

# The Impact of State-level U.S. Legalization Initiatives on Illegal Drug Flows

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**Vivian Mateos Zúñiga and David A. Shirk**

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## INTRODUCTION

Scholars and legalization advocates have argued that the legalization of cannabis would help curb drug flows from Mexico and weaken criminal organizations south of the border. However, there is little empirical research examining how the legalization of cannabis for medical and recreational purposes at the state-level in the United States has affected production levels and flows of cannabis from Mexico. To examine the theory that drug legalization reduces the incentives and profits for international drug trafficking organizations (DTOs), the authors draw on a mixed methodological approach that includes descriptive and inferential statistical analysis of data from the U.S. State Department, archival research using primary and open-source documents from U.S. and Mexican government and media sources, and interviews with U.S. officials and security experts to analyze trends in seizures and legalization.

Drawing on this information, we employ a series of statistical tests to examine the relationship of greater legal access to cannabis in U.S. states – measured by the percentage of the population living in states with access to legalized medical or recreational marijuana over time – to illegal eradication and seizures of drugs by Mexican government and U.S. border authorities. We use this measurable outcome as a proxy for illicit drug production and transshipment in Mexico. We find a substantial and statistically significant decrease in the amounts of cannabis apprehended by Mexican and U.S. border authorities in relation to the rate of legalization in the United States using our measurements of drug legalization. At the same time, the authors find additional statistically significant evidence that, as legal access to cannabis has increased, flows of other illicit drugs increased simultaneously, suggesting that criminal organizations have diversified into other drugs to remain profitable, particularly heroin and methamphetamine. Our findings do not find any evidence that cocaine has been significantly affected, for reasons we discuss.

We begin by briefly discussing the criminalization of cannabis in the United States through a series of laws from the 1930s through the 1970s. Next, we describe the subsequent efforts to repeal these laws – especially at the subnational level – starting in the 1970s, as well as the activist and scholarly research supporting the idea that legalization would diminish illicit production and trafficking of cannabis. With this foundation, we present our primary research question: What has been the effect of U.S. cannabis legalization on the production and flows of cannabis and other drugs from Mexico to the United States? Our hypotheses assert that cannabis legalization in the United States has been accompanied by decreasing production and trafficking of cannabis (as evidenced by decreasing eradication and seizures), but also by increasing production and trafficking of other illicit drugs that have helped to make up the difference. Upon presenting the descriptive and inferential data supporting these hypotheses, we analyze the limitations of our study and the possible implications of our findings for the ongoing drug war in Mexico and the United States, as well as for future research on this topic.

## BACKGROUND AND LITERATURE REVIEW

Through the early part of the 20<sup>th</sup> century, cannabis was legally available for both medical and recreational use in most parts of the United States. While there was a patchwork of state and local laws regulating its production, sale and consumption, cannabis consumption was not widely used and there were no federal government restrictions on its use until the 1930s.<sup>1</sup> However, the efforts of anti-drug crusaders led by Henry Anslinger resulted in the passage of the first U.S. federal law to control cannabis – the Marihuana Tax Act – in 1937.<sup>2</sup> This was followed by a series of federal laws that introduced stricter prohibitions on cannabis, including the 1951 Boggs Act and the 1956 Narcotics Control Act, which formally criminalized its use.<sup>3</sup> Finally, under the 1970 Controlled Substances Act, Congress established a system of “schedules” for classifying drugs, with cannabis and other drugs listed in the “Schedule I”

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<sup>1</sup> David F. Musto, “Opium, Cocaine and Marijuana in American History,” *Scientific American*, Vol. 265, No. 1 (July 1991), p. 45-46; Phil Nicholas and Andrew Churchill, “The Federal Bureau of Narcotics, the States, and the Origins of Modern Drug Enforcement in the United States, 1950-1962,” *Contemporary Drug Problems* 39, no. 4 (December 2012): 595-640.

<sup>2</sup> Douglas Clark Kinder, “Bureaucratic Cold Warrior: Harry J. Anslinger and Illicit Narcotics Traffic,” *Pacific Historical Review* 50, no. 2 (1981): 185; Douglas Clark Kinder, and William O. Walker. “Stable Force in a Storm: Harry J. Anslinger and United States Narcotic Foreign Policy, 1930-1962.” *The Journal of American History* 72, no. 4 (1986): 908-27; John F. Galliher, David P. Keys, and Michael Elsner. “Lindesmith v. Anslinger: An Early Government Victory in the Failed War on Drugs.” *The Journal of Criminal Law and Criminology* (1973-) 88, no. 2 (1998): 661-682; Kathleen Frydl, *The Drug Wars in America: 1940-1973*, Cambridge: Cambridge University Press, (2013); William B. McAllister, “Harry Anslinger Saves the World: National Security Imperatives and the 1937 Marihuana Tax Act,” *The Social History of Alcohol and Drugs* 33, no. 1 (Spring 2019): 37-62.

<sup>3</sup> Amund R. Tallaksen. “Junkies and Jim Crow: The Boggs Act of 1951 and the Racial Transformation of New Orleans’ Heroin Market.” *Journal of Urban History* 45, no. 2 (March 2019): 230-46.

category that is deemed as having the greatest potential for abuse.<sup>4</sup> This legal classification became the basis for President Richard Nixon's declaration of the "war on drugs," and contributed to a decades-long escalation of counter-drug measures in the United States and around the world.<sup>5</sup>

Since the beginning, a significant portion of U.S. counter-drug efforts have focused on cannabis, the most-commonly-used illicit drug in the United States.<sup>6</sup> Given its prevalent usage, cannabis has been the primary focus of U.S. domestic counter-drug efforts. Cannabis offenses accounted for 52% of all drug arrests in 2010 and – despite the legalization of recreational cannabis in several states beginning in 2012 – accounted for 43% of all drug arrests as recently as 2018.<sup>7</sup> Civil libertarian groups underscore the fact that arrest rates have been consistently higher for racial and ethnic minorities, with African Americans being more than two or three as likely to be arrested for cannabis offenses as whites.<sup>8</sup>

Meanwhile, although U.S. domestic producers have always supplied a large if not a majority share of the U.S. illicit cannabis market, the U.S. federal government has poured billions of dollars into combatting cannabis production in other countries.<sup>9</sup> The impacts of U.S. international drug control efforts has been enormous on those countries deemed most

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<sup>4</sup> See: Jonathon Erlen and Joseph F. Spillane. *Federal Drug Control: The Evolution of Policy and Practice*, Binghamton, NY: Pharmaceutical Products Press (2004). According to the DEA, "Drugs, substances, and certain chemicals used to make drugs are classified into five (5) distinct categories or schedules depending upon the drug's acceptable medical use and the drug's abuse or dependency potential. The abuse rate is a determinate factor in the scheduling of the drug; for example, Schedule I drugs have a high potential for abuse and the potential to create severe psychological and/or physical dependence. As the drug schedule changes-- Schedule II, Schedule III, etc., so does the abuse potential-- Schedule V drugs represents the least potential for abuse." Drug Enforcement Agency, "Drug Scheduling," Drug Information Website (Retrieved December 3, 2021), <https://www.dea.gov/drug-information/drug-scheduling>.

<sup>5</sup> Eva Bertram, Morris Blachman, Kenneth Sharpe, and Peter Andreas. *Drug War Politics: The Price of Denial*, Berkeley, Calif.: University of California Press, 1996; Ed Vulliamy, "Nixon's 'War on Drugs' Began 40 Years Ago, and the Battle is Still Raging," *The Guardian*, July 23, 2011. <http://www.guardian.co.uk/society/2011/jul/24/war-on-drugs-40-years>

<sup>6</sup> The best available longitudinal data on cannabis use are from the National Survey on Drug Use and Health (NSDUH) conducted by the Substance Abuse and Mental Health Data Archive (SAMHDA) of the U.S. Department of Health & Human Services (HHS). Using these data, Azofeifa, et. al., (2016) estimate that there were roughly a quarter million U.S. cannabis users each year from 2002-2014. Alejandro Azofeifa, Margaret E. Mattson, Gillian Schauer, Tim McAfee, Althea Grant, and Rob Lyerla, "National Estimates of Marijuana Use and Related Indicators – National Survey on Drug Use and Health, United States, 2002-2014," *Surveillance Summaries*, Center for Disease Control, September 2, 2016, 65(11);1-25.

