0.58
N	105		17		18		20		26		24	

4.1.2 Between Treatments Comparison

In order to analyse the effect of treatments on investment decisions, Table 9 shows a set of simple comparisons between treatments.

First, the differences between treatments detailed in Panel A allow to know how many investors refused to invest in a portfolio when this portfolio was related with **illegal drugs**. On the other hand, differences in Panel B allow to isolate the aversion to invest in a business related to **drugs**. Meanwhile, differences in Panel C allow to obtain the investor aversion to an illegal **portfolio**. Panel D shows differences that allow to isolate the aversion to invest in a business that involves a negative externality. Finally, Panel E shows some differences leading to other specific factors of aversion.This methodology has some advantages: First, as mentioned, it is possible to observe how much is the difference between the pure effect of the negative externality (Panel D) against the effect of the negative externality associated with drugs' business (Panel E), either illegal (X) or legal (XI). Second, it is possible to know if the effects are robust, because it uses different ways of measuring the same effect (through differences between different treatments). However, note that all the panels except for Panel C include comparisons between *within subjects* differences and *between subjects* differences.

Table 10 shows results for comparisons showed by Table 9. Column E shows the simple differences between the two treatments. The larger differences, which correspond to statistically significant differences are located in the panels related with

Table 9: Comparison between treatments for the whole sample - Definition

	Treatments comparison *(Difference)*	**Summary of the difference** *(Attributes of Portfolio B)*	**Result** *(Aversion to invest in...)*
Panel A			
I.	T1 − T2	(neutral) − (drugs + illegal)	**illegal drugs**
II.	T4 − T5	(neutral + negative ext.) − (drugs + illegal + negative ext.)	**illegal drugs**
Panel B			
III.	T1 − T3	(neutral) − (drugs + legal)	**drugs**
IV.	T4 − T6	(neutral + negative ext.) − (drugs+legal+negative ext.)	**drugs**
Panel C			
V.	T2 − T3	(drugs + illegal) − (drugs+legal)	**illegal** portfolio
VI.	T5 − T6	(drugs + illegal +negative ext.) − (drugs+ legal+ negative ext.)	**illegal** portfolio
Panel D			
VII.	T1 − T4	(neutral) − (neutral+ negative ext.)	portfolio with **negative ext.**
VIII.	T2 − T5	(drugs+ illegal) − (drugs+ illegal + negative ext.)	portfolio with **negative ext.**
IX.	T3 − T6	(drugs+legal) − (drugs+ legal+negative ext.)	portfolio with **negative ext.**
Panel E			
X.	T1 − T5	(neutral) − (drugs+ illegal+ negative ext.)	**illegal drugs with negative ext.**
XI.	T1 − T6	(neutral) − (drugs+ legal + negative ext.)	**drugs with negative ext.**
XII.	T2 − T6	(drugs+ illegal) − (drugs+legal+negative ext.)	**illegal** portfolio with **negative ext.**

drugs -Panel A, Panel B and lines X and XI in Panel E- (see table 10 for details in each line). The smaller differences are in Panel C, which means illegality alone does not cause a significant change in the mean of the number of safe choices. It is not surprising since a participant can perceive illegality just as a *label* in this experiment. Surprisingly, something similar can be concluded from Panel D, where differences are not significant. It means that the negative externality alone does not cause a significant change in the mean of the number of safe choices. However, there are significant differences when the negative externality is related to the drugs' business (Panel E) either illegal (line X) or legal (line XI). With respect to the robustness of the effects of treatments, column E shows the difference of differences. The only statistically significant difference between differences is in Panel B (with 90% of confidence level). This is not surprising while the comparison in this panel includes one within subjects' difference -line III- and one between subjects' difference -line IV-. In each one of the other cases, whether the differences are between or within subjects, the difference in differences is not statistically significant, suggesting that there is consistency in the effect of the treatments.

Table 10: Comparison between treatments for the whole sample - Results

	A. Treatments comparison (I)-(II)	B. Within Subjects *(=1)*	C. Safe Choices (I)	D. Safe Choices (II)	E. Mean of the difference	F. *Difference in differences*
Panel A: *Aversion to a portfolio related to illegal drugs*						
I.	T1-T2	1	5.70	7.25	-1.54***	-0.42
					(0.38)	
II.	T4-T5	0	6.17	7.29	-1.12*	
					(-0.42)	
Panel B: *Aversion to a portfolio related to drugs*						
III.	T1-T3	1	5.37	7.30	-1.93***	-0.89*
					(0.51)	
IV.	T4-T6	0	6.16	7.20	-1.04*	
					(0.54)	
Panel C: *Aversion to an illegal portfolio*						
V.	T2-T3	0	7.25	7.29	-0.05	-0.13
					(0.64)	
VI.	T5-T6	0	7.29	7.20	0.08	
					(0.62)	
Panel D: *Aversion to a portfolio with a negative externality*						
VII.	T1-T4	1	5.63	6.16	-0.53	(VII-VIII) -0.50
					(0.33)	
VIII.	T2-T5	0	7.25	7.29	-0.40	(VII-IX) -0.62
					(0.67)	
IX.	T3-T6	0	7.29	7.21	0.09	(VIII-IX) -0.50
					(0.59)	
Panel E: Others						
X.	T1-T5	1	6.16	7.29	-1.13***	-
					(0.4)	
XI.	T1-T6	1	5.83	7.20	-1.37**	-
					(0.42)	
XII.	T2-T6	0	7.25	6.61	0.04	-
					(0.64)	

4.2 Regression Analysis

4.2.1 Baseline Model

In order to find the elements causing the change in decisions (when comparing Part I and Part II of the experiment), regression analysis is conducted with some specifications including individual controls obtained in a post-experiment survey (see the complete survey in the Appendix). The following equation describes the baseline model:

$$Change_i = \beta_0 + \beta_1(Illegal_t) + \beta_2(Externality_t) + \beta_3(Illegal_t * externality_t) + \gamma(Controls_i) + \epsilon_i$$

Where the dependent variable "$Change_i$" is the difference between the number of safe choices of participant i in Part II minus the number of safe choices of participant i in Part I ($Change_i = (SafeChoicesPII) - (SafeChoicesPI)$ of participant i). This dependent variable allows to look for effects on the size of the change in the number of safe choices between the two parts of the experiment. The greater the change, the grater is the"jump" between the pure risk aversion (Part I) and the risk aversion under the frame (Part II), and also the greater the effect of the frame on decisions. If the variable "$Change_i$" is positive, the participant i is more risk averse in Part II than in Part I; if "$Change_i$" is negative it means the participant is more risk lover in Part II than in Part I; and if "$Change_i$" is zero it means the participant does not change his/her risk aversion level in the two parts. The dependent variable allows to capture the direction and size of the effect that the experiment's elements in Part II causes on participants' decisions. On the other hand, independent variables are dummy variables describing frames per treatment and categorical variables for controls obtained in the post-experiment survey. Table 11 shows the description of each variable in the baseline model [10].

Note that the variable $Drugs_t$ is not included in the regression. As T4 is the only treatment which Part II does not include the element of drugs, I prefer to exclude drugs from the regression to have balanced sub-samples to look for the effects of the independent variables. So this regression captures variations between T2, T3, T5 and T6. Not that T1 is just included to construct the dependent variable. The variable constructed by interacting $Illegal * Externality$ allows the model to has a *difference in differences'* structure.

Table 12 shows results for different OLS specifications of the baseline model for the consistent sample [11]. The first column does not include controls. Columns 2 to 6 include controls by groups and column 7 includes all controls' groups by topics

[10] Find summary statistics, description of controls and the complete post-experiment survey (in Spanish) in the Appendix

[11] Results are very similar when running the same regressions with several sub-samples: (1) the whole sample, (2) when the regressions do not include the most risk averse participants in the Part I of the experiment (those who have 9 or 10 safe choices) and (3) without including the risk neutral participants in part I (those who have the same number of safe choices in the two parts).

Table 11: Definition of variables

Variable	Definition
$SafeChoicesPI_i$	Number of safe choices of participant i in Part I
$SafeChoicesPII_i$	Number of safe choices of participant i in Part II
$Change_i$	Safe choices in PII − Safe choices in Part I
$illegal_t$	= 1 if Portfolio B is illegal in Part II, 0 otherwise
$externality_t$	= 1 if Portfolio B is illegal in Part II, 0 otherwise
Groups of Controls	
Sex	= 1 for female, = 0 for male.
Demographic controls	age, born in Bogota, *estrato*, career, semester
Respect for the law	See Post Experiment Survey in the Appendix
Corporate responsibility	See Post Experiment Survey in the Appendix
Drugs' personal view	See Post Experiment Survey in the Appendix
Drugs' social use	See Post Experiment Survey in the Appendix

according to questions in the post-experiment questionnaire [12] [13].

