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**Marihuana legalization and its effects on
consumption and teenagers' perception**

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I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where states otherwise by reference or acknowledgment, the work presented is entirely my own.

Jorge Alfredo Pellegrini Padilla (2019)

ABSTRACT

The purpose of this study is to test if the legalization of recreational marijuana implies an increase in the number of new consumers and if, at the same time, the teenager's perception of the substance is affected by the measure. A historical review of cannabis focusing on its uses and legal status throughout the time was performed in order to have a solid background of the topic. Then, why and how Uruguay and Canada recently legalized the plant was analysed, pointing out the differences between the two approaches: socialist vs capitalist. The case of the United States is also considered, explaining the current legal situation of the substance in the country. Finally, using data from the National Survey on Drug Use and Health (NSDUH) a quantitative analysis was conducted in the United States. It was concluded that the legalization of recreational marijuana potentially implies a positive increase in the number of new consumers of the drug and, on the other side, that the perception of teenagers regarding the drug is not likely to be affected by the new legal status of the plant.

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1. INTRODUCTION

The legalization of cannabis is a controversial topic that is seen in the news day in and day out. But which are the reasons behind the discussion? The fact is that the legalization of this simple plant can have effects on multiple aspects of a country, including the economy, health of the population and even ethics.

The initial motivation in my study started in 2013 when my home country, Uruguay, decided to fully legalize recreational marihuana. Many persons of my close relations circle were concerned about the policy and some of them feared the worst scenarios. But somehow, I thought that given the weight of Uruguay on the world economy, the decision would not transcend further. It was not until October 2018 when Canada, one of the biggest economies in the world, decided to take the same measure like the, relatively speaking, small developing Uruguay. It was in this moment that I realized that my home country may be the pioneer of a future global tendency. Immediately I felt the necessity to investigate more about the topic to see the possible consequences that such measure may have.

After deepening into the topic, I found out that there are two opposite positions regarding recreative marihuana's legalization, each of them with their own reasonable arguments behind. However, despite the various discrepancies between the two positions, there are two topics where they are both concerned: consumption and the teenagers. It is still unclear if legalization brings an increase in new consumers. And it is even more unclear if legalization affects the attitude of young people towards the substance. The core of this paper will be focused on the two previous points.

First, I considered that it is important to know the origins of the plant, its uses and of course the roots of its illegalization. A review throughout the history of cannabis, ranging from its origins until the present, has been done with the ultimate objective of having a solid background about the topic.

Secondly, I explained the two main uses that cannabis has nowadays: medical and recreational. Unsurprisingly, these uses are also the most controversial. Then, I made clear that my study will be only focused on the recreational use of the substance and I explained why and how Canada and Uruguay implemented the legalization of the plant in their system. Then I focused on the case of United States, which without any doubts it is the most peculiar case.

Finally, after having a wide and solid background of the situation I performed a quantitative analysis to see if:

- 1) Legalization of recreational marihuana implies an increase on the numbers of consumers.
- 2) Teenager's perception regarding marihuana is affected by the legalization.

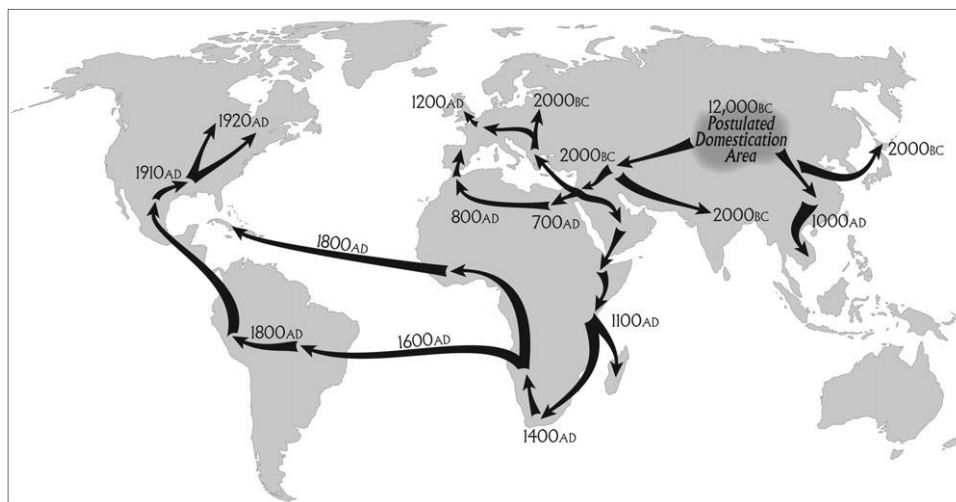
Before even getting into the historical background, I want to explain the difference between cannabis, marihuana and hemp so there is no confusion when I use later the terms:

- Cannabis: Cannabis Sativa L. is the scientific name of the plant. It has different varieties, each of them with different compositions which qualifies if the variety is more suitable for personal or industrial use. Therefore, cannabis includes the terms marihuana and hemp.
- Marihuana: It is a specie of Cannabis which due to its composition is suitable for personal use. These uses are basically two: medial and recreational.
- Hemp: It is a specie of Cannabis which due to its composition is often used on the industry.

2. HISTORY OF CANNABIS

It is a common belief that the prohibition of cannabis happened a long time ago and that it is related to its negative impact on health. However, by looking at history the ban can be described as a recent development, whilst the motives for it are tied to racism and economic interests.

Figure 1. Historical diffusion of Cannabis



Source: "High Points: An Historical Geography of Cannabis" by Barney Warf (2014)

The history of cannabis is extensive, complicated and singular so I will only be able to scratch the surface. I will try to show how important cannabis has been for the human being, its countless uses and impact on societies and finally the roots of its illegalization.

2.1 Origins of Cannabis and its early expansion

The first evidence of men's use of cannabis was found in Taiwan, dating back over 10.000 years to the Stone Age. (Abel, 1980, p. 4). In fact, cannabis was one of the first plants cultivated by the human. The reason for such a long relation between human and cannabis is due to the countless uses that the plant had during history, some of them crucial for the evolution of the human societies.

First, cannabis was cultivated for its grains; cannabis' seeds are rich in proteins and fats; and were usually used to produce oil. Later, Chinese realised that by breaking the stem of

the plant they could extract fibres to produce clothes, paper and sails, among many other things.

One of the most important uses of hemp was as a material for clothing. Before the written word was invented, ancients discovered through trial and error that twisted fibres were much stronger than individual ones. Once the art of spinning and weaving fibres into fabric was mastered, animal skins were replaced by hemp fibres as a main material for clothing. (Abel, 1980, p. 4)

In fact, hemp became so important for China's society that its own citizens nicknamed the country "The land of mulberry and hemp". Mulberry was grown to feed silkworms, which produce silk, one of China's most important goods. But silk fabric was so expensive that only a small proportion of the population could afford it. The rest of the population wore clothes made of hemp, which, contrary to the mulberry, was cheap and easy to grow and therefore it became a perfect substitute. (Abel, 1980, p. 5)

Hemp was also the first agricultural war crop. Chinese archers fashioned their bowstrings from bamboo fibres, until they discovered that hemp fibres were more resistant. Thereafter, with the new material, arrows reached longer distances with much more power, and consequently put the Chinese warriors in a favourable position against their enemies. From that moment on, emperors decided to set apart a portion of the land to the harvest of hemp. (Eberhard, 1968, pág. 102)

Among the many uses that hemp had, the production of paper was one of the most important. The impact of such an innovation in the human civilization is hardly measurable. The industry and its mass production of goods which is needed to record thousands of transactions and track inventories would be not possible without paper. The knowledge gathered in countless books would neither have a chance to exist. Every aspect of the society was affected by this vital discovery.