<sup>7</sup> American Civil Liberties Union, "Marijuana Arrests by the Numbers," available at <https://www.aclu.org/gallery/marijuana-arrests-numbers>; Peter Wagner and Wendy Sawyer, "Mass incarceration: the whole pie," *Prison Policy Initiative*, March 14, 2018, available at <https://www.prisonpolicy.org/reports/pie2018.html>.

<sup>8</sup> ACLU, *A Tale of Two Countries: Racially Targeted Arrests in the Era of Marijuana Reform*, American Civil Liberties Union Research Report, 2020, [https://www.aclu.org/sites/default/files/field\\_document/marijuanareport\\_03232021.pdf](https://www.aclu.org/sites/default/files/field_document/marijuanareport_03232021.pdf)

<sup>9</sup> David R. Bewley-Taylor, *The United States and International Drug Control, 1909-1997*, London: Pinter (1999).

responsible for the production and transit of illicit drugs.<sup>10</sup> Yet, these counter-drug efforts now face a shifting tide, as its nearest neighboring countries – Canada and Mexico, which have historically accounted for the largest share of illicit cannabis smuggled into the United States – have both moved to legalize cannabis production, distribution, and consumption just across the U.S. border.<sup>11</sup> At the same time, state-level legalization initiatives in the United States have similarly begun to erode the federal prohibition regime, contributing to a dramatic increase in availability in legal medical and recreational cannabis over the past three decades.

The first U.S. cannabis legalization initiative came in 1972, when a referendum titled Proposition 19 posited the state-wide legalization of cannabis in California. Prop 19 proposed that “no person in the State of California 18 years of age or older shall be punished in any way for growing, processing, transporting, or possessing marijuana for personal use, or for using it,” but the measure failed by an overwhelming vote of 66% opposed to 33% in favor.<sup>12</sup> It took more than a decade for advocates to propose the next state ballot initiative, Oregon’s Ballot Measure 5, which proposed in 1986 – at the height of Reagan era anti-drug efforts – the decriminalization of possession or growing cannabis for personal use. Measure 5 failed by an even wider margin of 73% opposed to 26% in favor, and was followed by several more years of veritable silence in state-level cannabis reform efforts.<sup>13</sup>

However, beginning in the mid-1990s, reform proponents launched a series of initiatives that largely succeeded by shifting the emphasis from recreational to medical use of cannabis, beginning in 1996 with California’s Proposition 215, which legalized “medical marijuana” thanks to a margin of 56% in favor to 44% opposed, paving the way for similar legislation in other states and – critics charged and advocates hoped – opening a path toward full legalization.<sup>14</sup> This was followed by a series of successful measures in 1998 in Alaska, Nevada, Oregon, and Washington, all of which succeeded in legalizing medical marijuana with substantial margins of voter support.

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<sup>10</sup> For example, from the 1970s through the 2000s, the U.S. and Colombian governments spent billions of dollars on counter-drug efforts. According to the Congressional Research Service, the total amount appropriated by Congress to support Plan Colombia from 2000-2016 along amounted to more than \$10 billion, with subsequent allocation of more than \$1.2 billion in additional funds through 2019. Also, beginning in 2009, U.S. and Mexican governments in counter-drug efforts included the multi-year \$4.5 billion international security cooperation agreement known as the Mérida Initiative. See: Congressional Research Service, “Colombia: Background and U.S. Relations,” R43813, November 29, 2019. <https://sgp.fas.org/crs/row/R43813.pdf> (Accessed September 14, 2021); UNODC, World Drug Report 2012 (United Nations publication, Sales No. E.12.XI.1).

<sup>11</sup> David Hammond, Samantha Goodman, Elle Wadsworth, Vicki Rynard, Christian Boudreau, and Wayne Hall. “Evaluating the impacts of cannabis legalization: The International Cannabis Policy Study,” *International Journal of Drug Policy*, Volume 77, March 2020.

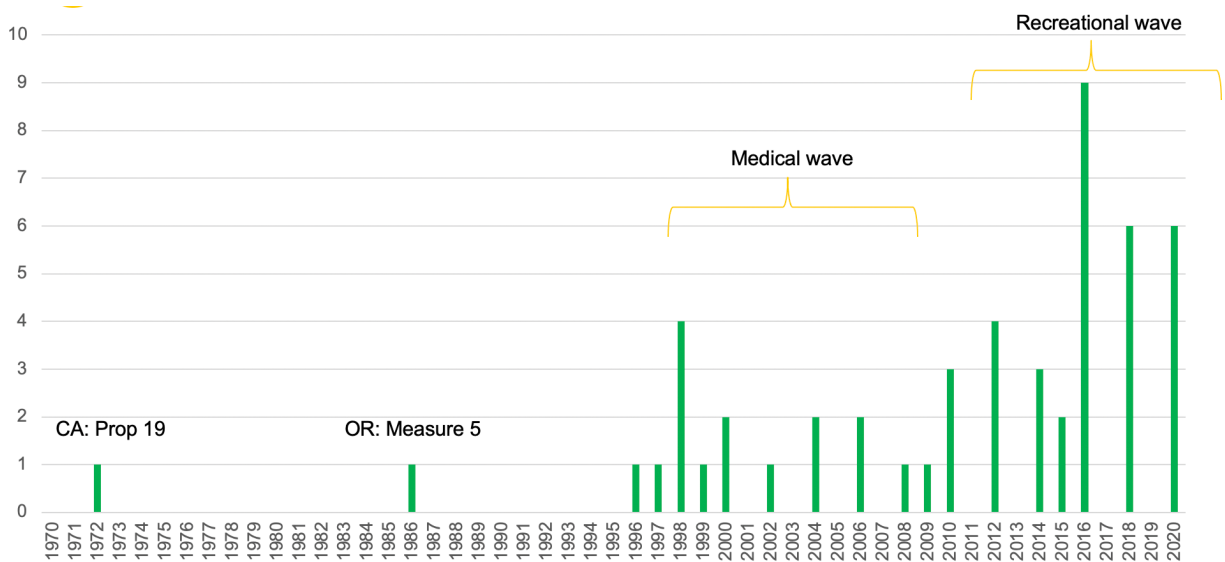
<sup>12</sup> “California Marijuana Legalization, Proposition 19 (1972),” *Ballotpedia* (Accessed December 8, 2021), [https://ballotpedia.org/California\\_Marijuana\\_Legalization,\\_Proposition\\_19\\_\(1972\)](https://ballotpedia.org/California_Marijuana_Legalization,_Proposition_19_(1972))

<sup>13</sup> Robert M. Hardaway (ed.), *Marijuana Politics: Uncovering the Troublesome History and Social Costs of Criminalization*, Santa Barbara: ABC-CLIO, 2018, p. 148.

<sup>14</sup> Michael Vitiello, Proposition 215: De Facto Legalization of Pot and the Shortcomings of Direct Democracy, 31 *University of Michigan Journal of Law Reform*, 707 (1998), <https://repository.law.umich.edu/mjlr/vol31/iss3/4>

The new focus on medical use of cannabis was clearly decisive in shifting public opinion in the 1990s, as the only state-level cannabis measure to fail during that decade was a 1997 Washington state ballot measure, titled Initiative 685, which sought to decriminalize marijuana. In fact, from the first state-level medical cannabis measure passed in 1996 to the year 2000, only five out of 27 state-level initiatives involving medical use of marijuana failed to pass with a majority of voter support. Legalizing medical use of cannabis was therefore an important “gateway” strategy for proponents of full-scale legalization for recreational purposes, which was opposed by substantial majorities on a series of state ballot initiatives into the 2000s in Alaska (2004), Colorado (2006), and California (2010). The number of legalization initiatives increased dramatically thereafter, as illustrated in **Figure 1** and **Table 1**.