The only robust effect across regressions is a gender effect, for the variable Sex_i (which is defined as Female=1)[14] . This means that women are systematically more risk averse in Part II with respect to their own decision in Part I. The variable change is, on average, 1 unit higher for women than for men. The size of the effect indicates that the difference between women's decisions, in Part II with respect to Part I, is on average 1 situation higher than this same difference for men [15]. The effect is significant at the 95% confidence level in columns 1, 2, 3, 4 and 6, and at the 90% confidence level in columns 5 and 7 [16]. This gender effect appears in all of the robustness checks below and is discussed in section 4.2.3, where the results are discussed.

[12]The R-squared in column 7 (using all controls) is the best of all columns, and it is equal to 0.2877, meaning that approximately 29% of the variability of $Change_i$ is accounted for by the variables in the model.

[13]Results reported include one variable for each question. When constructing indexes with variables according with the same groups, results remain very similar.

[14]The sample is balanced between men and women. In the whole sample there are 71 men and 70 women and in the consistent sample there are are 58 men and 47 women. See Table 19 in the appendix to look detailed number of participants by sex and treatments.

[15](This is equal to approximately 8% of the rank of variable $Change_i$. This rank is equal to 12, since the minimum is -2 and the maximum value is 10 (see Table **??** showing a comparison of coefficients' sizes and the size of rank of dependent variables.)

[16]For every regression in Table 12, tests are conducted to see if the effect of variables of interest are significantly different from 0, both for single variables ($Illegal_t$,$Externality_t$ and Sex_i) and for sets of variables. The sets of variables tested are the ones to look for the difference in differences effects: ($Illegal_t + Illegal_t * Externality_t$) and ($Externality_t + Illegal_t * Externality_t$). The collective contribution of these two sets is not significant in any case. The only significant variable in all regressions is the variable Sex_i, at a 95% confidence level in columns 2, 3, 4 and 6 and at a 90% confidence level in columns 5 and 7.

Table 12: Baseline Model

VARIABLES	(1) Change	(2) Change	(3) Change	(4) Change	(5) Change	(6) Change	(7) Change
Illegal	-0.490	-0.565	-0.555	-0.280	-0.278	-0.325	-0.328
	(0.733)	(0.736)	(0.748)	(0.731)	(0.761)	(0.819)	(1.069)
Externality	-0.292	-0.429	-0.286	-0.0278	-0.279	-0.677	-0.881
	(0.675)	(0.681)	(0.709)	(0.687)	(0.684)	(0.821)	(1.063)
Illegal*Externality	-0.231	-0.411	-0.486	-0.818	-0.581	-0.977	-0.787
	(0.955)	(0.974)	(0.985)	(0.965)	(0.982)	(1.107)	(1.345)
Sex (Female = 1)		1.031**	1.121**	1.042**	0.986*	1.416**	1.367*
		(0.489)	(0.500)	(0.483)	(0.523)	(0.597)	(0.756)
Demograhic Controls		Yes					
Respect for the law Controls			Yes				
Corporate responsibility Controls				Yes			
Drugs' personal view					Yes		
Drugs' social use						Yes	
All controls							Yes
Constant	1.667***	1.233	1.563	-0.456	1.692	-0.0540	1.598
	(0.511)	(1.649)	(1.924)	(1.537)	(2.558)	(1.447)	(6.154)
Observations	85	85	85	85	85	70	70
R-squared	0.032	0.114	0.113	0.116	0.121	0.166	0.288

Robust standard errors in parentheses
$***p < 0.01$, $**p < 0.05$, $*p < 0.1$

4.2.2 Robustness checks

4.2.2.1 Excluding individuals whose *Change=0*

Table 13 presents a variation of the baseline model, without including participants whose variable change is equal to zero. If $Change_i = 0$ it means participant i is indifferent to the frame presented in Part II of the experiment. Excluding participants who are indifferent to Part II treatments allows a better examination of the effect for participants who are sensitive to the elements presented in Part II. In that sense, it is expected that the baseline model's variation presented in this subsection confirms and deepens the effects found in the baseline model [17]. The model is the following:

$$Change_{i-0} = \beta_0 + \beta_1(Illegal_t) + \beta_2(Externality_t) + \beta_3(Illegal_t * externality_t) + \gamma(Controls_{i-0}) + \epsilon_{i-0}$$

Results in Table 13 show robustness in the gender effect with a higher size of the effect [18]. This time the variable change is from 1,3 to 2,2 units higher for women than for men. When taking into account just participants who have some change

[17] The R-squared in column 7 (using all controls) is the best of all columns, and it is equal to 0.7374, meaning that approximately 73.7% of the variability of $Change_i$ is accounted for by the variables in the model. This is an improvement with respect to the baseline model, where variables explain just 29% of the variability of $Change_i$

[18] Results reported include one variable for each question. When constructing indexes with variables according with the same groups, results remain very similar.

in their risk aversion level in the two parts of the experiment, the size of the effect indicates that the difference between women's decisions, in Part II with respect to Part I, is between 1,3 and 2,2 situations higher than this same difference for men. The effect is significant at the 95% confidence level in columns 1 and 3, and at the 90% confidence level in the rest of the columns. Note however that the sample in this specification is reduced to 41 and 53 participants.

Table 13: Robustness Check 1. Baseline excluding participants with $Change_i = 0$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Change	Change	Change	Change	Change	Change	Change
Illegal	-0.358	-0.334	-0.673	-0.0775	-0.163	-0.838	-1.175
	(1.067)	(1.154)	(1.112)	(1.076)	(1.158)	(1.276)	(1.479)
Externality	-0.496	-0.652	-0.826	0.532	-0.632	-1.578	-0.545
	(0.942)	(1.063)	(1.016)	(1.051)	(1.013)	(1.275)	(1.695)
Illegal*Externality	-1.022	-0.969	-0.955	-1.815	-0.984	-1.621	-1.490
	(1.425)	(1.574)	(1.509)	(1.437)	(1.489)	(1.798)	(2.069)
Sex (Female=1)	1.505**	1.425*	1.790**	1.353*	1.529*	1.821*	2.242*
	(0.706)	(0.747)	(0.734)	(0.697)	(0.770)	(0.901)	(1.154)
Tobacco (social use)						1.697**	2.115*
						(0.740)	(1.064)
Demographic Controls		Yes					
Respect for the law Controls			Yes				
Corporate responsibility Controls				Yes			
Drugs' personal view					Yes		
Drugs' social use						Yes	
All controls							Yes
Constant	1.906**	2.720	5.630**	-2.488	0.397	3.197	5.967
	(0.822)	(2.503)	(2.654)	(2.224)	(3.403)	(2.365)	(8.889)
Observations	53	53	53	53	53	41	41
R-squared	0.133	0.153	0.240	0.231	0.199	0.317	0.737

Standard errors in parentheses
$***p < 0.01$, $**p < 0.05$, $*p < 0.1$

By the other hand, in Table 13 the effect of tobacco use in the social environment of participants is significant with positive sign in the two cases it is included (in columns 6 and seven). This means that participants who perceive a greater use of tobacco -in their social environment- have a greater change in their risk aversion level between Part I and Part II of the experiment. As tobacco is a legal substance, this could be interpreted as an unwillingness to invest in "damaging" substances in general [19].

[19]For every regression in Table 13, tests are conducted to see if the effects of variables of interest are significantly different from 0, both for single variables ($Illegal_t$,$Externality_t$, Sex_i and $Tobacco_i$) and for sets of variables. The sets of variables tested are the ones to look for the difference in differences effects: ($Illegal_t + Illegal_t * Externality_t$) and ($Externality_t + Illegal_t * Externality_t$). The collective contribution of these two sets is not significant in any case except for ($Externality_t + Illegal_t * Externality_t$) in the regression of column 6 at a 95% confidence level. Sex_i is significant in all regressions, at a 95% confidence level in columns 1 and 3 and at a 90% confidence level in columns 2,4,5,6 and 7. The variable

4.2.2.2 Controlling by the risk aversion level

It was expected that decisions in Part II were affected both by (1) the risk aversion level showed in Part I and by (2) each treatment's framing in Part II. Previous regressions do not find effects caused by (2) each treatment's framing in Part II. It is now necessary to check whether there is an effect of (1) the risk aversion level showed in Part I. It is necessary to consider (1) as a control for decisions in Part II of the experiment because risk aversion level can affect participants' sensitivity to the framing in Part II of the experiment.