The Chinese, again, were pioneers in this process. The first fragments of papers containing hemp fibre were discovered in a grave in China dating to the first century B.C. (Abel, 1980, p. 8). Despite this evidence, the invention of paper is usually accredited to Ts'ai Lun, a minor court official who lived during the first century A.D. In fact, Ts'ai Lun did not invent the papermaking process as the Chinese legend says, but he improved it by adding new essential materials into its composition. Hemp was among them.

For many centuries the Chinese kept the secret of the papermaking process. It was not until the fifth century A.D that the formula was transferred: first to Japan, then to the Middle East and finally, during the eighth century A.D, to Europe.

From ancient China, Cannabis found its way to Korea and Japan approximately 2000 BC. This probably happened because of the geographical proximity and trade activity between the countries. In Korea, hemp was cultivated and used in the well-known Jeulmun pottery (Nelson, 1993). In Japan hemp also had an important role in the everyday life. Among the most popular uses, hemp was used as a material for clothes, nets, bedding and mats. Given the association of hemp and purity, clothes made from hemp were worn during religious ceremonies. (Joya, 1963, págs. 23-24)

Meanwhile, the Aryans were also familiar with the uses of Cannabis. With the time and the commercial relations, the Aryans widespread the plant through different channels that constitute the Silk Road, ranging from Mongolia to the Middle East and Eastern Europe. (Warf, 2014, pág. 420) Furthermore, due to the several invasions that the Aryans carried out, they spread the plant through the South Asian subcontinent between 2000 and 1000 BC (Zuardi, 2006). The oldest *Pen Ts'ao* (Translated as *Compendium of Materia Medica*) dating back to the first century A.C shows that Chinese society was already aware of the psychoactive and medical effects of Cannabis, but it was not its main use. (Li, Origin and use of cannabis in eastern Asia: Linguistic-cultural implications, 1974, pág. 51). In contrast, India started to cultivate cannabis because of its psychoactive effects, often related to medical and religious uses.

In the medical field, Cannabis was known for its power to release anxiety, sharpen the memory and alleviate fatigue. It was so important the figure of “Ganja Doctors”, called *poddar* or *parakdar*, was created (Warf, 2014, pág. 420). Cannabis was also used in religious ceremonies and festivals because of its spiritual dimension with the god Ganga from where the term *ganja* is derived (Chris, Lynn, & Judy, 1995). Gradually, cannabis moved from religious to recreational purposes. Bhang, a mild liquid made with cannabis’ leaves, was and still is the most popular recreational drink in India. Abel (1980) compares *Bhang* in India to the alcohol in the West. Cannabis was also smoked in *charas*, the most potent preparation of cannabis in India made from the resin which contains high levels of THC.

From the Slavic world, the plant eventually reached Europe. It arrived to Germany via migrating Teutonic tribes and introduced to Britain with the Anglo-Saxon invasions of the fifth century A.D. In northern France, hemp was cultivated as an alternative to flax. By the end of the mediaeval era cannabis was spread throughout most of Europe. (Warf, 2014, pág. 422). Cannabis also entered Eastern Africa from Egypt and Ethiopia through trade routes.

2.2 Cannabis reaches the New World

In 1492, Cristóbal Colón discovered America. Soon after such event, hemp crossed the Atlantic. As a present, Cristóbal Colón brought seeds and hemp textiles to the native inhabitants of America. Later, during the period of colonization, Hernán Cortes imported various plants from Asia and Europe, among them Cannabis, to improve the economy of the Viceroyalty of New Spain. The implementation of new crops was a tremendous success. In 1523, La Real Audiencia de Santo Domingo, the first court of the Spanish crown in America, authorized the cultivation of hemp. Subsequently, King Carlos V extended the authorization to the whole territory and ordered that the natives should be taught to spin and weave hemp fibres. (García Vallejo, 2010)

Hemp played a major role in producing sails and ropes, among others like clothes, sacks and paper. Due to the increased capacity of production, the United Kingdom, Portugal, Spain and France were able to become potent naval leaders.

Cannabis reached North America as early as 1611, when King James I imposed mandatory production of hemp in Jamestown (present day Virginia). Prior to that time, Russia was the largest hemp producer and a lot of European countries depended on its

supply. The United Kingdom was aware of such economic dependence and put some measures to mitigate it. For instance, in 1563 Queen Elizabeth decreed compulsory cultivation of hemp to landlords with more than sixty acres (Warf, 2014, pág. 426). Later, during the Napoleonic Wars, the United Kingdom had problems satisfying its hemp demand and King George III encouraged the cultivation of hemp in the kingdom and decided to build manufacturing points in the port cities of the South.

With the time, cannabis became one of the most important crops in America. As well as in other countries, its fibers were essential for clothing and in the case of the colonies, for its independence. After the outbreak of the American War of Independence (1775-1783) it would become more valuable than cash, and hemp paper would be used to redact the draft of the Declaration of Independence and the American Constitution.

2.3 Cannabis faces the law

The history of modern Cannabis' illegalization started in Mexico. It is believed that cannabis was brought to the country by the African slaves although no physical evidence exists. The shamans soon incorporated the plant their spiritual rituals (García Vallejo, 2010). Gradually its use changed from the spiritual dimension to medicine, and eventually it was used as a recreational drug. Early prejudices against marijuana started with the Mexican Revolution (1910-1911). Many Mexicans trying to escape from the violence of the civil war ended up in the southwestern U.S. These Mexicans brought cannabis with them. Widespread American racism towards Mexicans, together with some sensationalist newspapers, created an association between the plant and criminality.

The negative social stigma of marijuana was reinforced again with the black slaves who worked producing cotton crops in southern America. The slaves usually smoked marijuana to tolerate hard working conditions, aggravated because of the economic situation. During the 20's, Jazz and the night club scene proliferated in neighbourhoods where black slaves were established, first in New Orleans and then in St. Louis, Kansas City, Chicago and Harlem (Warf, 2014, pág. 429). White Americans therefore related marijuana, the Afro-American culture and the excesses of nightclubs.

An increasing awareness of drug's negative effects on society started on the beginning of the twentieth century, and it would be a central topic during the rest of the century. The International Opium Convention (1912) was the first international treaty that attempted to regulate drugs. It restricts the uses of opium, morphine and cocaine. Later, on 1925 a revision was carried out, restricting the export of cannabis and its derivatives to countries where it is banned.

In the United States, the discussion of alcohol's negative effects on health started to be a common topic in politics. Alcohol would be finally considered dangerous for the public health and therefore banned: The Prohibition (1920-1933) started. It will bring a voracious black market, organized crime and violence. During the 20's public opinion changed radically. Society realised that the remedy was worse than the disease. Alcohol consumption was still a problem, but now the distribution was clandestine managed by the mafias, which brought a lot of crime and violence to the society. Eventually, in 1933, alcohol was legalized again.