**Figure 1:** State Level Medical and Recreational Cannabis Legalization Initiatives, 1970-2020



Source: National Conference of State Legislatures. *Cannabis Overview*. (Accessed December 15, 2021), <https://www.ncsl.org/research/civil-and-criminal-justice/marijuana-overview.aspx>; National Conference of State Legislatures, *State medical marijuana laws*. (Accessed December 15, 2021), <http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx>; Ballotpedia, *Marijuana on the Ballot*, (Accessed December 15, 2021), [https://ballotpedia.org/Marijuana\\_on\\_the\\_ballot](https://ballotpedia.org/Marijuana_on_the_ballot)



**Table 1:** List of State Level Medical and Recreational Cannabis Legalization Initiatives, 1970-2021 (Successful initiatives marked in bold print)

Year	State	Initiative/ Proposition	Medical/ Recreational	Year	State	Initiative/ Proposition	Medical/ Recreational
1972	CA	Proposition 19	Recreational	2015	OH	Issue 3	Recreational
1986	OR	Ballot Measure 5	Recreational	<b>2015</b>	<b>WA</b>	<b>Advisory Vote #11</b>	<b>Medical</b>
<b>1996</b>	<b>CA</b>	<b>Proposition 215</b>	<b>Medical</b>	2016	AZ	Proposition 205	Recreational
1997	WA	Initiative 685	Recreational	<b>2016</b>	<b>AR</b>	<b>Issue 6</b>	<b>Medical</b>
1998	AL	Measure 8	Medical	<b>2016</b>	<b>CA</b>	<b>Proposition 64</b>	<b>Recreational</b>
<b>1998</b>	<b>NV</b>	<b>Question 9</b>	<b>Medical</b>	<b>2016</b>	<b>FL</b>	<b>Amendment 2</b>	<b>Medical</b>
<b>1998</b>	<b>OR</b>	<b>Measure 67</b>	<b>Medical</b>	<b>2016</b>	<b>ME</b>	<b>Question 1</b>	<b>Recreational</b>
<b>1998</b>	<b>WA</b>	<b>Initiative 692</b>	<b>Medical</b>	<b>2016</b>	<b>MA</b>	<b>Question 4</b>	<b>Recreational</b>
<b>1999</b>	<b>ME</b>	<b>Question 2</b>	<b>Medical</b>	<b>2016</b>	<b>MN</b>	<b>IR-124</b>	<b>Medical</b>
<b>2000</b>	<b>CO</b>	<b>Initiative 20</b>	<b>Medical</b>	<b>2016</b>	<b>NV</b>	<b>Question 2</b>	<b>Recreational</b>
<b>2000</b>	<b>NV</b>	<b>Question 9</b>	<b>Medical</b>	<b>2016</b>	<b>ND</b>	<b>Initiated Statutory Measure 5</b>	<b>Medical</b>
2002	AZ	Proposition 203	Medical	<b>2018</b>	<b>MI</b>	<b>Proposal 1</b>	<b>Recreational</b>
2004	AL	Measure 2	Recreational	<b>2018</b>	<b>MS</b>	<b>Amendment 2</b>	<b>Medical</b>
<b>2004</b>	<b>MO</b>	<b>Allowance, 1-148</b>	<b>Medical</b>	2018	MS	Proposition C	Medical
2006	CO	Initiative 44	Recreational	2018	ND	Measure 3	Recreational
2006	SD	Initiative 4	Medical	<b>2018</b>	<b>OK</b>	<b>Question 788</b>	<b>Medical</b>
<b>2008</b>	<b>MI</b>	<b>Proposal 1</b>	<b>Medical</b>	<b>2018</b>	<b>UT</b>	<b>Proposition 2</b>	<b>Medical</b>
<b>2009</b>	<b>ME</b>	<b>Question 5</b>	<b>Medical</b>	<b>2020</b>	<b>AZ</b>	<b>Proposition 207</b>	<b>Recreational</b>
<b>2010</b>	<b>AZ</b>	<b>Proposition 203</b>	<b>Medical</b>	<b>2020</b>	<b>MT</b>	<b>1-182</b>	<b>Medical</b>

## The Impact of State-level U.S. Legalization Initiatives on Illegal Drug Flows

2010	CA	Proposition 19	Recreational		2020	MT	CI-118	Recreational
2010	SD	Initiative 13	Medical		2020	MT	I-90	Recreational
2012	AR	Issue 5	Medical		2020	NJ	Public Question 1	Recreational
2012	CO	Amendment 64	Recreational		2020	SD	Amendment A	Medical
2012	MA	Question 3	Medical		2021	NY	Senate Bill 854-A	Recreational
2012	WA	Marijuana Legalization & Regulation Initiative	Recreational		2021	VA	Senate Bill 1406	Recreational
2014	AL	Ballot Measure 2	Recreational		2021	NM	House Bill 2	Recreational
2014	FL	Amendment 2	Medical		2021	CT	Joint Bill 1201	Recreational
2014	OR	Measure 91	Recreational		2021	AB	Act 2021-450	Medical

Source: National Conference of State Legislatures. *Cannabis Overview*. (Accessed December 15, 2021), <https://www.ncsl.org/research/civil-and-criminal-justice/marijuana-overview.aspx>; National Conference of State Legislatures, *State medical marijuana laws*. (Accessed December 15, 2021), <http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx>; Ballotpedia, *Marijuana on the Ballot*, (Accessed December 15, 2021), [https://ballotpedia.org/Marijuana\\_on\\_the\\_ballot](https://ballotpedia.org/Marijuana_on_the_ballot)

Among the failed efforts, California’s 2010 ballot initiative, Proposition 19, garnered enormous national attention and appears to have helped shift the national discussion on cannabis legalization. Prop 19 would have allowed adults aged “21 years old or older to possess, cultivate, or transport marijuana for personal use.”<sup>15</sup> Among the various arguments in favor of Proposition 19, proponents contended that the initiative would bring an end to failed marijuana prohibition, weaken drug cartels, save taxpayers money, and generate billions in revenue for the state of California. While Prop 19 failed by 45.5% to 54.5% on the November 2010 ballot, the strong support for the measure – including endorsements from the state Democratic party, the NAACP, and several newspaper editorial boards – demonstrated that public views on cannabis legalization had begun to shift substantially, which encouraged

<sup>15</sup> “Official Voter Information Guide California Statewide General Election, Tuesday, November 2, 2010,” California Secretary of State, (Retrieved November 2, 2021) from <https://vigarchive.sos.ca.gov/2010/general/quick-reference-guide/19/>.

reformers in other states to follow suit with initiatives in other states.<sup>16</sup>

Indeed, thereafter, the tide clearly began to turn in favor of legalizing recreational cannabis, with successful legalization initiatives in Colorado and Washington in 2012; in Oregon and Alaska in 2014; and California, Maine, Massachusetts, and Nevada in 2016; Michigan in 2018; and Arizona, Montana, and New Jersey in 2020.<sup>17</sup> In 2020, South Dakota also approved a law permitting medical cannabis. In 2021, four states – Connecticut, New Mexico, New York, and Virginia (all of which previously allowed medical cannabis use – voted to legalize recreational use of cannabis, and one state – Alabama – passed a medical use bill.<sup>18</sup> Out of 16 state-level ballot measures attempting to legalize recreational use of cannabis after 2010, only three failed to achieve majority support from voters: Ohio’s Proposition 205 in 2016, Arizona’s Proposition 205 in 2016, and North Dakota’s Measure 3 in 2018.

In short, by 2021, 16 states allowed the cultivation, distribution, possession, and consumption of cannabis for both medical and recreational purposes, while fully prohibitionist states were in the minority. As illustrated in **Figure 2**, cannabis legalization across the U.S. lacks uniformity, though it is worth noting that three out of four states that border Mexico (except Texas) all have legal access to marijuana. Moreover, it is quite likely that – despite laws requiring prescriptions, age limits, and the like – the availability of regulated cannabis allows for some degree of unauthorized use, as well as “spillover” into states fully prohibiting cannabis. For practical purposes, then, legal cannabis is much more accessible in recent years than at any point since the 1930s, raising important questions about the impacts of this change.