To measure each participant's risk aversion level this paper uses the number of safe choices in Part I of the experiment [20]. The baseline model does not include this measure as a control in order to avoid endogeneity, because the variable *Safe Choices in Part* I_i is used to construct the dependent variable $Change_i$ in the baseline model. Table 14 shows results for different specifications using the number of *Safe Choices in Part I* as a control and the dependent variable *Safe Choices in Part II* [21]. The dependent variable is not $Change_i$ in order to avoid endogeneity by construction of the variable. The model presented in Table 14 is the following:

$SafeChoicesPartII_i = \beta_0 + \beta_1(Illegal_t) + \beta_2(Externality_t) + \beta_3(Illegal_t * externality_t) + \beta_4(SafeChoicesPartI_i) + \gamma(Controls_i) + \epsilon_i$

In first place, Table 14 shows a robust and significant effect for the variable *Safe Choices in Part* I_i. It is significant at the 99% confidence level in all the specifications. The size of the effect indicates that on average for one safe choice in Part I, participants choose half additional safe choice in Part II. It means each participant's risk aversion level has a direct and positive effect in decisions in Part II. It is not surprising at all, as the two parts of the experiment have exactly the same risk structure (the element varying is frame in Part).

In second place, in Table 14 the gender effect is positive, significant at 99% confidence level in all the specifications and the size of the coefficient increases with respect to the baseline model. The size of the effect indicates that if the participant is a woman, she chooses from 1.4 to 2.2 additional safe choices with respect than men in Part II. There are no significant effects in any of the other variables, not even in controls [22].[23]

$Tobacco_i$ is also significant when used, at a 95% confidence level in regression of column 6 and at a 90% confidence level in column 7.

[20] This is the same measure used by Holt and Laury (2002).

[21] The R-squared in 14's regressions show an improvement with respect to the baseline model.

[22] This results remain similar when running the same regressions excluding participants whose variable $Change_i = 0$. The gender effect is also robust when running the regression with the dependent variable defined as $Change_i = 0$ and using the endogenous variable *Safe Choices in Part I as a control*

[23] For every regression in Table 14, tests are conducted to see if the effects of variables of interest are significantly different from 0, both for single variables ($Illegal_t$,$Externality_t$, Sex_i and $SafeChoicesPartI_i$) and for sets of variables. The sets of variables tested are the ones to look for the difference in differences effects: ($Illegal_t + Illegal_t * Externality_t$) and ($Externality_t + Illegal_t * Externality_t$). The collective contribution of these two sets is not significant in any case. The variables Sex_i and $SafeChoicesPartI_i$ are significant in all regressions at a 99% confidence level.

Table 14: Robustness Check 2. Controlling by risk aversion level

VARIABLES	(1) Safe Ch. in Part II	(2) Safe Ch. in Part II	(3) Safe Ch. in Part II	(4) Safe Ch. in Part II	(5) Safe Ch. in Part II	(6) Safe Ch. in Part II	(7) Safe Ch. in Part II
Illegal	-0.416	-0.594	-0.527	-0.156	-0.418	-0.554	-0.573
	(0.626)	(0.641)	(0.656)	(0.631)	(0.678)	(0.699)	(0.888)
Externality	-0.246	-0.446	-0.277	0.00841	-0.278	-0.793	-0.653
	(0.577)	(0.593)	(0.622)	(0.592)	(0.608)	(0.700)	(0.882)
Illegal*Externality	-0.509	-0.263	-0.427	-0.841	-0.476	-0.542	-0.553
	(0.827)	(0.849)	(0.865)	(0.832)	(0.874)	(0.946)	(1.117)
Sex (Female=1)	1.493***	1.485***	1.459***	1.401***	1.442***	1.954***	2.161***
	(0.424)	(0.435)	(0.444)	(0.422)	(0.476)	(0.520)	(0.651)
Safe Choices	0.551***	0.535***	0.538***	0.518***	0.558***	0.492***	0.398***
in Part I	(0.0899)	(0.0925)	(0.0960)	(0.0915)	(0.0970)	(0.103)	(0.133)
Demograhic Controls		Yes					
Respect for the law Controls			Yes				
Corporate responsibility Controls				Yes			
Drugs' personal view					Yes		
Drugs' social use						Yes	
All controls							Yes
Constant	3.679***	2.690*	4.423**	1.712	4.074*	3.056**	-2.199
	(0.675)	(1.465)	(1.789)	(1.387)	(2.335)	(1.386)	(5.170)
Observations	85	85	85	85	85	70	70
R-squared	0.434	0.456	0.448	0.469	0.437	0.457	0.563

Standard errors in parentheses
$***p < 0.01$, $**p < 0.05$, $*p < 0.1$

4.2.2.3 Baseline model excluding women

Previous results in this paper and other works [24] suggest women are more risk averse than men. In this sense, it is interesting to look for different effects when separating the sample between men and women. There are not robust significant effects when considering just women (both for the whole and the consistent sub-samples of women), but there is an effect that is sometimes significant when considering just consistent men. Table 15 shows results for different specifications for the following model:

$$Change_{iMen} = \beta_0 + \beta_1(Illegal_t) + \beta_2(Externality_t) + \beta_3(Illegal_t * externality_t) + \gamma(Controls_{iMen}) + \epsilon_{iMen}$$

Table 15 shows a negative and significant effect (at 90% confidence level in columns 1,3,4 and 5) for the variable $Illegal_t * Externality_t$ for men in the consistent sample. It means that when this two elements are together, the variable $Change_i$ is smaller. The negative sign does not mean $Change_i$ is negative (since just 6 of the consistent men has a negative value for the variable $Change_i$); but it means that, on average, consistent men make a more risk averse choice in Part II in comparison with their own decisions in Part I, but they do not make a big leap (between their own decisions in the two parts) when illegality and a negative

[24] 15 experiments with the consistent result of women's higher risk aversion are documented by Charness and Gneezy (2012). This is discussed in section 4.2.3. of this paper

externality are together involved in the risky portfolio. It means that consisted men increase their level of risk aversion very modestly in Part II of the experiment, so that they remain close to their initial risk aversion level (Part I). It is accurate to say that, on average, $Change_i$ is positive when these two elements (illegality and negative externality) are together because they two are perceived as something negative. But why is this effect smaller when these two elements are together? Some possible explanations are given for this:

1. $Change_i$ is not greater because participants could think the negative externality (diminishing an ECU for all participants' payments) is justified or logical if the portfolio is illegal. Then portfolio B has negative characteristics, but not so much to ignore the attractiveness of the highest payment if the best scenario is chosen.
2. $Change_i$ is not greater because participants could perceive that investing in B (the riskier portfolio) is the best strategy if they think not many participants are going to invest in B. If the participant i thinks not many other participants are able to invest in something illegal that causes harm to society, investing in B can be a courageous decision that can report higher payment.

According to Table 15, it is possible to suggest that men could fit better into these interpretations. As the effects of the variables $Illegal_t$ and $Externality_t$ are small and not significant it is not really possible to interpret the effect of each one of these two elements separately [25]. Note however that the effect is not significant in column 7, when all controls are used and that sub-sample in Table 14 is small (it is reduced to 39 and 46 men). So, this effect is not really a robust one.

4.2.3 Discussion of results

A. No effects for illegality and for the negative externality

Regression results in this paper do not show robust evidence of statistically significant effects neither for illegality nor for negative externalities on participants' decisions. Nor is there robust evidence that there is a statistically significant effect

[25] Nevertheless, for every regression in Table 14, tests are conducted to see if the effects of variables of interest are significantly different from 0, both for single variables ($Illegal_t$, $Externality_t$ and $Illegal_t * Externality_t$). The effect of the variable $Illegal_t * Externality_t$ is significantly different from 0 in columns 1, 3, 4 and 5 at a 90% confidence level.

The same test is applied for the sets of variables to look for the difference in differences effects: $(Illegal_t + Illegal_t * Externality_t)$ and $(Externality_t + Illegal_t * Externality_t)$. The collective contribution of $(Illegal_t + Illegal_t * Externality_t)$ is significantly different from 0 in 6 of the 7 specifications, at a 95% confidence level in columns 1 to 5 and at a 90% of confidence level in column 7. By the other hand, the collective contribution of $(Externality_t + Illegal_t * Externality_t)$ is significantly different from 0 in 4 of the 7 specifications, at a 95% confidence level in column 4 and at a 90% of confidence level in columns 1, 5 and 6.

This suggest that the effect of $Illegal_t * Externality_t$ is explained mostly by the combination of the two elements. But Illegality could be leading the effect, since the test for the collective effect of $(Illegal_t + Illegal_t * Externality_t)$ shows this effect is significantly different from 0 in 6 of the 7 specifications, suggesting a greater robustness of this collective effect with respect to the others.