Suddenly, thousands of employees from the police office department, especially from the narcotics division, were not necessary anymore. The attention now needs to be focused on another substance: marijuana. Businessmen of the cotton and nylon industry were the first allies to support the illegalization, clearly with self-economic interests behind. Four main characters are popularly directly connected to the prohibition of Cannabis: William Randolph Hearst, the owner of the largest newspaper chain and media company who also had important investments in the timber industry to support his papers; the DuPont family whose chemical company invented the nylon and feared the competence of hemp; Andrew William Mellow, the Secretary of the Treasury and a former banker who had important investments in DuPont; and Harry J. Anslinger who served as the first commissioner of the U.S. Treasury Department's Federal Bureau of Narcotics and was the person who carried out the legislation against the plant.

Taking advantage of the negative connotation that marijuana had in the moment, a massive propaganda against the plant was issued throughout all the United States. The method to create a repulsion against it was simple: implement the fear that any of us could have the unfortunate luck to cross paths with a person under the effects of Cannabis. The most popular movie created in the epoque, *Reefer Madness* (1936), describes the effects of marijuana as following:

[...] smoking the so destroying *reefer* they (teenagers) find a moment's pleasure but at a terrible price. Debauchery, violence, murder, suicide... and the ultimate end of the marijuana's addict: hopeless insanity.

Harry J. Anslinger also included public police reports of gruesome crimes supposedly committed by people under the influence of cannabis as a part of the propaganda. The most famous case was the Licata family in Florida in 1933. Victor Licata, a 20 old years man, killed his parents and three siblings with an ax. Although it was proved that he suffered from mental illness, anti-cannabis propogandists spread the history that he was addicted to cannabis.

Figure 2. *Reefer madness* original posters



Source: <https://www.gettyimages.co.uk/>

At this point it is important to remark that marijuana and hemp were never distinguished in the propaganda. In fact, detractors of the plant were not interested in making such a distinction. The ultimate goal of them was the prohibition of hemp. As we named before, businessmen as Andrew Mellon, William Hearst and the DuPont family among others, were into the cotton and nylon industry. Hemp was not only a perfect substitute of such materials, but friendlier with the environment, better quality and more efficient to produce at the time. Therefore, if cannabis was finally legalized, their fortune will skyrocket.

Eventually, in 1937 the Marijuana Tax Law was created. The law is often considered the starting point of modern legalization of cannabis. In fact, it did not legalize cannabis but that was clearly the intent. The law placed an exorbitant tax on the commerce in marijuana from top to bottom, including:

“SEC. 2. (a) Every person who imports, manufactures, produces, compounds, sells, deals in, dispenses, prescribes, administers, or gives away marihuana shall [...] pay the following special taxes respectively:”

By creating an overly excessive tax, a de facto prohibition was created. Only the wealthy citizens could afford it. Failure to pay the tax, which could amount up to \$2.000, was considered a criminal offense with penalties up to 5 years in prison.

2.4 Cannabis and the Second World War

The Attack on Pearl Harbor (December 7, 1941) is always mentioned in any basic history lesson, being the reason of why The United States of America declared officially war to Japan. But, in comparison, not many people know about The Philippines Campaign (Dec. 1941- Jun.1942). In fact, only four hours after attacking Pearl Harbor, Japan attacked The Philippines, at that time an American protectorate. Only 5 months after the first bomb was dropped, Japan successfully occupied the territory. It is often considered the worst military defeat in the United States history. (A Guide to the War in the Pacific)

Japan occupied the Philippines as a part of their plan of a “Greater East Asia War”. Until then, the Philippines was a strategic air base for the United States. Having the control of the territory will allow Japan to guarantee the air superiority, to ensure the communications with the recent conquered territories of the South and to enhance its supply of raw materials. One of the principal industries on the islands was hemp production. During war time hemp was considered a strategic good. It was fundamental for fabric production, belts, backpacks, ropes, parachute webbing, twine, shoes, boots and other diverse war equipment.

The invasion of the Philippines and later China, two of the most important hemp producers, marked the beginning of rationing. Hitler is aware of the key role of hemp during the war, and when he invaded Russia in 1941, Germans cut off the access to hemp to the Allies. The Allies will see themselves in serious problems to satisfy their hemp’s demand. As a response, the United Kingdom asked to India to increase the production of hemp.

The United States realized soon after their entrance in the war that they could not access to their hemp’s provisions. Given the importance of hemp, the American administration

decided to encourage the national production. The Marihuana Tax Act of 1937 is lifted, cannabis' seeds are distributed to farmers and even a film is recorded: *Hemp for Victory* (1942). The movie encourages American farmers to cultivate hemp. It explains how the farmers can have access to the seeds, the way the plant should be cultivated and the various uses that eventually the fibers will have.

Eventually, with the Liberation of Philippines (Oct.1944-Sep.1945) Americans reconquered the protectorate and the hemp supply overseas is recovered. After the Second World War, India achieves its independence (August 15, 1947). With the mechanization of the agriculture, its production increases exponentially and it can restart exporting to the rest of the world again. United States illegalize cannabis again, but they will have to import millions of tons of hemp to satisfy the industry's demand during the Post-War Economic Boom (1945-1973).

2.5 Cannabis illegalization became international

Despite the short relief that cannabis had during the Second World War, the plant was demonized during the rest of the late twentieth century and its illegalization was reinforced with several laws in the United States. For instance, in 1951 the Boogs Act is approved, setting minimum mandatory sentences for drug conviction. Possession of marihuana could carry a minimum sentence of 2 years and a fine up to \$20.000. Not long after, the Narcotic Control Act of 1956 will put cannabis in the same category as heroin.

But cannabis illegalization reached a new stage in 1961 with the United Nations Single Convention on Narcotic Drugs. Starting from the premise that any single country could not effectively regulate drugs because the extension of the problem overpasses the national frontiers, the United Nations proposed a collective answer towards the issue. Eventually, more than seventy countries agreed on a unified regulation on narcotics, among them, cannabis.

At this point, cannabis becomes illegal and penalized in almost all the countries of the world. It will be not until the beginning of the twenty-first century that the situation will start to change.

3. CANNABIS NOWADAYS

3.1 Medical and recreational uses

As we observe throughout history cannabis has countless uses. But due to the sudden illegalization that the plant suffered during the twentieth century, alternative materials were found. For example, nowadays the most used material for clothing is cotton and synthetic fibers as nylon and polyesters. Other fibers extracted from the stem of jute, flex and stinging nettle are also popular. In the case of paper, paper made from wood is almost five times cheaper than paper from hemp (Small, 2017, p. 115) and therefore production of the last is marginal.

All this does not mean that the substitutive materials that are used nowadays are better than cannabis, but legal. In fact, cannabis is one of the most environmentally friendly materials. This is important when it comes to developed countries where an increase of

environment awareness is taking place. Furthermore, new uses of cannabis came also with the time. One of the most impressive one is hemp as a material for building houses. With hempcrete, a building material derivate from cannabis, energy-efficient, non-toxic and resistant to mold, insects and fire houses can be built. All this from an ecological source of raw material.

But when we talk about current legalization, all these uses are put aside in a second level. Nobody doubts about the countless uses that hemp proved to have during centuries. But what matters nowadays when it comes to cannabis' legal status is its psychoactive agent, which is used with two purposes: medicinal and recreational.