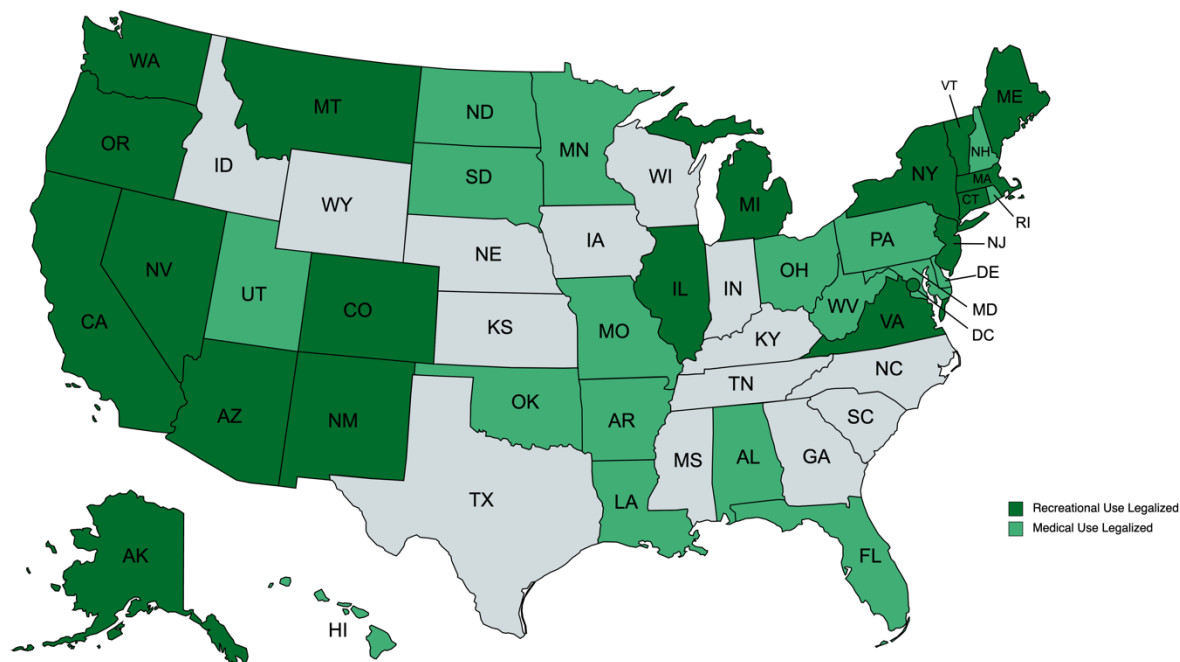
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<sup>16</sup> John Walsh, “California’s Proposition 19 Falls Short, but Moves the Marijuana Policy Debate Forward,” Commentary, Washington Office on Latin America, November 3, 2010. Retrieved June 11, 2021. <https://www.wola.org/analysis/californias-proposition-19-falls-short-but-moves-the-marijuana-policy-debate-forward/>

<sup>17</sup> Montana passed two separate laws – CI-118 and I-90 – dealing with recreational cannabis, as well as one (1-182) dealing specifically with medical cannabis.

<sup>18</sup> Kris Kane, “2021: The Least Eventful Year For Marijuana,” Forbes, December 31, 2021. <https://www.forbes.com/sites/kriskrane/2021/12/31/2021-the-least-eventful-year-for-marijuana/?sh=47a581763255>

**Figure 2:** U.S. States Permitting Medical and Recreational Use of Cannabis as of January 2022



Map created by Vivian Mateos Zúñiga using MapChart.net. Note: All states allowing recreational use also allow medical use.

There has been a considerable amount of research on the impacts of cannabis legalization, though most attention has been paid to the way that it has impacted public health. Some early research on this topic examined the impact of medical cannabis legalization on public awareness and general consumption.<sup>19</sup> Since the proliferation of recreational cannabis initiatives, many scholars have focused on how legalization in different U.S. states has influenced patterns of cannabis use, addiction, and abuse.<sup>20</sup> Within this category, a substantial

<sup>19</sup> Esther K. Choo, Madeline Benz, Nikolas Zaller, Otis Warren, Kristin Rising, and John McConnell. “The impact of state medical marijuana legislation on adolescent marijuana use,” *Journal of Adolescent Health*, 55, 2014, p. 160–166; Deborah S. Hasin, Melanie Wall, Katherine M. Keyes, Madgalena Cerdá, John Schulenberg, Patrick M. O’Malley, Sandro Galea, Rosalie Pacula, and Tianshu Feng, “Medical Marijuana Laws and Adolescent Marijuana Use in the USA from 1991 to 2014: Results from Annual, Repeated Cross-Sectional Surveys,” *The Lancet Psychiatry*, 2, 2015, p. 601–608; Silvia S.Martin, Christine M. Mauro, Julian Santaella-Tenorio, June H. Kim, Magdalena Cerda, Katherine M. Keyes, Deborah S. Hasin, Sandro Galea, and Melanie Walla. “State-level Medical Marijuana Laws, Marijuana Use and Perceived Availability of Marijuana Among the General U.S. Population,” *Drug and Alcohol Dependence*, Volume 169, 1 December 2016, p. 26-32.

<sup>20</sup> See, for example: Austin M. Miller, Robert Rosenman, Benjamin W. Cowan, “Recreational Marijuana Legalization and College Student Use: Early Evidence,” *SSM-Population Health*, 3, 2017, 649–657; Hannah Carliner, Qiana Brown, Aaron L. Sarvet, and Deborah S. Hasin, “Cannabis Use, Attitudes, and Legal Status in the U.S.: A Review,” *Preventive Medicine*, 104, 2017, p. 13–23; David Hammond, Samantha Goodman, Elle Wadsworth, Vicki Rynard, Christian Boudreau, and Wayne Hall. “Evaluating the impacts of cannabis legalization: The International Cannabis Policy Study,” *International Journal of Drug Policy*, Volume 77, March 2020.

amount of research has focused on the effects of cannabis legalization on the black market among adolescents.<sup>21</sup> Others have studied the impacts of cannabis legalization on other aspects of public health (e.g., unintentional ingestion of edibles), commercial retail trends, and regulatory practices.<sup>22</sup>

However, there has been relatively little attention to the ways that legalization has impacted illicit drug producers and traffickers in countries like Mexico, which has been a longtime supplier of illicit cannabis to the United States. Theories that U.S. legalization efforts would cripple Mexican drug trafficking organizations are rooted partly in the fact that cannabis has made up a significant share of their illicit revenues. For decades, the prohibition of cannabis has created a highly lucrative black market for Mexican drug trafficking organizations (DTOs), enabling them to generate enormous profits, corrupt government officials, and perpetrate violence.<sup>23</sup> Legalization advocates have therefore posited that legalizing cannabis would help to reduce the violence and corrupting power of such groups.<sup>24</sup> In 2007, the Government Accountability Office estimated that “drug proceeds in Mexico ranged from: \$3.9 billion to \$14.3 billion for marijuana” in 2005.<sup>25</sup> Even a more conservative estimate resulting from a 2010 RAND study suggested that cannabis represented roughly 20-25% of the \$6-7 billion in U.S. revenues for Mexican drug trafficking organizations.<sup>26</sup> This suggests that competition from

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<sup>21</sup> Joseph J. Palamar, Danielle C. Ompad and Eva Petkova, “Correlates of Intentions to Use Cannabis Among US High School Seniors in the Case of Cannabis Legalization,” *International Journal of Drug Policy*, May 2014; Magdalena Cerda, Melanie Wall, Tianshu Feng, Katherin M. Keyes, Aaron Sarvet, John Schulenberg, Patrick M. O’Malley, Rosalie Liccardo Pacula, Sandro Galea, and Deborah S. Hasin, “Association of State Recreational Marijuana Laws with Adolescent Marijuana Use,” *JAMA Pediatrics*, 171(2), February 2017, p. 142-149; Ashley Brooks-Russell, Ming Ma, Arnold H. Levinson, Leo Kattari, Tom Kirchner, Erin M. Anderson Goodell, and Renee M. Johnson, “Adolescent Marijuana Use, Marijuana-related Perceptions, and Use of Other Substances Before and After Initiation of Retail Marijuana Sales in Colorado (2013-2015),” *Prevention Science*, 20 (2), 2019, p. 185-193.