Table 15: Robustness Check 3. Consistent men

VARIABLES	(1) Change	(2) Change	(3) Change	(4) Change	(5) Change	(6) Change	(7) Change
Illegal	0.182	-0.0916	0.266	0.300	0.232	0.409	-0.127
	(0.623)	(0.605)	(0.680)	(0.658)	(0.666)	(0.724)	(1.211)
Externality	0.382	0.236	0.706	0.359	0.510	0.204	0.935
	(0.580)	(0.578)	(0.642)	(0.619)	(0.608)	(0.740)	(1.162)
Illegal*Externality	-1.604*	-1.213	-1.683*	-1.721*	-1.729*	-1.723	-2.353
	(0.876)	(0.890)	(0.930)	(0.922)	(0.969)	(1.083)	(1.852)
Demograhic Controls		Yes					
Respect for the law Controls			Yes				
Corporate responsibility Controls				Yes			
Drugs' personal view					Yes		
Drugs' social use						Yes	
All controls							Yes
Constant	0.818*	1.163	0.494	1.070	4.035*	1.145	5.434
	(0.440)	(1.559)	(1.618)	(1.384)	(2.171)	(1.329)	(5.494)
Observations	46	46	46	46	46	39	39
R-squared	0.120	0.278	0.218	0.163	0.228	0.121	0.687

Standard errors in parentheses
$***p < 0.01$, $**p < 0.05$, $*p < 0.1$

when these two elements are together.

It is necessary to take into account that coefficients of this variables ($Illegal_t$, $Externality_t$ and $Illegal_t * Externality_t$) are small in comparison with the rank of the dependent variable[26]. This means that if any of these effects exist, their size is very likely to be small. The size of the coefficients and the consistency of the results along various specifications and several robustness checks suggest that not having found an effect is not part of a power problem[27].

Additionally, *Stratified permutation tests* are applied to discard effects of illegality and the negative externality on decisions in this experiment (Sen, 2014). A permutation test is accurate to small samples because it randomly reassigns variable's values through Monte Carlo simulations across the sample. When running several tests with 1000 permutations and with and without controls, the hypotheses

[26]In the baseline model (see the baseline model in Table 11) the rank of the dependent variable $Change_i$ is 12 (since the minimum value is -2 and the maximum is 10). Then, the coefficient of the variable $Illegal_t$ (-0,328) is less than 3% of the dependent variable's rank. This same percentage is 7% for the variable $Externality_t$ and 6.5% for the variable $Illegal_t * Externality_t$. On the contrary, the coefficient of the variable Sex_i reaches 11.3% of dependent variable's rank. Table 21 in the appendix shows coefficients of interests as proportion of the respective dependent variable rank, showing that the size of this coefficients is generally small.

[27]An explanation when no expected effects are found is a possible lack of power of the sample. To discard this possibility it would be suitable to perform a power test, but this kind of tests need assumptions about the possible size of the effects and the contribution of each variable of interest in the R_2 of the model. As previous literature does not give adequate insights to make hypothesis about effects size and to make this assumptions it is not possible to conduct this test in a confident way.

of no effect for the variables illegality and negative externality can not be rejected, meaning that these two elements have no effect on decisions in this experiment (A complete description as well as results of the tests are reported in the Appendix, in the section 7.6.). Given this results, there is no robust evidence that the hypotheses in section 3.4 are true.

There are several possible interpretations for not having found effects nor for illegality neither for the negative externality. That illegality has not a significant effect on the investment decisions suggests a weak sense of respect for law. A label of illegality when there are not strong incentives of punishment does not discourage investment decisions. This is not surprising in Colombia, where the rule of law has been argued to be weak (Thoumi, 2005).

On the other hand it is surprising that the negative externality has not a significant effect on investment decisions. Participants of the experiment do not increase their risk aversion level due to an specific negative externality. This result suggests a (1) low level of empathy (in case the negative externality does not cause effects on investment decisions because participants do not care to affect the other participants' payment); or (2) a low level of confidence in the other participants (in case the negative externality does not cause effects on investment decisions because participants think the rest of the participants will not mind the externality and many of them will going to invest in the option causing the externality, so it is a better strategy that option too).

Other possible interpretation of not having found this effects is the normalization of drug issues in Colombia since treatments considered in regression analysis have always present drugs as part of the framing. People are so used to the issues of war on drugs, drugs industry and drugs culture in Colombia[28] that it was not possible to find sensitivity to the framings in the experiment in this paper. However mean comparisons within and between subjects in section 4.1.2. suggest an willingness to invest in something related to drugs. Since the variable drugs is not tested[29] in regression analysis, this issue needs to be explored in further research.

These results suggest that neither illegality nor the existence of negative externalities are efficient elements to discourage investment, suggesting that better strategies than drugs prohibition need to be addressed in the political agenda.

B. Robust gender effect

On the other hand, regression results in this paper show a robust gender effect that gives additional evidence of women being more risk averse than men in economic experiments. In this case women show a higher change between their decisions in Part I and Part II of the experiment. This means women have a higher level of receptivity to elements in Part II of the experiment, which make them to be more risk averse in Part II. This result is consistent with the literature. Charness and Gneezy (2012) summarize 15 papers whose original hypotheses are not related to

[28] see Duncan, 2014 for a detailed analysis of drug trafficking power at political, economic, and cultural levels

[29] Nevertheless, when it is included as independent in the baseline model it does not show any significant effect.

gender effects, but to other issues related to investment behavior under a risk environment. All the 15 experiments are based on the same set of investment decisions proposed in Gneezy and Potter (1997). In all of the 15 experiments summarized by the authors there is consistent evidence that women are financially more risk averse than men. As in the experiments documented by Charness and Gneezy (2012), this article finds a gender effect even though the experiment was not designed to study the interaction between decision making under risk and the gender of the decision maker. This adds evidence to the strong gender effect documented by them.

In order to understand gender differences leading results in this paper, Table 16 and 17 show gender comparison for decisions variables (Panel A) and all control variables obtained in the post experiment survey (Panels B to E) for the whole sample [30]. In first place women are statistically more risk averse than men in Part I and Part II, as the number of safe choices in the rows (1) and (2) are significantly higher for women than for men. [31] With respect to control variables, just 5 of 22 control variables show significant differences by sex [32]. There are not significant differences in demographic controls (which is desirable in order to look for behavioral effects on decisions). The 5 variables that present significant differences are described below:

- The variable *Corporate Responsibility* [33] is significantly higher for women than for men at a 90% confidence level although in a small quantity (-0,22). This variable is equal to a whole a number from 1 to 4, where 1 means that the participant fully agrees with the statement *"The only social responsibility of a company should be to provide profits to its shareholders"* and the number 4 means the participant strongly disagrees with the statement. This means that female participants support the concept of corporate social responsibility as adequate, and in this sense, it can be interpreted as a women propensity to be in agreement with the internalization of negative externalities by the companies or producers.
- The variable *Bar Responsibility* [34] is significantly higher for women than for men at a 99% confidence level. This variable is a dummy taking values of 1 or 2 according with participants' decision to the following hypothetical situation: *You are the owner of a bar in a university sector. On a Friday night, a young adult is in obvious drunkenness and wants to continue buying and consuming alcohol. In this situation, what would you do?* The first option (value=1) is to still selling alcohol to the young adult because he is a free person responsible for his own decisions and the second option is to stop selling him alcohol and to offer him a cab (value=2). As this variable is a dummy, the value (-0,19) implies that female participants have values on average 20% higher than male participants. It means that women participants are more likely to choose

[30] Significant differences and signs remain similar when taking just the consistent sample.

[31] The variable $Change_i$ does not show significant differences between men and women in simple mean t-test but the regression analysis made in the previous section show a robust effect of being woman on this variable.

[32] Comparison remain similar when using just the consistent sample where N=103

[33] This variable is constructed with participants' answers to the the question 11 in the post experiment survey, included in the appendix.

[34] Question 13 of the post experiment survey, included in the appendix.

the most conservative option in terms of alcohol consumption and the more regulated scenario in economic and social terms. It can also be interpreted as women choosing the less risky option.

- The variable *All consumers are addicted* [35] is significantly lower for women than for men at 99% confidence level. This variable is equal to a whole number from 1 to 4, where 1 means that the participant fully agrees with the statement *"All drug users become addicts"* and the number 4 means the participant strongly disagrees with the statement. This means women participants are more conservative than men in this opinion in front of drugs consumption. This kind of opinion has a correlation with the supporting of drugs prohibition (García and Ortiz, 2014) and could be related with the higher women's sensibility to Part II of the experiment, showing a higher unwillingness level to invest in a drugs' related portfolio than men.
- Women participants have statistically significant lower values in the variables *Alcohol* and *Marihuana*[36]. These two variables take values equal to a whole number from 1 to 3. Number 1 means that less than 10% of participant i's social environment (family and friends) consumes the respective substance at least once in a month. Number 2 means this proportion is between 11% and 49%. Number 3 indicates this proportion is superior to 50%. This variables in women an men are significantly different at a 95% confidence level for alcohol and at a 90% confidence level for marihuana. This means that women participants perceive their social environment as less involved in alcohol and marihuana consumption than men do. This variables can be interpreted as a proxy of participants' own consumption habits. In this sense, women participants seem to perceive less exposure to environments of familiarity with this substances and this fact could lead their greater sensibility to the risk aversion increasing in front of the to drugs framing in Part II of the experiment.