But before getting into the topic, two tecnicisms must be defined:

- **THC:** Tetrahydrocannabinol or delta-9-tetrahydrocannabinol is the principal psychoactive of cannabis, and as all psychoactive affects the brain function resulting in a change of the mood, behavior, perception or cognition. It is the component that makes people feel high and therefore it is highly sought-after by growers who use cannabis for recreational purposes.
- **CBD:** Cannabidiol. It is the second most abundant substance in the plant, but it is not considered a psychoactive. It counteracts most of the negative effects of THC, and usually acts as a sedative producing a sensation of pain-relief. For such reasons, it is often used in the medical field.

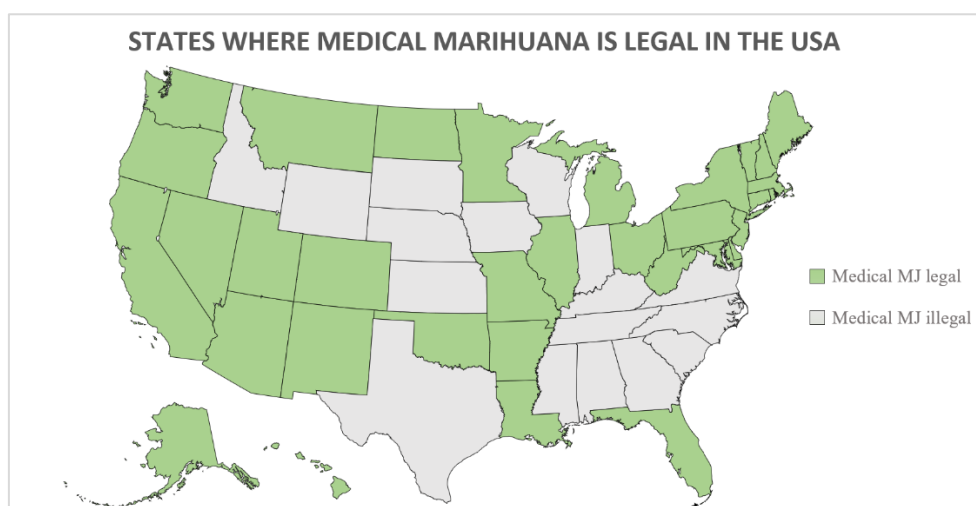
3.1.1 Medical marihuana

Although this paper is not focused on medicine, it would be not fair to not mention the medical applications that cannabis has. In fact, nowadays so many studies are being carried out that it is impossible to mention all of them. Therefore, I will broadly explain the most agreed medical effects and the current situation of the debate.

Cannabis is a double-edged sword when it comes to medical uses: it has negative as well as positive effects on health. On the positive side we have strong evidence that marihuana is effective against chronic pain, neuropathic pain and spasticity (Hill, 2015) among others. Due to the sedative characteristics of CBD, cannabis seems like an effective and natural medicine against pain and anxiety, two of the negative side effects in diseases like cancer, Parkinson, epilepsy, HIV and hepatitis among many others. Furthermore, THC is known for boosting the appetite and therefore cannabis can be used effectively in diseases like anorexia or any other appetite related problem (Mattes, Engelman, Shaw, & Elsohly, 1994).

On the negative side we have that cannabis can result in cardiovascular complications (Fisher, Ghuran, Vadamalai, & Antonios, 2005), alter teenagers' brains and affect negatively to the cognitive skills (Batalla, et al., 2013) and increase the risk to develop psychosis (Marconi, Di Forti, Lewis, Murray, & Vassos, 2016) among others. Another important concern regarding cannabis use is the addiction that it may cause. Some studies (Lopez-Quintero, y otros, 2011) point out that the probability to become addicted after trying cannabis is 8.9%.

Figure 3. Situation of medical marihuana in the USA



Source: <https://medicalmarijuana.procon.org/view.resource.php?resourceID=000881>

In short, cannabis has shown to have positive and negative effects on health so far. In addition, it is worth to highlight that because the plant has been illegal in most of the countries during the last century, research and studies could not be performed. Nowadays, with the gradual legalization more and more studies are throwing light to the medical effects of cannabis. The main question in the current debate that it is hoped to be answered with future research is: Which effects, positive or negative, outweigh the balance?

3.1.2 Recreational marihuana

When cannabis is consumed with the only purpose of getting high we talk about recreational marihuana. In such cases, marihuana is mostly consumed in three ways: as marihuana (smoking the dry flours of the plant), as hashish (resin of the plant) or hash oil (produced by solvent extraction of the plant).

The use of recreational marihuana is the most controversial topic nowadays and where the discussions about legalization are focused. If we look at statistics, marihuana is the world's most commonly used illegal drug and its users continue to grow (United Nations Office on Drugs and Crime, 2018). Therefore, one may conclude that the laws against cannabis are not deterring its use and a new legal framework should be applied.

3.2 Legal situation of recreational marihuana

If during the twentieth century we observed a trend towards cannabis illegalization, during the next century the trend is reversed. At this point it is worth to differentiate and explain the three main legal statuses that cannabis can have:

- **Illegalized:** It is not allowed by law to possess, produce, consume or to pursue any other activity related to the substance. Breaking the law is considered a crime, consequently carrying criminal penalties in addition to economic sanctions.
- **Decriminalized:** Possessions of small amounts meant for personal use are not considered a crime, and therefore criminal penalties are not imposed. Economic sanctions may be imposed. The manufacturing and sale of the substance remains illegal and therefore no regulation or taxation can be carried out by the state.

- Legalized: If the drug is legalized it would also be decriminalized. Legalizing the substance means the lifting or abolishment of the laws against the drug. That means that any activity, including manufacturing and sale of the drug, is legal. No criminal penalties or economic sanctions can be imposed. In such case, regulation or taxation can be carried out by the state.

The Netherlands, and more specifically Amsterdam, are well-known because of its loose laws towards cannabis. In fact, it was the first country to decriminalize marijuana back in 1972 and not long time after, in 1976, made it available for recreational uses in coffee shops (Booth, 2005, p. 338). But the Netherlands may be considered an outlier because we will have to wait until 2001 to see Luxemburg and Portugal doing the same. During the following years, more and more countries joined the movement, including Belgium (2013), Chile (2005), Brazil (2006), Mexico (2006), Argentina (2009), Colombia (2012) and many others.

Even though decriminalization is a huge step towards legalization, it has a terrible drawback: manufacturing and sale of cannabis are still illegal. If one thinks about the Netherlands, this problem is evident. Coffee shops can grow a small amount of weed to retail customers, but in most of the cases this quantity is not enough, especially considering the thousands of tourists who seek for the drug. In such situation, a lot of retailers decide to buy marijuana in the black market to sell it legally to the public. Max Daniel, chief of the Netherlands' organized crime unit expressed in 2008:

“The policy of allowing shops to sell their supplies via the front door but not buy via the back door has created a gray area that is, by definition, good for doing business”

Legalizing only one part of the supply chain seems not to make a lot of sense. If the supply side of the market is not regulated, the state is missing a huge opportunity to control the origin and quality/properties of the drug and at the same time they are encouraging the black market to flourish.

So far, in 2019, only two countries fully legalized cannabis: Uruguay (2013) and Canada (2018). But although both countries stepped towards the same direction, they did it in two totally different ways.

3.2.1 Uruguay: the socialist approach

On December 2013 Uruguay became the first country in the world to fully legalize recreational marijuana. But it was not until July 2017 that the drug was effectively commercialized. The decision was taken with the aim of reducing the narco-traffic in the country.