<sup>22</sup> Dazhe Cao, Sahaphume Srisuma, Alvin C. Bronstein, and Christopher Hoyte. “Characterization of edible Marijuana Product Exposures Reported to United States Poison Centers,” *Clinical Toxicology*, 54(9) 2016, 840-846; Keyes, K. M., Wall, M., Cerdá, M., Schulenberg, J., O’Malley, P. M., Galea, S., et al., “How Does State Marijuana Policy Affect US Youth? Medical Marijuana Laws, Marijuana Use and Perceived Harmfulness: 1991-2014,” *Addiction*, 111, 2187-2195.

<sup>23</sup> We use the term “drug trafficking organization” here with some caution. We are aware that not all organized crime groups (OCGs) are properly described as DTOs, and not all DTOs are dedicated solely to drug trafficking. However, when referring to OCGs that engage in drug trafficking, the term DTO is a valid descriptor. That is why we use the term here and in certain other places in this article.

<sup>24</sup> Justin Ling, “Legalization Advocates Hope to End Mexico’s Drug War,” *Foreign Policy*, December 12, 2020, <https://foreignpolicy.com/2020/12/12/legalization-advocates-hope-end-mexico-drug-war-decriminalization/>

<sup>25</sup> United States Government Accountability Office. “U.S. Assistance Has Helped Mexican Counternarcotics Efforts, but the Flow of Illicit Drugs into the United States Remains High,” Washington, DC. October 25, 2007.

<sup>26</sup> In 2010, RAND estimates accounting for the price of exporting cannabis legally produced in California and competitive pricing concluded that California’s legalization of cannabis could potentially displace around 95% of the market for illegal cannabis trafficked by Mexican DTOs. Kilmer, B., Caulkins, J. P., Bond, B. M., & Reuter, P. H. (2010). Reducing Drug Trafficking Revenues and Violence in Mexico: Would Legalizing Marijuana in California Help? RAND Corporation. <http://www.jstor.org/stable/10.7249/op325rc>

legalized cannabis in the United States may lead to diminished demand and revenue for Mexican cannabis.

On the other hand, experts have pointed to the ingenious adaptability of organized crime groups, and the probability that any loss of revenue from cannabis would lead criminal organizations to diversify their illicit revenue generating activities.<sup>27</sup> Indeed, criminal organizations that engage in drug trafficking also tend to be highly in tune with market demands and the tastes of their consumers.<sup>28</sup> Certain Mexican DTOs have already shifted their operations toward heroin, methamphetamine, and fentanyl to profit from the opioid epidemic across the United States, destabilizing long-standing production patterns and supply chains and fueling violent competition among criminal organizations.<sup>29</sup> Still, there are few studies that have attempted to systematically determine whether and to what extent these shifts have been associated with the U.S. legalization of cannabis, which motivates the authors to explore this question.

## RESEARCH QUESTION & HYPOTHESES

The legalization of cannabis for medical and/or recreational purposes in nearly half of U.S. states over the last decade presents a testable research question: what has been the effect of the increased availability of legalized cannabis on both drug production in Mexico and illicit flows of drugs to the United States? To address this question, we posit the null hypothesis and a number of testable alternative hypotheses derived from the discussion above. First, the null hypothesis would assume that legalization of cannabis in the United States should have no impact on the production and transit of drugs in Mexico, or the flow of illicit drugs into the United States:

H0(a): There is no effect on production and transit of drugs in Mexico.

H0(b): There is no effect on flow of illicit drugs into the United States.

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<sup>27</sup> Indeed, it bears mentioning that many “DTOs” are not exclusively dedicated to drug trafficking, and are perhaps better described as a “collection of criminal enterprises” that includes money laundering, extortion, kidnapping, grand theft, and various other illicit activities Morris, E. K. (2013). “Think Again: Mexican Drug Cartels,” *Foreign Policy*, 203, 30–33. <http://www.jstor.org/stable/24576001>

<sup>28</sup> Clavel, T. (2017, September 20). “How California's legalization of Marijuana Impacts Mexico's Cartels,” *InSight Crime*. Retrieved September 10, 2021, from <https://insightcrime.org/news/brief/how-california-legalization-of-marijuana-impacts-mexico-s-cartels/>.

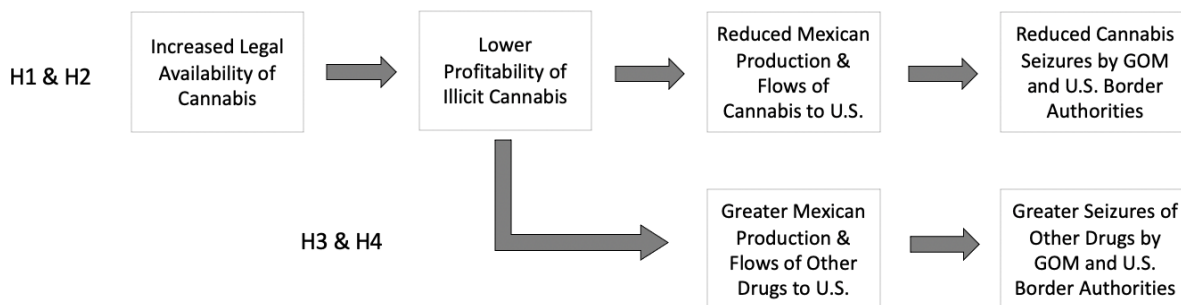
<sup>29</sup> Lucy La Rosa and David A. Shirk, “The New Generation: Mexico's Emerging Organized Crime Threat,” Justice in Mexico Policy Brief, February 5, 2018. <https://justiceinmexico.org/wp-content/uploads/2018/03/180319-Policy-Brief-CJNG.pdf>; Romain Le Cour Grandmaison, Nathaniel Morris, and Benjamin T. Smith, “The U.S. Fentanyl Boom and the Mexican Opium Crisis: Finding Opportunities Amidst Violence?,” *Briefing Paper Series on Building Resilient Communities in Mexico: Civic Responses to Crime and Violence*, Mexico Institute at the Woodrow Wilson International Center for Scholars and Justice in Mexico, February 2019.

Our alternative hypotheses contend that the legalization of the medical and/or recreational production, sale, possession, and consumption of cannabis will have a two-part effect. On the one hand, greater U.S. access to legalized cannabis will be associated with a measurable decrease in cannabis production in Mexico and cannabis trafficking into the United States. On the other hand, greater U.S. access to legalized cannabis will be associated with a measurable increase in the production and trafficking of other drugs, as criminal organizations seek to compensate for declining cannabis revenues. These alternative hypotheses are articulated as follows:

- H1: Illicit cannabis production in Mexico will decrease.
- H2: Illicit cannabis trafficking into the United States will decrease.
- H3: Production of other illicit drugs in Mexico will increase.
- H4: Trafficking of other illicit drugs into the United States will increase.

The four alternate hypotheses presented here allow us to explore multiple measures of the effects of our independent variable as a way to validate our driving hypothesis that increased legal availability of cannabis has measurable and statistically significant effects on drug production and flows into the United States. In short, these hypotheses allow us to test the theoretical claim that cannabis legalization depresses the profitability for illicit cannabis trafficking for DTOs, resulting in decreased production and flows of cannabis and a corresponding reduction in cannabis seizures by Mexican and U.S. authorities. At the same time, the resulting market incentives for increased production and trafficking of other drugs, leading to increased seizures of these substances by Mexican and U.S. authorities.