[35] Question 9 in the post experiment survey, included in the appendix.

[36] Which are respectively constructed with participants answers to questions 15 and 17 in the post experiment survey, included in the appendix.

Table 16: Decisions and controls by sex, Panels A-C (Whole Sample)

	Men	Women	Total	Mean of the difference (Men) − (Women)
Panel A. Women's decissions				
(1) Safe Choices in P I	5,38	6,13	5,75	-0,75 **
				(0,352)
(2) Safe Choices in P II	6,36	7,7	7,02	-1,33 ***
				(0,36)
(3) Change (S.Ch PII − S.Ch. PI)	0,99	1,57	1,28	-0,58
				(0,37)
Panel B. Demographic Controls				
(4) *Estrato*	3,83	3,59	3,7	0,25
				(0,17)
(5) Career	1,80	1,74	1,77	0,06
				(0,17)
(6) Semester	7,15	7,16	7,16	-0,00
				(0,40)
(7) Born in Bogotá	0,75	0,85	0,80	-0,10
				(0,06)
Panel C. Respect for the law				
(8) Law importance in honor	2,35	2,30	2,33	0,05
				(0,17)
(9) Respect for the law	2,11	1,96	2,04	0,16
				(0,16)
(10) Smuggling I	1,97	1,86	1,91	0,11
				(0,17)
(11) Smuggling II	2,70	2,70	2,70	0,00
				(0,22)
(12) Smuggling III	2,00	1,86	1,93	0,14
				(0,18)
(13) Illegality justification	3,28	3,37	3,33	-0,09
				(0,11)

Standard errors in parentheses
$***p < 0.01$, $**p < 0.05$, $*p < 0.1$

Table 17: Decisions and controls by sex, Panels D-F (Whole Sample)

	Men	Women	Total	Mean of the difference (Men) − (Women)
Panel D. Corporate responsibility				
(14) Corporate responsibility	3,24	3,46	3,35	-0,22 *
				(0,13)
(15) Disco Responsibility	1,83	1,87	1,85	-0,04
				(0,08)
(16) Bar Responsibility	1,63	1,83	1,73	-0,19 ***
				(0,07)
Panel E. Drugs' personal view				
(17) Drugs' prohibition I	2,79	2,67	2,73	0,12
				(0,15)
(18) Drugs' prohibition II	3,35	3,21	3,28	0,14
				(0,13)
(19) Drugs are a problem	1,21	1,16	1,18	0,05
				(0,08)
(20) All consumers are addicted	3,23	2,89	3,06	0,34 ***
				(0,12)
(21) Consumption is a right	2,18	2,30	2,24	-0,12
				(0,13)
Panel F. Drugs' social use				
(22) Alcohol	2,49	2,20	2,35	0,29 **
				(0,12)
(23) Tobacco	1,79	1,69	1,74	0,10
				(0,12)
(24) Marihuana	1,49	1,31	1,40	0,18 *
				(0,09)
(25) Other drugs	1,17	1,12	1,15	0,04
				(0,07)
N	70	71	141	

Standard errors in parentheses
$***p < 0.01$, $**p < 0.05$, $*p < 0.1$

This findings are in line with García and Ortiz (2014), who finds in a set of surveys in 6 cities in Latin America, that women have less probability to define marijuana consumption as a citizen right. This combination of women's higher risk aversion and less familiarity and tolerance in front of drugs consumption seems to be the reasons leading regressions findings.

5 Conclusions

Studying drugs market operation and evaluating alternative policy scenarios has an especial relevance in Colombia, one of the major drugs' producer countries. In some places of the world a change in drugs policy is happening now. But in other places, citizens' opinion and political will still very reluctant to a change, especially when it comes to drugs other than marijuana.Transformations in this field requires deep comprehension of the structure of this market. Particularly, it requires the analysis of the behavior of its agents in front of the different elements associated with a drugs-related business. This individual behavior can not be studied with macro simulations of the market.

The experiment in this paper pretends to take a step toward understanding this behavior. The aim is to analyze the effect of three different factors influencing the individual decision to invest when somebody faces the opportunity of investing in a business related to (i) a criminal activity (illegal), (ii) drugs, or (iii) a negative social effect (negative externality). When people want to participate or invest in a business, they have to decide between different options. To decide which option to take, people may consider elements like the risk associated with each business, the type of business, the legal context and the associated externalities.The experimental design in this paper presents to the participants two options to invest, applying the set of *Ten Paired Lottery-Choice Decisions* based on Holt and Laury (2002). Part I of the experiment is a replication of Holt and Laury (2002) to measure individual risk aversion level. In Part II, the more risky option pretends to reflect some characteristics of a drugs-related business. Using a between subjects methodology, the three factors mentioned above vary along five different treatments in Part II: type of business (neutral or drugs-related), legal status (legal or illegal) and negative externality (with and without a negative externality). This negative externality consists in the fact that for each person who chooses "Portfolio B" all participants lose an ECU from the gain. One specific aim of the design is to isolate the effect each element causes on investment decisions and to find out if interaction effects between elements are in fact stronger than separated effects. A post-experiment survey is conducted to construct controls and enrich the analysis. The variable used to analyze results is the change between the number of safe choices (the number of times between 0 to 10 that each participant chooses "Portfolio A", which is the safe portfolio) in each part of the experiment. The larger the number of safe choices, the larger the level of risk aversion. The larger the change between the number of safe choices in Part II with respect to Part I of the experiment, the larger the effect of Part II's framing. Three ways of analysis lead to similar conclusions:

In first place, within subjects comparisons of means allow to conclude that

frames in Part II lead to an increase in the risk aversion level for the majority of participants: for both the whole and the consistent sample[37], most of the participants increase their level of risk aversion in Part II with respect to Part I. The only exception in this trend is when the treatment in Part II includes just the negative externality: in this case the difference between risk aversion level in Part I and Part II is not significant. This suggests that the negative externality alone does not increase the degree of risk aversion of participants and that this increase may be more motivated by the association of portfolio B with drugs.

In second place, between subjects comparisons of means show that the larger and statistically significant differences between the number of safe choices in Part I and Part II are located in the panels related with drugs. The smallest differences are in the panel related to illegality, suggesting that the illegality status alone does not generate an increase in the risk aversion level. Surprisingly, differences are not statistically significant in the panel grouping the results for the negative externality. It means that the negative externality alone does not cause a significant change in the mean of the number of safe choices. There are only statistically significant differences when the negative externality is related to the drugs' business.

In third place, regression analysis does not show any statistically significant effect neither for illegality nor for the negative externality on investment decisions [38].

By the other hand, regression analysis finds a robust gender effect across regressions and robustness checks. Women are systematically more risk averse than men in Part II with respect to their own decisions in Part I. The variable change is, on average, 1 unit higher for women than for men. The size of the effect indicates that the difference between women decisions, in Part II with respect to Part I, is on average 1 situation higher than this same difference for men. This finding gives evidence of women being more risk averse than men in economic experiments, which is consistent with the strong gender effect documented by Charness and Gneezy (2012). When analyzing information obtained in a post experiment questionnaire, women appear to be more conservative in some positions related to drugs policies, are less exposed to social substances consumption and are more prone to the corporate responsibility concept (the obligation of a company to internalize negative externalities).

In summary, within and between subjects comparisons of means suggest there is an unwillingness to invest in a drug-related business but the consistency of this effect needs to be tested in future research. Regression analyzes do not show robust evidence of effects due to illegality and the negative externality. At the same time, women are more sensible to the framing in Part II of the experiment, while they appear to support drugs ban in a greater level than men according to the post-experiment survey. So it is suitable to suppose that if the variable drugs have some effect it is not due to being illegal or for causing a negative effect to society but just by the fact of an ideological posture in front of drugs. Further research is necessary

[37]The whole sample includes all participants, while the consistent sample excludes participants which do multiple switching.

[38]Regression analysis does not include a variable for drugs in order to preserve sample balancing between treatments

to test this hypothesis. In a producer country like Colombia this possible unwillingness could be associated with a strong marketing strategy to set up an anti-drugs behavior in society.

That illegality has not a significant effect on the investment decisions suggests a weak sense of respect for law. This is not surprising in Colombia, where the rule of law has been argued to be weak (Thoumi, 2005).

Finally, it is surprising that the negative externality has not a significant effect on investment decisions. Participants of the experiment do not increase their risk aversion level due to an specific negative externality. This result indicates a low level of empathy or trust relative to other participants. The negative externality does not cause effects on investment decision because participants do not care to affect the other participants' payment, or because they think the other participants will not mind the externality and many of them will going to invest in the option causing the externality. This finding has a particular relevance in Colombia, a country with a variety of sources with negative externalities such as drugs' trade, criminal mining and political corruption.