In line with its culture, the legalization was adopted from a socialist approach. The state became the only producer of the marijuana that later is delivered to the final consumers through pharmacies. Therefore, the state assumed the monopoly of the market.

With the law approved, only the Uruguayan citizens or residents over 18 years were allowed:

- Buy up to 10 grams of marijuana weekly in the pharmacies that are authorized.

- Carry a maximum of 40 grams per person.
- Cultivate up to 6 plants per person.
- A person can also get marihuana through a social club, which must be composed of a minimum of 15 people and up to 45. Each member can get a maximum of 480 grams per year through the clubs.

A public institution called “Instituto de Regulación y Control del Cannabis” (IRCCA) was created as a main body to regulate and control the market. A strict control is possible because every person who wants to acquire cannabis through pharmacies, social clubs or even cultivate the plant for personal consumption must be registered in a digitalized national system.

In IRCCA’s webpage (www.ircca.gub.uy) many interesting numbers can be found but one stands out: at the end of May 2019 only 17 pharmacies are selling cannabis. If we consider that at the same date 36.284 persons are legally registered to acquire marihuana in these pharmacies, on average, each pharmacy has more than 2.000 consumers. With such a good prospect, why are there no more pharmacies selling marihuana? The answer relies on the financial sector.

Although Uruguay is a sovereign country, most of the Uruguayan banks route their international transactions through the United States and therefore, rely on the American banks. The American banks are regulated by the USA Patriot Act, a law passed weeks after the terrorist attacks of the 11 of September 2001. The act, among others, regulates the international banking system by forbidding American banks to work with institutions that are somehow involved with illegal substances, including cannabis.

Therefore, since most of the pharmacies which sell cannabis in Uruguay have accounts with the Uruguayan banks, American banks threatened Uruguayan ones to cut off their relations. In such situation, Uruguayan banks had a dilemma: to keep doing business with the few pharmacies that sell cannabis and risk its financial relations with the American banks or to stop financing the pharmacies. As it is logical, pharmacies’ bank accounts were eventually cancelled. In short, that means that any pharmacy which wants to sell cannabis in Uruguay has no access to financial funds and therefore, it can only operate with its own funds.

Despite the obstacles, Uruguay did not step back on legalization. Nowadays the country is considered a pioneer in cannabis’ regulation and the rest of the world is observing the results of the model to borrow ideas for possible future regulations.

3.2.2 Canada: the capitalist approach

In October 2018, Canada became the second country in the world to legalize recreational marihuana, and the first nation to do so in the G7 and G20. Although Uruguay was the first country to legalize recreational marihuana, the fact that Canada is one of the largest developed economies in the world makes the event more relevant.

The main objectives of legalization in Canada are keeping marihuana away from underage users and reduce the crime related to the drug. To do so, as its predecessor did, a legal framework has been designed but from a totally different approach: capitalism.

As we already know, in Uruguay it is the state who produces the marihuana which is later retailed through pharmacies. In the case of Canada, the state acts as a regulator body and in most of the cases the supply side of the market is satisfied through private business which previously obtained a license.

Furthermore, in the case of Canada, the state passed the Bill C-45, most known as the Cannabis Act, which provides certain rules at the national level for the regulation, but some degree of autonomy is left for the 13 provinces of the country. That means that the experience of acquiring marihuana in Canada can substantially change depending on the province. For instance, in Quebec only government-run stores are allowed to sell marihuana meanwhile in Saskatchewan more than fifty private stores do so.

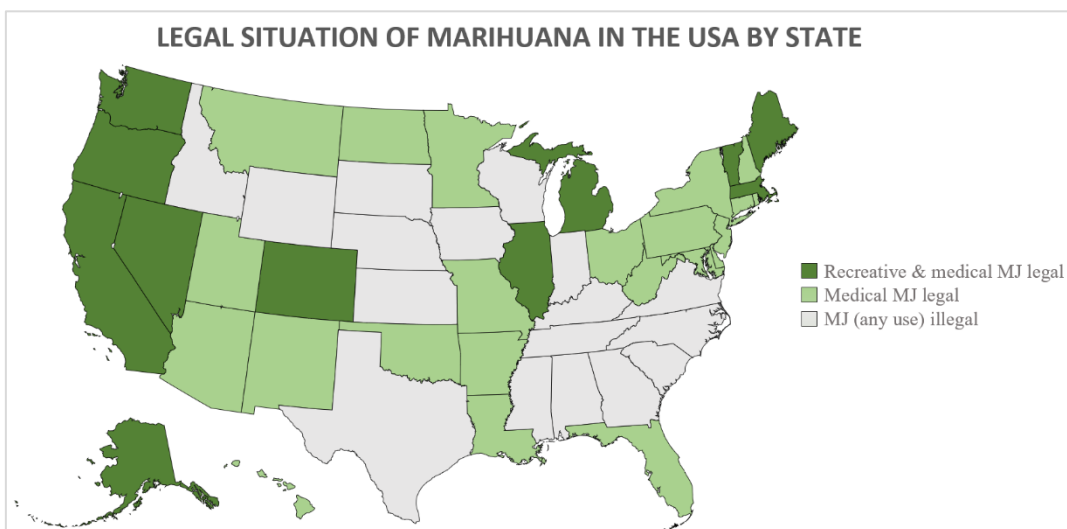
Another important difference with Uruguay is that in Canada not only citizens or residents can buy marihuana but tourists too. This created a big concern to policymakers since marihuana tourists are considered a problem in countries like the Netherlands, especially in Amsterdam. In fact, some private companies are already trying to create “marihuana-tours” in Canada. Fortunately for Canadians, marketing and cannabis propaganda are forbidden and therefore it is hard for these kinds of private companies to attract tourists.

In conclusion, legalization of recreational marihuana in both Uruguay and Canada can be considered as a recent event and it is still unclear if the experiment will be a success or a failure. In any case, it is interesting to see the two opposite approaches to legalization and their differences. It seems clear that if any of them prove to be a success, it will become a reference for future legal frameworks in countries that decide to take the same step.

3.2.3 United States

The current legal situation of cannabis in the United States can be considered unique in the world. Cannabis, in all its forms, is forbidden by federal law, specifically by the Controlled Substance Act (CSA) passed in 1971. But surprisingly, medical marihuana is legal in 33 states and recreational marihuana is also legal in 11 states. Furthermore, both uses are also legal in the District of Columbia. This is possible by individual states’ legislation.