**Figure 3:** Diagram Illustrating Authors’ Hypotheses Regarding Availability of Cannabis



Looking to the methodologies we explain in greater detail in the next section, it is worth noting here that these hypotheses effectively lump together medical and recreational legalization. On the one hand, several studies strongly suggest that legalizing cannabis for medical use has “spill over” effects in making cannabis available for nonmedical use.<sup>30</sup> On the other hand, in developing this research, the authors conducted hypothesis tests that separately tested the effect of increased access to legalized medical use of cannabis and legalized recreational use of cannabis, and – while there were differences in the coefficients for either measure – there were no major differences in the direction or statistical significance of the results. Thus, for simplicity the authors combined states allowing medical and/or recreational cannabis. Below, we provide more detail on the data and methodology used here to operationalize and test these hypotheses, as well as the descriptive and inferential statistical evidence that supports each of our alternate hypotheses, invalidating the null hypothesis.

## DATA AND METHODOLOGY

The methodology behind this research consists of qualitative and quantitative analysis. It includes research regarding drug prohibition and legalization laws in order to understand the history of marijuana in the United States as well as the patterns surrounding its legalization over time. We also conducted interviews with experts in U.S.-Mexico security relations in order to gain a fuller understanding of binational cooperation surrounding drug control efforts.<sup>31</sup> Many of these experts also provided helpful insights into gaps in official government datasets and potential explanations regarding confounding variables.

To measure the availability of legalized cannabis in the United States, we used various publicly available sources to identify the years in which each state introduced laws permitting either the medical or recreational use of cannabis and gathered state-by-state intercensal data

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<sup>30</sup> See, for example: Xinguang Chen, Bin Yu, Bonita Stanton, Robert L. Cook, Ding-Geng (Din) Chen, and Chukwuemeka Okafor, “Medical Marijuana Laws and Marijuana Use Among U.S. Adolescents: Evidence From Michigan Youth Risk Behavior Surveillance Data,” *Journal of Drug Education: Substance Abuse Research and Prevention*, Vol. 48(1-2), 2018, p. 18-35; Yu-Wei Luke Chu, “The Effects of Medical Marijuana Laws on Illegal Marijuana Use,” *Journal of Health Economics*, 38, (2014), p. 43-61; Bridget Freisthler and Paul J. Gruenewald, “Examining the Relationship Between the Physical Availability of Medical Marijuana and Marijuana Use Across Fifty California Cities,” *Drug and Alcohol Dependence*, 143, 2014, p. 244-250; Joseph Schuermeyer, Stacy Salomonsen-Sautel, Rumi Kato Price, Sundari Balan, Christian Thurstone, Sung-Joon Min, and Joseph T Sakai, “Temporal Trends in Marijuana Attitudes, Availability and Use in Colorado Compared to Non-Medical Marijuana States: 2003-11,” *Drug Alcohol Dependence*, 140 (July 1, 2014), p.145-55; Christian Thurstone, Shane A. Lieberman, and Sarah J. Schmiege, “Medical Marijuana Diversion and Associated Problems in Adolescent Substance Treatment,” *Drug and Alcohol Dependence*, 118 (2-3), 2011, p. 489-492; George Sam Wang, Genie Roosevelt, and Kennon Heard, “Pediatric Marijuana Exposures in a Medical Marijuana State,” *JAMA Pediatrics*, 167(7), 2013, p. 630-633.

<sup>31</sup> To protect the identity of respondents working in law enforcement and counter-drug efforts, we withhold their names and reference only their positions and institutional affiliations.



spanning from 1995 to 2020.<sup>32</sup> Using total state-level population figures reported by the U.S. Census during that time frame, we calculated the annual proportion of the U.S. population with legal access to either medical or recreational.<sup>33</sup>

“Access” to cannabis is difficult to measure precisely because it involves many factors, including state and local regulations terms of production and distribution, the number and type of distributors available in any state, the type and quality of product sold, the varying lag time from policy change to policy implementation across different jurisdictions, and also the variable level of demand across different markets. It is also difficult to account for “grey market” and “spill over” usage by individuals who utilize legally purchases cannabis illegally, such as minors and individuals who use medically prescribed cannabis without a valid health condition.<sup>34</sup> Thus, we recognize that relying on the percentage of the population that lives in a state where cannabis has been made available for medical or recreational use does adequately account for these many differences in per capita access. However, compiling more complete information to account for these differences would be exceedingly cumbersome, and it is not clear that this would significantly improve the findings of this study. Thus, we rely on the overall percentage of the population in legalizing states as a crude proxy indicator of the general accessibility of cannabis.

As illustrated in **Figure 4**, as legalization efforts were successful in more states over time, the percentage of the U.S. population with legal access to cannabis began to rise, with notable increases in 2011 and 2016. In each state, laws permitting the production, distribution, and consumption of legalized medical or recreational cannabis typically came into force the year after legislation was approved. Thus, in 1996, California’s initial legalization of the medicinal use of cannabis meant that at least 12% of the total U.S. population had a limited form of legal access to cannabis since 1997. In 2021, at least 42% of the U.S. population had access to medical

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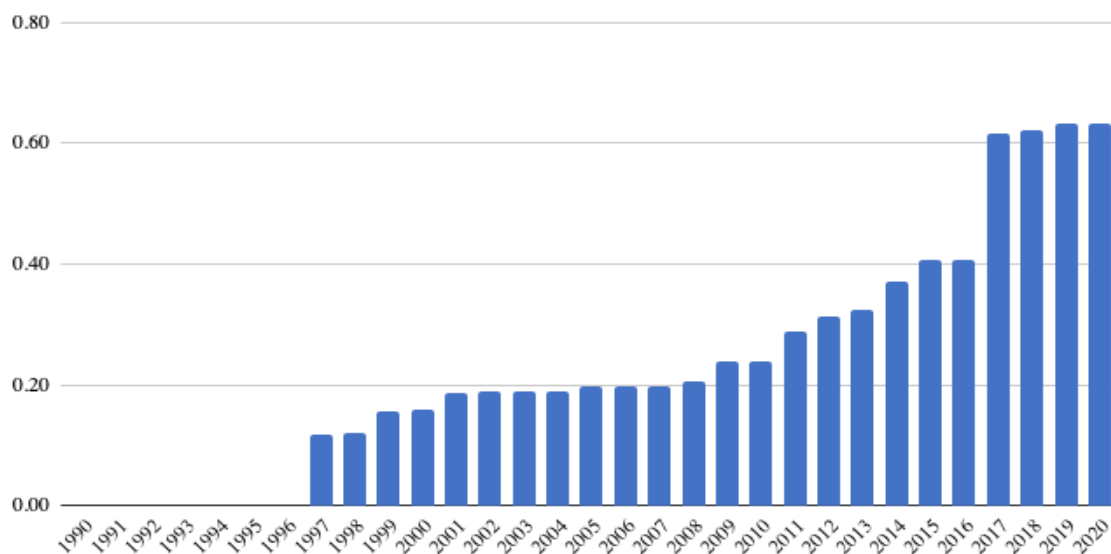
<sup>32</sup> National Conference of State Legislatures. *Cannabis Overview*. (Accessed December 15, 2021), <https://www.ncsl.org/research/civil-and-criminal-justice/marijuana-overview.aspx>; National Conference of State Legislatures, *State medical marijuana laws*. (Accessed December 15, 2021), <http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx>; Ballotpedia, *Marijuana on the Ballot*, (Accessed December 15, 2021), [https://ballotpedia.org/Marijuana\\_on\\_the\\_ballot](https://ballotpedia.org/Marijuana_on_the_ballot)

<sup>33</sup> United States Census Bureau. *State and county intercensal tables: 1990-2000*. [Census.gov](https://www.census.gov). (October 8, 2021), Retrieved May 14, 2021, <https://www.census.gov/data/tables/time-series/demo/popest/intercensal-1990-2000-state-and-county-totals.html>; United States Census Bureau, *State intercensal tables: 2000-2010*. [Census.gov](https://www.census.gov). (October 8, 2021), Retrieved June 14, 2021, <https://www.census.gov/data/tables/time-series/demo/popest/intercensal-2000-2010-state.html>; United States Census Bureau. *County population totals: 2010-2020*. [Census.gov](https://www.census.gov). (October 8, 2021), Retrieved May 14, 2021, <https://www.census.gov/programs-surveys/popest/technical-documentation/research/evaluation-estimates/2020-evaluation-estimates/2010s-counties-total.html>

<sup>34</sup> An alternative measure worth considering in a future study for greater precision could try to tally the number of cannabis consumers at the county level using National Alliance of State Pharmacy Association data to gauge the total number of consumers nationally. However, this would still leave open the question of diversion for nonmedical or unauthorized use (e.g., by minors).

cannabis, while 21% of the population had access to recreational and medical cannabis. Thus, in total, the proportion of the U.S. population with legal access to cannabis jumped to over 60% in 2017 and largely plateaued thereafter.