These results suggest that neither illegality nor the existence of negative externalities are efficient elements to discourage investment, suggesting that better strategies than drugs prohibition need to be addressed in the political agenda. This paper suggest the hypothesis that people are not averse to invest in a drugs-related business because drugs cause damage to the society or because they are illegal, but because of personal ideological postures in front of drugs. This hypothesis need to be tested in further research. For further research, it could be also interesting to run the experiment with other type of illegal goods, such as guns. This paper also finds additional evidence finding a higher risk aversion level for women when taking investment decisions, in line with previous risk experiments. For future research it would be very interesting to look for educational roots in this women's consistently higher risk aversion level.

6 References

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7 Appendix

7.1 Two-sample Kolmogorov-Smirnov test for equality of distribution

Table 18: Two-sample Kolmogorov-Smirnov test for equality of distribution

Smaller group	D	P-value	Exact
Holt and Laury	0.2222	0.641	
This experiment	-0.2222	0.641	
Combined K-S:	0.2222	0.979	0.989

Note: ties exist in combined dataset; there are 17 unique values out of 18 observations.

7.2 Descriptive Statistics

The following table show descriptive statistics for the variables used to construct models and descriptive analyzes.

Table 19: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Safe Choices in Part I	5.75	2.12	0	10	141
Safe Choices in Part II	7.03	2.27	0	10	141
Change (Safe ch. PII − Safe ch. PI)	1.28	2.21	-3	10	141
Drugs	0.79	0.41	0	1	141
Illegal	0.39	0.49	0	1	141
Externality	0.64	0.48	0	1	141
Externality*Illegality	0.22	0.42	0	1	141
Demographic Controls					
Sex	0.50	0.50	0	1	141
Estrato	3.71	0.99	1	6	141
Career	1.77	0.98	1	4	141
Semester	7.16	2.37	2	10	141
Born in Bogota	0.81	0.4	0	1	140
Age	21.06	2.18	17	35	141
Respect for the law Controls					
Law importance in honor	2.33	0.99	1	4	141
Respect for the law	2.04	0.95	1	3	141
Smuggling I	1.91	0.98	1	5	141
Smuggling II	2.7	1.36	1	5	141
Smuggling III	1.93	1.07	1	5	141
Illegality justification	3.33	0.64	1	4	141
Corporate responsibility					
Corporate responsibility	3.35	0.76	1	4	141
Disco Responsibility	1.85	0.51	1	3	141
Bar Responsibility	1.73	0.45	1	2	141
Drugs' personal view					
Drugs' prohibition I	2.73	0.93	1	4	141
Drugs' prohibition II	3.28	0.78	1	4	141
Drugs are a problem	1.18	0.52	0	2	141
All consumers are addicted	3.06	0.78	1	4	141
Consumption is a right	2.24	0.79	1	4	141
Drugs' social use					
Alcohol	2.35	0.72	1	3	141
Tobacco	1.74	0.72	1	3	136
Marihuana	1.4	0.56	1	3	135
Other drugs	1.15	0.38	1	3	117

7.3 Post-Experiment Survey

The following questionnaire was applied to all participants once the experiment was completed and before payment was made. The questionnaire is presented in Spanish, just as it was implemented to the participants. The name of each question's variable along this paper appears in parenthesis at the beginning of each question.

CUESTIONARIO POST-EXPERIMENTO

Para finalizar el experimento, por favor conteste el siguiente cuestionario. La totalidad de los datos suministrados a continuación son de carácter anónimo, lo que significa que no podremos identificar sus respuestas con usted. Únicamente necesitamos que responda de la manera más honesta posible. La información que nos proporcione será utilizada con fines estrictamente académicos. El cuestionario no tiene respuestas correctas o deseables, y solo se propone captar sus opiniones sinceras.

1. (Age) Edad: (en número de años cumplidos)
2. (Sex) Sexo: Hombre o Mujer
3. (Career) Carrera que cursa en la universidad (en caso de estudiar dos carreras, seleccione la que primero comenzó)
   - Economía
   - Finanzas y Comercio Internacional
   - Antropología
   - Sociología
   - Periodismo
   - Jurisprudencia
   - Ciencia Política
   - Historia
   - Medicina
   - Otra. ¿Cuál?
4. (Semester) Semestre que cursa: (Número de 1 a 10)
5. (Born in Bogota) Ciudad de nacimiento
6. (Estrato) Estrato de su residencia: (Número de 1 a 6)

En las siguientes preguntas seleccione una sola de las opciones de respuesta.

1. (Law importance in honor) ¿Cree usted que cumplir la ley es importante para ser moralmente honorable?
   - Cumplir la ley es **indispensable** para ser moralmente honorable.
   - Cumplir la ley es **muy importante** para ser moralmente honorable.
   - Cumplir la ley es **importante** para ser moralmente honorable.
   - Cumplir la ley **no es importante** para ser moralmente honorable.

2. (Respect for the law) ¿Cree usted que debe cumplirse la ley aunque uno no esté de acuerdo con ella? Señale la afirmación que mejor represente su opinión.
   - Si, porque respetarlas es lo correcto como ciudadanos.
   - Si, porque siempre existe el riesgo de que seamos castigados si no las cumplimos.
   - Pueden incumplirse, cuando consideremos que son ineficientes, innecesarias o perversas.
   - Pueden incumplirse, cuando sepamos que el Estado no tiene los medios para castigarnos por incumplirlas.

   Considere la siguiente situación: Una persona tiene la oportunidad de ganar dinero si permite que el depósito de su casa sea utilizado para guardar mercancía de contrabando. Debido a que su familia tiene necesidades económicas, decide aceptar la oferta. Para aliviar su sentimiento de culpa, esta persona utiliza las siguientes justificaciones. Por favor, califique cada afirmación de 1 a 5, en donde 1 significa desaprobación total y 5 significa aprobación total:
   1st item
3. (Smuggling I) El contrabando no le hace daño a nadie. Es más: crea más competencia y permite ofrecer mercancías más baratas al consumidor: (1 a 5).
4. (Smuggling II) Aunque el contrabando perjudique las finanzas del Estado, el dinero que se recauda en impuestos de todas formas se pierde debido a la corrupción política : (1 a 5).
5. (Smuggling III) No importa el origen del dinero, las necesidades económicas de la familia son más importantes: (1 a 5).

   ¿Qué tanto aprueba usted las siguientes afirmaciones?
6. (Illegality justification) Cuando un beneficio económico significativo está en juego, es justificable que las personas incumplan la ley.
   - Totalmente de acuerdo
   - De acuerdo
   - En desacuerdo
   - Totalmente en desacuerdo
7. (Drugs' prohibition I) El consumo y la producción de sustancias alucinógenas deben ser prohibidos por el Estado.
   - Totalmente de acuerdo
   - De acuerdo
   - En desacuerdo
   - Totalmente en desacuerdo
8. (Drugs' prohibition II) La mejor forma de luchar contra las drogas es su prohibición total.
   - Totalmente de acuerdo
   - De acuerdo
   - En desacuerdo
   - Totalmente en desacuerdo
9. (All consumers are addicted) Todos los consumidores de drogas se convierten en adictos

- Totalmente de acuerdo
- De acuerdo
- En desacuerdo
- Totalmente en desacuerdo

10. (Consumption as a right) Las personas mayores de edad tienen derecho a consumir lo que libremente prefieran.
    - Totalmente de acuerdo
    - De acuerdo
    - En desacuerdo
    - Totalmente en desacuerdo
11. (Corporate Responsibility) La única responsabilidad social de una compañía debería ser proporcionar utilidades a sus accionistas.

    - Totalmente de acuerdo
    - De acuerdo
    - En desacuerdo
    - Totalmente en desacuerdo

En las siguientes preguntas seleccione una sola de las opciones de respuesta.

12. (Disco Responsibility) Una discoteca posee una zona de terraza en el piso veinte de un edificio. Aunque la terraza tiene parcialmente cubiertos sus límites para evitar accidentes, una noche una joven se lanza desde la terraza y muere. ¿Quién es el principal responsable de lo sucedido? Señale la opción con la que se encuentre más de acuerdo.
    A. La joven que falleció es la principal responsable por lo sucedido. La legislación sobre las terrazas no debería cambiar.
    B. La joven que falleció es la principal responsable por lo sucedido, pero los establecimientos con terraza deberían estar regulados.
    C. La discoteca es la principal responsable de lo sucedido. Las autoridades deberían clausurarla y prohibir establecimientos en terrazas.
    abiertas.
13. (Bar Responsibility) Usted es el propietario de un bar en un sector universitario. En una noche de viernes, un joven mayor de edad está en evidente estado de embriaguez y desea seguir comprando y consumiendo alcohol. Ante esta situación, ¿usted qué haría?
    A. Le sigue vendiendo cuanto el joven quiera, pues él es un consumidor libre de tomar sus propias decisiones.
    B. Le manifiesta que no puede seguirle vendiendo alcohol esta noche y le ofrece pedirle un taxi.