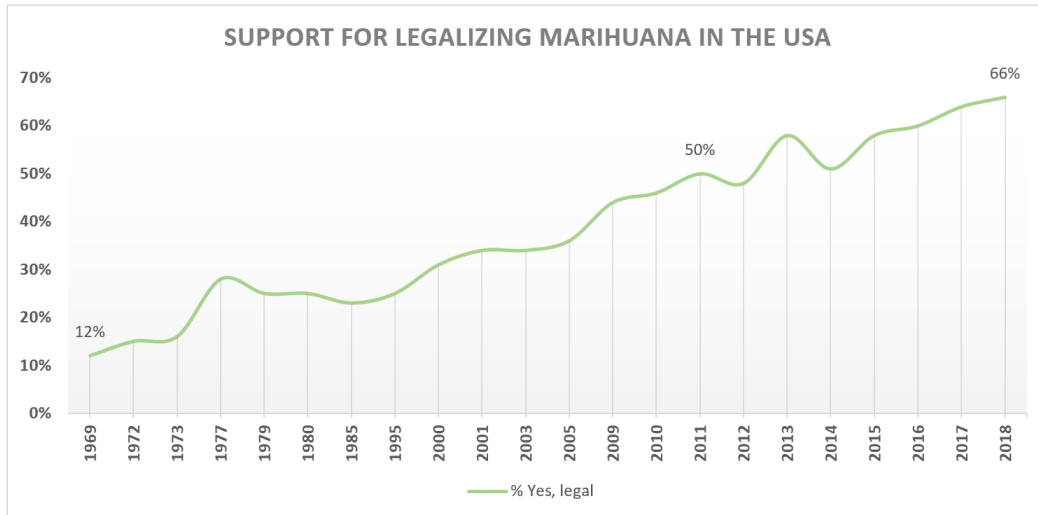
Figure 4. Situation of medical and recreational marihuana in USA



Source: <https://marijuana.procon.org/view.resource.php?resourceID=006868>

Back in 1969 Colorado and Washington were the first states to legalize the recreational use of marijuana in the United States. Later in 2014 Alaska, Oregon and the District of Columbia joined the movement. It is a paradox that the first states that legalized the plant during the 30s were the first to relegalize it.

Figure 5. Support for legalizing marijuana in the United States (1969 to 2018)



Source: <https://news.gallup.com/poll/1657/illegal-drugs.aspx>

Since marijuana is forbidden by the federal law in USA, the states that legalized marijuana had to adopt the capitalist model, that is, each state acts as a regulator but not as a producer. It is out of the scope of this work to dig into each state's legislation, but it is important to keep in mind that recreational cannabis is an everyday discussion in American politics. Furthermore, with the recent legalization of marijuana in Canada, America is feeling more pressure to reform its legal framework.

It seems that after a century all the negative propaganda and the unfounded fears that were inculcated to the American society about marijuana are fading. At the beginning of the 70s only a 12% of the American population agreed with the legalization. With the time, as observed in figure 4, the percentage increased until 50% in 2011. Only one year after this, Colorado and Washington legalized recreational marijuana. In 2018 two thirds of the American population supports the legalization, so it is not surprising to hear daily discussions about cannabis legalization in the political sphere.

Recently two big events took place, telltale signs that legalization may be coming soon at the national level. The first is the Secure and Fair Enforcement Banking Act, mostly known as the SAFE Baking act. The first time the bill was introduced in the Congress was May 2017. It aims to solve the problem of incompatibility between financial institutions and legally cannabis related businesses. Basically, if the bill is passed, federal banking regulators would not be allowed anymore to intervene or limit the financial resources of any business dealing with legal cannabis. As we already explained, this will also have a huge impact on the Uruguayan legalization model, which has difficulties for finding banking funds.

The second remarkable event is the Hemp Farming Act of 2018. For the first time in the American history, some cannabis products were removed from the Controlled Substance

Act. In specific, low THC cannabis, including hemp. That means that hemp is now considered as a normal agricultural crop, allowing farmers to have access to the national banking system, contracting crop insurances and doing marketing as well as research of the plant.

To sum up, United States has 11 out of its 50 states that already legalized recreational marihuana. Although federal laws consider the substance illegal, a shift on the mentality of the American society together with the international changes that cannabis legalization is suffering call for the creation of a legal framework at the national level.

4. QUANTITATIVE ANALYSIS

4.1 Problem Statement

As we observed, during human history cannabis had three clearly differentiated social statuses. The first, until 1920 was mostly a positive view, where the plant was venerated and played a key role in the countries' economy and in the day-to-day life of the citizens. After the 1920 the plant started to be considered as a threat for the society and eventually a strict ban was imposed in most of the world. Recently, with the beginning of the twentieth first century the social view of the plant changed radically. As a response, policy-makers had to reconsider current laws regarding cannabis and, in some cases, design new legal frameworks.

When the topic of drugs is debated in any social circle, including politics, two concerns always arises: increase in consumption and the fear that teenagers become more prone to consume it. And the case of marihuana is not different.

One of the main arguments against recreational marihuana legalization is that if the drug is legalized, then new consumers will arise. The reasoning behind is quite straight forward: the drug will be more available than before the legalization. Furthermore, it is believed that big companies, especially tobacco companies, will soon get into the business of commercializing cannabis due to product similarities and complementarities. The marketing of marihuana, level of manufacturing and advertising will change the scope of marihuana users.

In the other side we have the teenagers. Normally when a substance is illegal, implicitly, society tends to think that such substance is harmful for them. This negative conception of the substance deters people from consuming it, especially underage people. If marihuana is legalized, then such fear will disappear. Teenagers will start to think that marihuana is not that dangerous. If this happens, then teenagers will be more likely to consume marihuana.

In the analysis I will test these two hypotheses. First, I will test if the number of new consumers of marihuana has increased after legalization. Then I will test if legalization affects the teenagers' degree of acceptance regarding the use marihuana.

4.2 Case Study and Data

The analysis will be focused on the United States. The reasons for such decision are basically two:

- The United States is composed of 50 states, and as we already know, some of them already legalized recreational marihuana meanwhile others did not. For a quantitative analysis this is a favorable situation because one can compare easily the two different groups of states. Because each state belongs to the same country, the results will be less affected by the influence of variables such the culture, the language, religion or the political and economic situation among others.
- Fortunately for the study, the United States conducts yearly the National Survey on Drugs and Health (NSDUH) and, even more important, publishes their results. The survey differentiates the data for each state and many variables related to marihuana are created which are very helpful for the purposes of the analysis. Thus, I will use data from the NSDUH from the year 2002 until 2018 on a biannual basis.

Including Uruguay and Canada on the analysis was considered but eventually were not for one main reason: The lack of public available data. In the cases that we found data it was not enough to conduct a proper quantitative analysis. This is probably linked to the fact that legalization, in both countries, is quite recent: in Uruguay effective commercialization of recreational marihuana started on July 2017 and in the case of Canada on October 2018.

4.3 Methodology

For the purposes of the analysis I will always differentiate two groups:

- Group 0: The states that did not legalized recreational marihuana
- Group 1: The states that legalized recreational marihuana

Although we already know that 11 states plus the District of Columbia took the step towards legalization and therefore they should compose Group 1, only 4 states plus the District of Columbia will be considered within this group.

Table 1. Detail of states that have legalized recreational marihuana.

STATE	NAME OF THE BILL	APPROVED	EFFECTIVE	GROUP
Colorado	Amendment 64	2012	2014	1
Washington	Initiative 502	2012	2014	1
Alaska	Ballot Measure 2	2014	2015	1
District of Columbia	Initiative 71	2014	2015	1
Oregon	Measure 91	2014	2015	1
California	Proposition 64	2016	2018	0
Maine	Question 1	2016	2020	0
Massachusetts	Question 4	2016	2018	0
Nevada	Question 2	2016	2017	0
Michigan	Proposal 1	2018	2018	0
Vermont	Legislative Bill H.511	2018	2018	0
Illinois	Illinois HB1438	2019	2020	0

Source: <https://marijuana.procon.org/view.resource.php?resourceID=006868>

The reason behind such decision is simple: Although all these 11 states plus the District of Columbia already passed a bill to legalize recreational marihuana, not in all of them the bill is effective yet or it has been effective recently. In Table 1 we can observe that the states that will be considered within Group 1 are those which effectively legalized recreational marihuana between 2014 and 2015. The rest of the states listed in Table 1 plus those which are not shown in the table (40 states) will be considered in Group 0.