**Figure 4:** Percent of U.S. Population Living in States with Legal Access to Medical or Recreational Cannabis



Source: Author compilation of data from U.S. Census and various state ballot initiatives.

Compiling and analyzing data on drug production in Mexico and flows across the U.S.-Mexico border is challenging. Because they involve clandestine activities, illicit drug production and flows into the United States are impossible to measure directly. For the purposes of this study, we necessarily relied on official Mexican and U.S. government data on illicit drug eradication and seizures as a proxy for changes in the illegal production and trafficking of drugs into the United States. Specifically, our key dependent variables included eradication estimates from the Mexican government, seizure data from Mexican law enforcement and armed forces, and U.S. seizure data from U.S. Customs and Border Patrol. Yet, as we discuss below, even these official sources can have serious flaws that make them imperfect measures of the primary phenomenon we wish to understand: the actual amounts of illicit drugs being cultivated and illegally trafficked.

In an effort to assess trends in drug production in Mexico, we relied on nationally reported figures on cultivation, eradication, and seizures when available from both U.S. and Mexican sources. The U.S. Department of State's annual International Narcotics Control Strategy Reports (INCSR) provides data on potential harvest, estimated impact, eradication, cultivation,

and potential yield of both opium and cannabis.<sup>35</sup> The Mexican President's Annual Report also provides figures on marijuana and opium eradication as well as marijuana, cocaine, opium gum, and heroin seizures. Also, the National Center for Planning, Analysis and Information for Combating Crime (*Centro Nacional de Planeación, Análisis e Información para el Combate a la Delincuencia, CENAPI*), and the Mexican Federal Attorney General's office (*Fiscalía General de la República, FGR*) provide detailed data on efforts of Mexican armed forces and state and local authorities in the government's fight against domestic production of illicit drugs.

It is worth noting that official Mexican government data are not reported consistently across all categories of illicit drugs over time. Also, according to one U.S. official interviewed for this article, there are questions about the consistency and reliability of the methodologies used to estimate illicit cultivation and crop yield across various years.<sup>36</sup> Moreover, as one former Mexican government official noted, there are sometimes strong incentives for officials and agencies to exaggerate or otherwise distort official figures on counter-drug efforts, due to various political and international pressures.<sup>37</sup> Notably, U.S. Congressional certification requirements created intense pressure for Mexican government officials to present the most favorable possible image of the country's counter-drug efforts, which raises questions about the validity of data reported during this period.<sup>38</sup> These concerns bear further consideration when analyzing the findings below, given that official Mexican government data appeared to generate weaker results in some instances.

In an effort to assess trends in drug flows into the United States, we relied on U.S. drug seizures at and between ports of entry from the U.S. Customs and Border Patrol's (CBP). Figures on seizures are broken down by the different branches within CBP, including the Office of Field Operations (OFO) and the U.S. Border Patrol (USBP). The OFO is responsible for managing ports of entry (POEs) and seizing any illicit substances being smuggled across

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<sup>35</sup> The INCSR measures drug production and seizures in Mexico and uses data provided by the Mexican government as the basis for its assessments. According to the INCSR's methodological report, the U.S. government employs sample survey methodologies for illicit cultivation estimates, and analysts combine annual data sets with eradication and seizure data provided by Mexican authorities. These reports date back to 1988 and additionally include seizure data on various narcotics including opium, heroin, cocaine, cannabis, and methamphetamine.

<sup>36</sup> In order to measure crop yield, the Mexican government works with the United Nations Office on Drugs and Crime (UNODC) to measure the cultivation of various narcotics, including poppy cultivation and opium yield. Combined, these figures provide a broad estimate of drug production on Mexican soil. Mexico's armed forces also engage in field operations to verify cultivation estimates on the ground. However, one U.S. official consulted for this study raised questions about the validity of the methodologies employed to measure cultivation. Interview with current U.S. State Department official via Zoom on July 28, 2021.

<sup>37</sup> Interview with former-Mexican intelligence official via Zoom on July 19, 2021.

<sup>38</sup> From 1986 to 2002, the U.S. Congress required that Mexico and other illicit drug-producing countries be certified by the executive branch each year to ensure their full cooperation in counter-drug efforts, lest they be subjected to economic sanctions. "Mexican Drug Certification Issues: U.S. Congressional Action, 1986-2002," *Congressional Research Service*. Order Code 98-174 F, October 22, 2002.

POEs. USBP is the law enforcement agency within CBP that is tasked with securing the border between POEs and seizing illicit substances smuggled outside of POEs.<sup>39</sup> Data on OFO and USBP seizures are accessible through the publicly available CBP Enforcement Statistics published through the official CBP Newsroom dating back to Fiscal Year 2012. Additional figures dating back to Fiscal Year 2004 are available through the Department of Homeland Security's "Independent Review of the U.S. Customs and Border Protection's Reporting of Drug Control Performance Summary Reports" which include seizure data on cocaine, heroin, and marijuana.

It should be noted that U.S. border agency data available for certain illicit drugs is limited, especially for certain years and particularly for synthetic drugs. Notably, methamphetamine seizures in the United States were not reported by the Office of Field Operations (OFO) until fiscal year 2012, while OFO reports of fentanyl seizures did not appear until FY2015. Similarly, the U.S. Border Patrol methamphetamine seizures are only publicly available going back to FY2011 and fentanyl seizures are reported publicly as of FY2016. Additionally, OFO data for all seizures is unavailable for FY2011. Also, data collected on illicit drug seizures at specific U.S. border sectors are not publicly available, and were not attainable through multiple official requests presented in writing by the authors to CBP. This makes it impossible to determine the share of drugs that are seized at either the U.S.-Canadian border or the U.S.-Mexican border, or in particular geographic areas along either border. Thus, our dependent variables for measuring illicit drug flows specifically from Mexico are cruder than we would like them to be, as it is not clear that any relationship found between U.S. legalization of cannabis and seizures of illicit drugs necessarily involves flows from Mexico.<sup>40</sup>

In terms of methodology, we used the datasets that we constructed on yearly estimates for access to legal medical and recreational cannabis, eradication and seizures in Mexico, and Border Patrol and port of entry seizures at U.S. borders, to run a series of hypothesis tests. Specifically, we regressed our dependent variables for Mexican drug cultivation, eradication and seizures, as well as seizure data at Ports of Entry and between Ports of Entry, against the percent of population with legal access to cannabis each year to see if there is a statistically significant relationship between the two variables. In this way, our models tested the relationship between U.S. legalization trends and Mexican counter-drug efforts targeting drug production and trafficking, as well as U.S. counter-drug efforts targeting illicit cross-border drug flows. Again, it is worth noting that we conducted similar tests for the availability of either legal medical or recreational cannabis, but the differences between these two measures was slight. With this in mind, we opted to rely on a single measure of cannabis availability that

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<sup>39</sup> Finklea, K. (2019, July 3). Illicit Drug Flows and Seizures in the United States: What Do We [Not] Know? Retrieved June 25, 2021, from <https://sgp.fas.org/crs/misc/R45812.pdf>.