14. (Drugs are a problem) En su opinión, el consumo de drogas debe ser considerado principalmente como:
    A. Un problema de seguridad ciudadana.
    B. Un problema de salud pública.
    C. No es un problema
    .

15. (Alcohol) Qué porcentaje de su entorno social (sumando su familia y sus amigos) considera usted que consume alcohol de manera habitual (al menos una vez al mes):
A. Menos del 10%.
B. Entre el 11% y el 49%.
C. Más del 50%.
D. No sabe.

16. (Tobacco) Qué porcentaje de su entorno social (sumando su familia y sus amigos) considera usted que consume tabaco de manera habitual (al menos una vez al mes):
A. Menos del 10%.
B. Entre el 11% y el 49%.
C. Más del 50%.
D. No sabe.

17. (Marihuana) Qué porcentaje de su entorno social (sumando su familia y sus amigos) considera usted que consume marihuana de manera habitual (al menos una vez al mes):
A. Menos del 10%.
B. Entre el 11% y el 49%.
C. Más del 50%.
D. No sabe.

18. (Other drugs) Qué porcentaje de su entorno social (sumando su familia y sus amigos) considera usted que consume drogas alucinógenas de manera habitual (al menos una vez al mes):
A. Menos del 10%.
B. Entre el 11% y el 49%.
C. Más del 50%.
D. No sabe.

7.4 Sample by sex

The following table show sample balancing by sex.

Table 20: Distribution of participants by sex and treatment

	Consistent sample			Whole Sample		
Treatment	Men	Women	Total	Men	Women	Total
T1-T2	11	6	17	13	11	24
T1-T3	11	7	18	15	12	27
T1-T4	12	8	20	16	14	30
T1-T5	9	17	26	10	21	31
T1-T6	15	9	24	17	12	29
Total	58	47	105	71	70	141

7.5 Coefficients as proportion of dependent variable's rank

Table 21: Coefficients β as proportion of dependent variables's rank

	Min.	Max.	Rank of dependent variable	Coefficients β in regressions of column (7) - all controls			
				Illegal	*Externality*	*Ilegal*Externality*	*Sex*
Baseline Model	-2	10	12	-0.33	-0.88	-0.78	1.37
(% of rank)				(-2.73)	(-7.33)	(-6.50)	(11.39)
Robustness 1	-2	10	12	-1.18	-0.54	-1.49	2.24
(% of rank)				(-9.79)	(-4.50)	(-12.42)	(18.67)
Robustness 2	0	10	10	-0.57	-0.65	-0.55	2.16
(% of rank)				(-5.73)	(-6.53)	(-5.53)	(21.61)
Robustness 3	-2	5	7	-0.13	(0.94	-2.35	-
(% of rank)				(-1.81)	(13.36)	(-33.57)	-

Note: The rank in Robustness 2 corresponds to the Variable *Safe Choices in Part I*. In the rest of the cases. the dependent variable is *Change*.

7.6 Stratified permutation test

Stratified permutation tests are applied to discard effects of illegality and the negative externality on the decisions in this experiment. A permutation test is accurate to small samples because it randomly reassigns values through Monte Carlo simulations across the sample. As the structure of the baseline model is a design combining two treatments (2x2), it is necessary to use a *stratified* permutation test, in order to test the significance of one of the treatments at a time. It means the dependent variable is permuted within one of the treatments at a time to check the significance of the the other. The tests are applied only on the sample of the baseline regression[39].

Test variation I. H0: No illegality effect

The first aim of the test is to see if the variable *Change* is not different under illegality and legality. So the null hypothesis is that the effect of illegality is zero. Under the null hypothesis of no illegality effect, the observed variable *Change* is permuted within each *strata* of the negative externality treatment, not between. This allows to check if illegality is significant within each strata of the negative externality (with and without), as the null hypothesis of no illegality effect does not imply no externally effect.

When running the test with 1000 permutations and no controls in the regression (see stata output in Figure 2) the p-value corresponding to the null hypothesis of no illegality effect is 0.2. It means the null hypothesis can not be rejected and thus, it can not be rejected that illegality has a null effect.

When running the test with all controls (see Figure 3) the p-value for illegality is 0.7 (the only significant variable is sex with a p-value equal to 0.04), which confirms the conclusion of the test without controls.

Test variation II. H0: No negative externality effect

Under the null hypothesis of no negative externality effect, the observed variable *Change* is permuted within each *strata* of the legality status. This allows to check if the negative externality is significant within each strata of legality status (legal and illegal), as the null hypothesis of no externality effect does not imply no illegality effect.

When running the test with 1000 permutations and no controls in the regression (see stata output in Figure 4) the p-value corresponding to the null hypothesis of no negative externality effect is 0.4. It means the null hypothesis can not be rejected and the effect of the negative externality is not significantly different from zero.

When running the test with all controls (see Figure 5) the p-value for illegality is 0.7 meaning the null hypothesis can not be rejected (the only significant variable is sex with a p-value equal to 0.04), which confirms the conclusion of the test without controls.

[39]Excluding the treatment 4 and using just the consistent sample, bur results are similar when using the whole sample

```
. permute cambio "regress cambio ilegal externalidad" _b, reps(1000) strata(externalidad)

command:      regress cambio ilegal externalidad
statistics:   b_ilegal    = _b[ilegal]
              b_extern~d = _b[externalidad]
              b_cons      = _b[_cons]
permute var:  cambio

Monte Carlo permutation statistics                Number of obs    =        85
                                                  Number of strata =         2
                                                  Replications     =      1000

------------------------------------------------------------------------------
T             |      T(obs)       c       n   p=c/n   SE(p) [95% Conf. Interval]
--------------+---------------------------------------------------------------
b_ilegal      |    -.6260097     209    1000  0.2090  0.0129    .184186   .2355399
b_extern~d    |    -.4071082     909    1000  0.9090  0.0091   .8894485   .9261009
b_cons        |     1.732633     117    1000  0.1170  0.0102    .097729   .1385575
------------------------------------------------------------------------------
Note:  confidence intervals are with respect to p=c/n
Note:  c = #{|T| >= |T(obs)|}

.
end of do-file
```

Figure 2: Stratified permutation test without controls (H0: No effects for illegality)

```
. permute cambio "regress cambio ilegal externalidad ilegal_ext sexo $demogr_3 $break_law $neg_ext_opinion
> $drugs_ban_opinion $drugs_socialuse" _b, reps(1000) strata(externalidad)

command:      regress cambio ilegal externalidad ilegal_ext sexo estrato carrera semestre Bogota_origen _le
> y_honor _ley_respetar2 _contrabando3 _contrabando4 _contrabando5 _illegal_for_benefit6 _responsabilidadUt
> ilidades7 _Responsab_discoteca _bar_responsable13 _drugsBan8 _drugsBan9 drugsProblem14 _TodosSonAdictos10
>  _derechoConsumo11 alcohol15 _tabaco16 _marihuana17 _otherDrugs18
statistics:   b_ilegal   = _b[ilegal]
              b_extern~d = _b[externalidad]
              b_ilegal~t = _b[ilegal_ext]
              b_sexo     = _b[sexo]
              b_estrato  = _b[estrato]
              b_carrera  = _b[carrera]
              b_semestre = _b[semestre]
              b_Bogota~n = _b[Bogota_origen]
              b__ley_h~r = _b[_ley_honor]
              b__ley_r~2 = _b[_ley_respetar2]
              b__contr~3 = _b[_contrabando3]
              b__contr~4 = _b[_contrabando4]
              b__contr~5 = _b[_contrabando5]
              b__illeg~6 = _b[_illegal_for_benefit6]
              b__respo~7 = _b[_responsabilidadUtilidades7]
              b__Respo~a = _b[_Responsab_discoteca]
              b__bar_~13 = _b[_bar_responsable13]
              b__drugs~8 = _b[_drugsBan8]
              b__drugs~9 = _b[_drugsBan9]
              b_drugs~14 = _b[drugsProblem14]
              b__Todo~10 = _b[_TodosSonAdictos10]
              b__dere~11 = _b[_derechoConsumo11]
              b_alcoh~15 = _b[alcohol15]
              b__taba~16 = _b[_tabaco16]
              b__mari~17 = _b[_marihuana17]
              b__othe~18 = _b[_otherDrugs18]
              b_cons     = _b[_cons]
permute var:  cambio
(15 observations deleted)
note: label truncated to 80 characters

Monte Carlo permutation statistics                Number of obs    =        85
                                                  Number of strata =         2
                                                  Replications     =      1000
```