Test 1: Evolution of the number of new cannabis consumers

As explained before, first I want to see if the number of new consumers of marihuana increased before and after legalization. To do so a variable based on multiple conditions from other existing variables was created. These variables capture:

- The date when the interview to the individual was done
- Did you use marihuana in the past year?
- Year of first marihuana use
- Month of first marihuana use
- Day of first marihuana use

After having the answer to these five variables, a new variable is created which captures if a person can be considered as a recent cannabis consumer or not.

The evolution of the new variable was observed from 2002 to 2017 for each state. Furthermore, I also added the averages of these variable for Group 1 and Group 0, considering the weight of each state.

Test 2: Teenagers' acceptance of marihuana before and after the legalization

To measure the degree of acceptance that teenagers have towards marihuana I used six variables which are provided by the NSDUH. The questions for each variable were the following:

1. How do you think your parents would feel about you trying marijuana or hashish once or twice?
2. How do you think your parents would feel about you using marijuana or hashish once a month or more?
3. How do you feel about someone your age trying marijuana or hashish once or twice?
4. How do you feel about someone your age using marijuana once a month or more?
5. How do you think your close friends would feel about you trying marijuana or hashish once or twice?
6. How do you think your close friends would feel about you using marijuana or hashish once a month or more?

I created a variable called "STIGMA" which is the result of scoring all the previous six variables, giving the same weight to each of them. The variable measures the degree of acceptance that the teenagers have regarding the use of recreational marihuana. Values close to zero mean that the level of acceptance is low, and conversely, values close to one mean that the use of the drug is fully accepted among teenagers.

Once I created the STIGMA variable, I used a Difference-in-Difference model to see how legalization affected the variable. The model is defined by:

- Period before: I took the last data set before legalization, that is 2013-2014
- Period after: I took the most recent data set after legalization, that is 2016-2017
- Treatment: It refers to the legalization of recreational marihuana.
- Treatment Group: It refers to Group 1, that is, states that legalized recreational marihuana.
- Control Group: It refers to Group 0, that is, states that did not legalize recreational marihuana

The equation of the model is the following:

$$STIGMA_{tg} = \beta_0 + \beta_1 * (Period)_t + \beta_2 * (Group)_g + \beta_3 * (Period * Group)_{tg} + \varepsilon_{tg}$$

Where:

- *STIGMA* is the variable of interest.
- $\beta_0 \dots \beta_3$ are unknown parameters.
- ε is the error.
- “Period” is a dummy variable that indicates the period when the observation was taken. The value 0 indicates the period before, and the value 1 indicated the period after.
- “Group” is a dummy variable that indicated the group. The value 0 indicates that recreational marihuana is not legal (Group 0), and the value 1 indicates that recreational marihuana is legal (Group 1).
- “*Time * Legal*” is the interaction term between the two previous variables.

I assumed that there are no other factors than legalization of recreational marihuana that could affect the groups differently.

4.4 Discussions

4.4.1 Findings

Test 1

Figure 6. Evolution of new recreational marihuana consumer (2002-2017) in USA

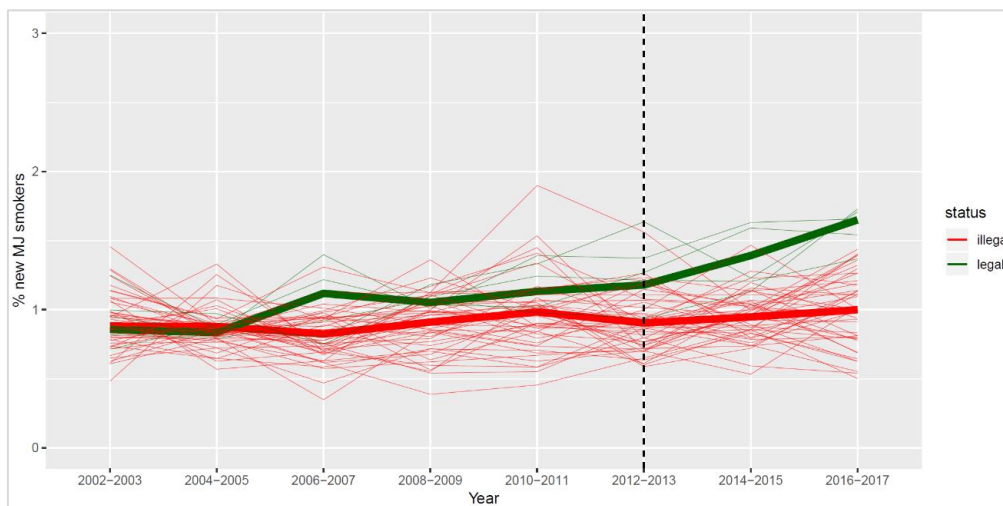


Figure 6 represents the evolution of the number of new consumers of recreational marihuana between the 2002 and 2017. The 46 states that compose Group 0 are represented in red, meanwhile the average of the group is represented also in red but in a wider line. In the other side, green lines represent the 4 states plus the District of Columbia. The mean of Group 1 is also represented in a wider green line.

At a first glance we can quickly see that, on average, both Groups had approximately the same number of new consumers of marihuana until 2005. But after this year the means of both groups start to separate. If we look at each of the states that compose Group 1, we can see how from 2005 onwards, all the lines will be always above the mean of Group 0. That means that the states of Group 1 were already more prone, in comparison with Group 0, to have new consumers of marihuana even before the legalization

If we focus on the before-after legalization period (2012-2013), we can clearly see an effect. Although it is true that the mean of Group 1 was already above than the one of Group 0, after the legalization the lines separate even more. In 2017, only around a 1% of the population became a new consumer of marihuana in countries where the substance was illegal, meanwhile in countries that legalize it the percentage increases to almost 1,6%.

In conclusion, historically Group 1 states tended to have more new consumers of marihuana than Group 0 states even before the legalization. But when the ban was abolished, the differences became even greater. Therefore, it seems that the legal status of the plant has a clearly direct effect on the numbers of people who decide to start consuming it.

Test 2

Figure 7. Teenagers' acceptance of marihuana use before and after legalization

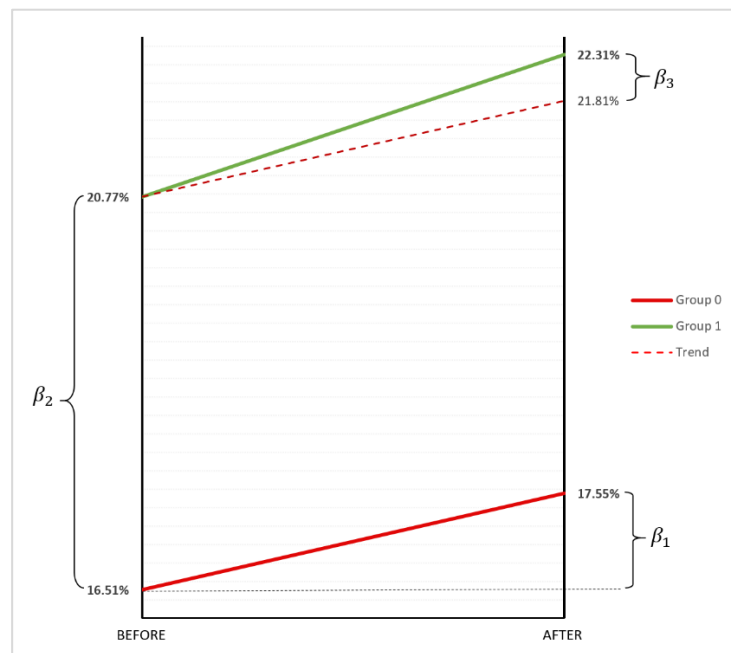


Figure 7 represents graphically the results of the Difference in Difference estimates. As we can clearly see the fact of being in one group or other already has an effect even before the legalization. To be more precise, the acceptance of marihuana is 4,26 percentage

points higher within the teenagers that compose Group 1. Furthermore, as seen in Table 3 the estimate is very significant. This result is in line with the previous test, where we saw that population of Group 1 tends to have more new marihuana consumers than ones from Group 0.

On the other side we observe in Figure 7 that legalization had a positive effect on Stigma: the degree of acceptance increases 0,50 percentage points because of legalization. Unfortunately, Table 3 shows that such estimate is not significant, and therefore one may conclude that legalization does not affect the teenagers' degree of acceptance. The high value of the p-value in the estimate β_3 may be the result of only having 5 samples composing Group 1 against 46 composing Group 0.

In conclusion, according to the results of my model, legalization does not provoke that teenagers accept more the use of marihuana. It is worth to mention that the model would throw more significant results as the years elapse and the rest of the 11 states that already have legalized recreational marihuana can be included in Group 1.

Table 2. Effects of the legalization on teenagers' acceptance of marihuana

Model 1: OLS, using observations 1-102					
Dependent variable: STIGMA					
	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	16.5081	0.509045	32.43	<0.0001	***
PERIOD	1.04231	0.719898	1.448	0.1508	
GROUP	4.25982	1.62576	2.620	0.0102	**
PERIODxGROUP	0.498099	2.29917	0.2166	0.8289	
Mean dependent var	17.47127	S.D. dependent var	3.699652		
Sum squared resid	1168.143	S.E. of regression	3.452510		
R-squared	0.155008	Adjusted R-squared	0.129141		
F(3, 98)	5.992471	P-value(F)	0.000859		
Log-likelihood	-269.0798	Akaike criterion	546.1596		
Schwarz criterion	556.6595	Hannan-Quinn	550.4114		

4.4.2 Limitations of the study

Most models cannot incorporate all the variables of a complex phenomenon. And this study is not an exception. I consider that following limitations are the most important ones when I performed my analysis, and therefore they should be noted:

- Effect lag of the legalization: As many policies, legalization's effects involves a delay. One can describe the effect lag of a policy as the amount of time that elapses since the action is taken until such action has its ultimate effect.

When recreational marihuana is legalized, one cannot expect to see a huge change in the number of consumers just right after the measure is implemented. Furthermore, in topics like the one treated in this study, one may see an increase in consumption of the substance during the first years only because now people feel free to do something that before was considered as illegal. As the time passes, the new legal status of the drug becomes something normal, and the consumption tends to stabilize. It is likely that only then one can examine the real effects of legalization among the population.

- Recency of recreational marijuana's legalization: Directly related to the previous limitation, but not identical, we have the recency of the legalization. Here we have two dimensions: the former legal status of the substance and the lack of sufficient data.

The first refers to the fact that recreational marijuana was illegal during the past century. Therefore, the market of the substance was not controlled nor strictly quantified. That means that, for example, historical data on consumption is not available and only estimates can be found. On one hand we have that many estimates exist, some of them contradictory. And on the other hand, working with estimates involves depending on the reliability of them and its assumptions.

Secondly, although many studies concerning marijuana are being carried out nowadays and data is being collected, we need to wait until some time elapses to have complete datasets. Unfortunately, the only thing one can do about it is to wait.

- Restricted data: The NSDUH, as I already mentioned, is a survey that is performed every year in the United States. Following the rules of data privacy, the American government must protect somehow the privacy of the interviewed people. In the case of the NSDUH, such protection is ensured in two ways: either deleting compromised variables or to issue aggregate data. Unfortunately, I had access to individual level data but the variable "state" was deleted for privacy. So, the only option I had is to work with aggregate data by states.

It is possible to access to individual data with all its original variables, but a fee of more than \$3.000 has to be paid. Obviously, due to the scope of this study such decision was not taken.

I mention this because if I could have had access to unrestricted individual data with all its variables, I could have achieved more robust conclusions. For instance, in Test 1 a trend analysis could be performed giving more solid arguments to the results. On the other side, in Test 2 I could have control for variables as gender, economic situation or race that probably affect the results of the test.

5. CONCLUSIONS

Analyzing the history of cannabis, from its origins to the present time, provided a general background to understand the importance of the plant throughout the human history and the roots of the global illegalization that is still present nowadays. It has been seen that cannabis played a key role in the development of human societies. Furthermore, due to the constant contact with the plant, its psychoactive effect was not kept hidden for long.

Starting in 1920, an increase of awareness regarding drugs started to arise. Not long after, cannabis was forbidden, first in the United States and later globally. The roots of the illegalization were based on racism and economic interests.

With the beginning of the twentieth first century, the society's perception of the plant changed. It seems that all the unfounded fears that were created since 1920 were questioned by the society. Furthermore, it must be mentioned that despite the global ban, marihuana is still the most consumed illegal drug in the world. With such prospect, governments need to reconsider its policies towards the substance.

As a response, a wave of decriminalization took place during the first twenty years of the current century. But two countries went further: Uruguay and Canada fully legalized the recreational use of the substance. In addition, twenty per cent of the American states also stepped in the same direction. Consequently, various legal frameworks were designed.

Eventually, a quantitative analysis has been performed in the United States. The fact that it is possible to compare states which have legalized the substance with others that have not, gives more credibility to the analysis. Furthermore, data from a national organization (NSDUH) has been used which, initially, is reliable.

It has been observed that in general, states where recreational marihuana is nowadays legal, had higher numbers of new cannabis' consumers even before the legalization. This may suggest that legalization is a response of the state to adapt its legal framework to the society. In addition, the results of the analysis suggest that legalization of recreational marihuana may cause a positive increase in the number of new consumers. Unfortunately, there is not sufficient data is available to perform a statistical test which could throw more robust results on the concern.

On the other side, a Difference in Difference model has been used to analyze if the teenagers tend to accept more the use of marihuana after the legalization. Even before the legalization, again a clear difference between the two groups was observed. In states where marihuana is legalized nowadays teenagers approved more the use of the substance than in the rest of the states. This difference is supported by a significant p-value on the test. When the two periods were compared, the model provided an increase of 0,50% acceptance increase related to the legalization, although the estimate was not significant at 95%. This may be due to the fact that only five out of the eleven states which legalized recreational marihuana could be considered as such because of the recent adoption of the legalization.

Taking into consideration the limitations of the study, which are mostly related to the recency of the legalization, it can be concluded that if the same analysis is performed in a future more significant results will be drawn.

In conclusion, legalization seems to be a global tendency that probably more countries will adapt soon. So far only few countries did it, each of them creating different models to regulate the substance. Special attention must be given to these models because the rest of the world can gather priceless knowledge to create their new legal framework forecasting possible effects and avoiding errors that would negatively affect the society.

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