T	T(obs)	c	n	p=c/n	SE(p)	[95% Conf.	Interval]
b_ilegal	-.3280075	736	1000	0.7360	0.0139	.7075104	.7630926
b_extern~d	-.8810335	383	1000	0.3830	0.0154	.3527529	.4139381
b_ilegal~t	-.7873041	540	1000	0.5400	0.0158	.5085302	.5712337
b_sexo	1.367205	48	1000	0.0480	0.0068	.0356003	.0631401
b_estrato	-.3163444	355	1000	0.3550	0.0151	.3253059	.3855508
b_carrera	-.1616798	648	1000	0.6480	0.0151	.6174971	.6776284
b_semestre	.0117121	957	1000	0.9570	0.0064	.9425137	.9687088
b_Bogota~n	.6214862	500	1000	0.5000	0.0158	.4685492	.5314508
b__ley_h~r	-.2621327	507	1000	0.5070	0.0158	.4755315	.5384271
b__ley_r~2	.4705225	229	1000	0.2290	0.0133	.2032858	.2563202
b__contr~3	-.0881547	855	1000	0.8550	0.0111	.8316337	.8762528
b__contr~4	.1318108	644	1000	0.6440	0.0151	.6134335	.6737157
b__contr~5	-.2189558	558	1000	0.5580	0.0157	.5265866	.5890709
b__illeg~6	.0676795	914	1000	0.9140	0.0089	.8948797	.9306375
b__respo~7	-.3211295	576	1000	0.5760	0.0156	.544684	.6068673
b__Respo~a	.4394711	592	1000	0.5920	0.0155	.5608053	.6226514
b__bar_~13	.0425483	949	1000	0.9490	0.0070	.9334865	.9617948
b__drugs~8	.5135568	322	1000	0.3220	0.0148	.2931004	.3519519
b__drugs~9	-.6098125	364	1000	0.3640	0.0152	.3341163	.3946871
b_drugs~14	-.4900281	471	1000	0.4710	0.0158	.4396868	.5024844
b__Todo~10	-.3096615	608	1000	0.6080	0.0154	.57696	.6384022
b__dere~11	.3083487	574	1000	0.5740	0.0156	.5426711	.6048919
b_alcoh~15	.515622	380	1000	0.3800	0.0153	.349807	.4109018
b__taba~16	.6489771	264	1000	0.2640	0.0139	.2369074	.2924896
b__mari~17	-.2294308	724	1000	0.7240	0.0141	.6951618	.7515127
b__othe~18	-.1429587	873	1000	0.8730	0.0105	.85076	.8930157
b_cons	1.597656	787	1000	0.7870	0.0129	.760297	.8120011

```
Note:  confidence intervals are with respect to p=c/n
Note:  c = #{|T| >= |T(obs)|}
```

Figure 3: Stratified permutation test using all controls (H0: No effects for illegality)

```
. permute cambio "regress cambio ilegal externalidad" _b, reps(1000) strata(ilegal)

command:      regress cambio ilegal externalidad
statistics:   b_ilegal   = _b[ilegal]
              b_extern~d = _b[externalidad]
              b_cons     = _b[_cons]
permute var:  cambio

Monte Carlo permutation statistics                Number of obs    =        85
                                                  Number of strata =         2
                                                  Replications     =      1000

------------------------------------------------------------------------------
T            |    T(obs)       c       n   p=c/n   SE(p) [95% Conf. Interval]
-------------+----------------------------------------------------------------
b_ilegal     |  -.6260097     807    1000  0.8070  0.0125    .78115   .8310279
b_extern~d   |  -.4071082     428    1000  0.4280  0.0156  .3970839   .4593412
b_cons       |   1.732633     216    1000  0.2160  0.0130  .1908609   .2428229
------------------------------------------------------------------------------
Note:  confidence intervals are with respect to p=c/n
Note:  c = #{|T| >= |T(obs)|}
```

Figure 4: Stratified permutation without controls (H0: No effects for negative externality)

```
. permute cambio "regress cambio ilegal externalidad ilegal_ext sexo $demogr_3 $break_law $neg_ext_opinion
> $drugs_ban_opinion $drugs_socialuse" _b, reps(1000) strata(ilegal)

command:      regress cambio ilegal externalidad ilegal_ext sexo estrato carrera semestre Bogota_origen _le
> y_honor _ley_respetar2 _contrabando3 _contrabando4 _contrabando5 _illegal_for_benefit6 _responsabilidadUt
> ilidades7 _Responsab_discoteca _bar_responsable13 _drugsBan8 _drugsBan9 drugsProblem14 _TodosSonAdictos10
>  _derechoConsumo11 alcohol15 _tabaco16 _marihuana17 _otherDrugs18
statistics:   b_ilegal   = _b[ilegal]
              b_extern~d = _b[externalidad]
              b_ilegal~t = _b[ilegal_ext]
              b_sexo     = _b[sexo]
              b_estrato  = _b[estrato]
              b_carrera  = _b[carrera]
              b_semestre = _b[semestre]
              b_Bogota~n = _b[Bogota_origen]
              b__ley_h~r = _b[_ley_honor]
              b__ley_r~2 = _b[_ley_respetar2]
              b__contr~3 = _b[_contrabando3]
              b__contr~4 = _b[_contrabando4]
              b__contr~5 = _b[_contrabando5]
              b__illeg~6 = _b[_illegal_for_benefit6]
              b__respo~7 = _b[_responsabilidadUtilidades7]
              b__Respo~a = _b[_Responsab_discoteca]
              b__bar_~13 = _b[_bar_responsable13]
              b__drugs~8 = _b[_drugsBan8]
              b__drugs~9 = _b[_drugsBan9]
              b_drugs~14 = _b[drugsProblem14]
              b__Todo~10 = _b[_TodosSonAdictos10]
              b__dere~11 = _b[_derechoConsumo11]
              b_alcoh~15 = _b[alcohol15]
              b__taba~16 = _b[_tabaco16]
              b__mari~17 = _b[_marihuana17]
              b__othe~18 = _b[_otherDrugs18]
              b_cons     = _b[_cons]
permute var:  cambio
(15 observations deleted)
note: label truncated to 80 characters

Monte Carlo permutation statistics                Number of obs    =        85
                                                  Number of strata =         2
                                                  Replications     =      1000
```

T	T(obs)	c	n	p=c/n	SE(p)	[95% Conf.	Interval]
b_ilegal	-.3280075	758	1000	0.7580	0.0135	.7302178	.7842541
b_extern~d	-.8810335	453	1000	0.4530	0.0157	.4218248	.4844527
b_ilegal~t	-.7873041	555	1000	0.5550	0.0157	.5235744	.5861009
b_sexo	1.367205	46	1000	0.0460	0.0066	.0338715	.0608836
b_estrato	-.3163444	344	1000	0.3440	0.0150	.3145531	.3743687
b_carrera	-.1616798	681	1000	0.6810	0.0147	.6511106	.7098194
b_semestre	.0117121	939	1000	0.9390	0.0076	.9223292	.9530221
b_Bogota~n	.6214862	506	1000	0.5060	0.0158	.4745337	.5374309
b__ley_h~r	-.2621327	460	1000	0.4600	0.0158	.4287663	.4914698
b__ley_r~2	.4705225	225	1000	0.2250	0.0132	.1994589	.252171
b__contr~3	-.0881547	845	1000	0.8450	0.0114	.8210585	.8668891
b__contr~4	.1318108	621	1000	0.6210	0.0153	.5901106	.6511747
b__contr~5	-.2189558	599	1000	0.5990	0.0155	.5678688	.6295465
b__illeg~6	.0676795	923	1000	0.9230	0.0084	.9047006	.938758
b__respo~7	-.3211295	553	1000	0.5530	0.0157	.5215669	.5841202
b__Respo~a	.4394711	598	1000	0.5980	0.0155	.5668594	.6285619
b__bar_~13	.0425483	939	1000	0.9390	0.0076	.9223292	.9530221
b__drugs~8	.5135568	329	1000	0.3290	0.0149	.2999185	.3590923
b__drugs~9	-.6098125	373	1000	0.3730	0.0153	.342938	.4038122
b_drugs~14	-.4900281	470	1000	0.4700	0.0158	.4386934	.5014837
b__Todo~10	-.3096615	639	1000	0.6390	0.0152	.6083571	.6688217
b__dere~11	.3083487	601	1000	0.6010	0.0155	.5698882	.6315154
b_alcoh~15	.515622	405	1000	0.4050	0.0155	.3743928	.4361682
b__taba~16	.6489771	231	1000	0.2310	0.0133	.2052005	.2583935
b__mari~17	-.2294308	740	1000	0.7400	0.0139	.7116323	.7669469
b__othe~18	-.1429587	884	1000	0.8840	0.0101	.8625132	.903194
b_cons	1.597656	775	1000	0.7750	0.0132	.747829	.8005411

```
Note:  confidence intervals are with respect to p=c/n
Note:  c = #{|T| >= |T(obs)|}
```

Figure 5: Stratified permutation test using all controls (H0: No effects for negative externality)