<sup>40</sup> For this reason, our efforts to look at both seizures in Mexico and along the U.S.-Mexico border is intended to provide additional support for our hypotheses.

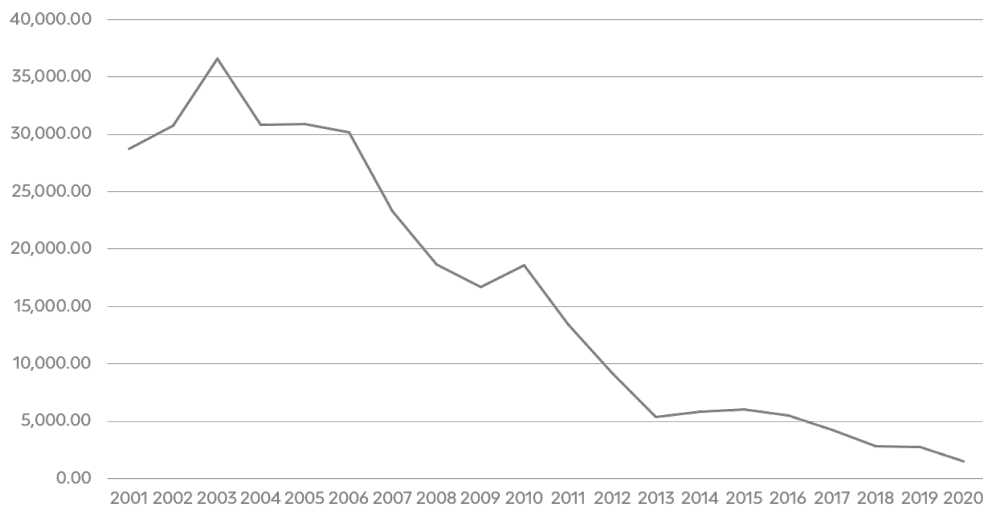
includes the percentage of the population with one or the other (given that all states allowing recreational consumption also allow medical use).

## FINDINGS

If U.S. demand for illicit cannabis were to decrease over time along with increased availability of legal cannabis in U.S. states, we might expect to see evidence of that in the form of declining cannabis eradication and seizures by Mexican and U.S. border authorities. Consistent with this initial hypothesis, the data from the Mexican government show a general decline in cannabis eradication of cannabis between 2001 and 2020 (See **Figure 5**), as well as a general decline in cannabis seizures over that same time period (See **Figure 6**). With regard to our other set of hypotheses, given declining revenues from illicit cannabis trafficking, we expect to see increased seizures of cocaine, heroin, and/or methamphetamine as organized crime groups diversified into these areas. Mexican government seizures of cannabis and, to a lesser extent, cocaine declined, as illustrated in **Figure 6** and

**Figure 7**, respectively. As observable in **Figure 8**, there were substantial increases in Mexican government seizures of opium from around 2009 to 2015, while seizures of heroin remained fairly flat.

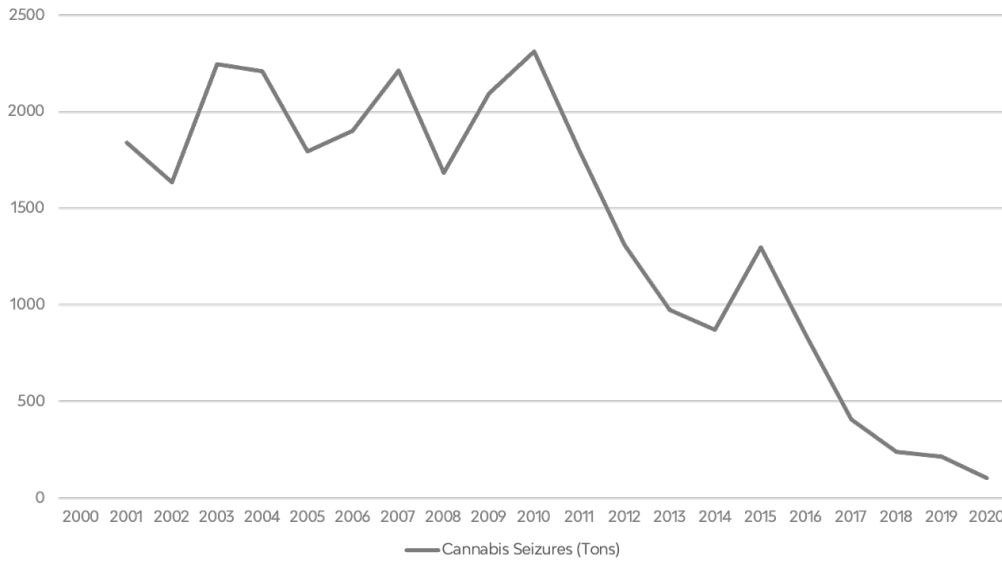
**Figure 5: Total Hectares of Cannabis Eradicated by the Mexican Government, 2001-2020**



Source: Annual Report of the Mexican President (various years).<sup>41</sup>

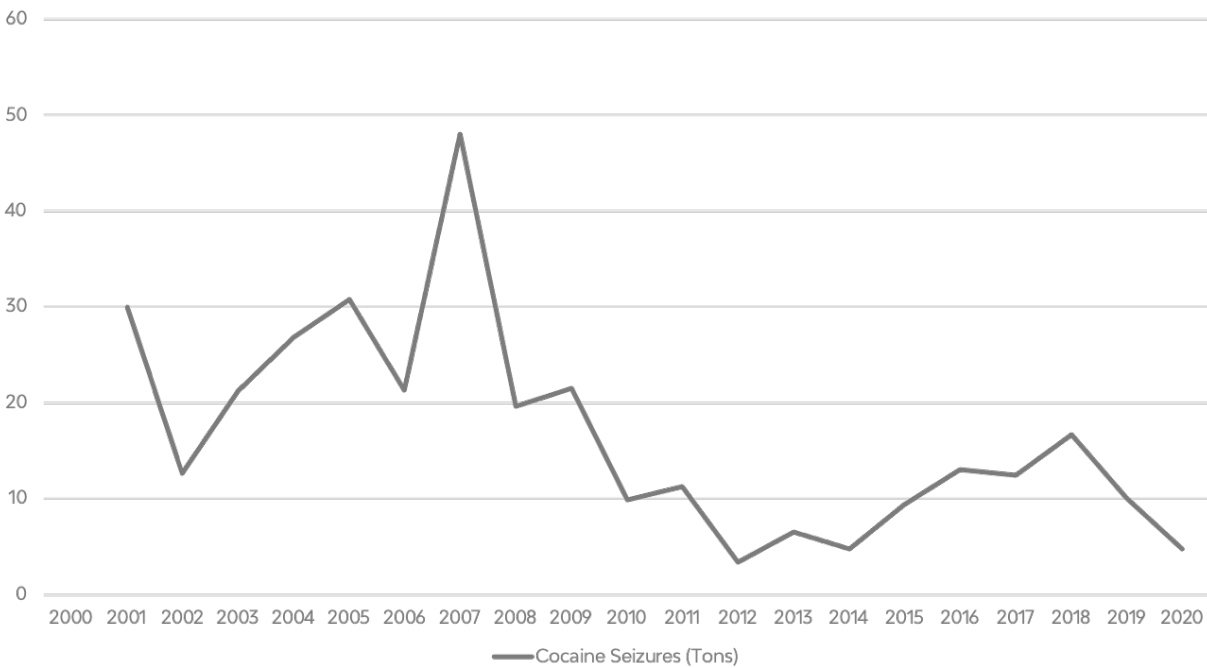
<sup>41</sup> Government of Mexico. (2021, September). Tercer Informe de Gobierno del Presidente Andres Manuel Lopez Obrador. Mexico City.

**Figure 6:** Total Mexican Government Seizures of Cannabis (in Metric Tons), FY2001 to FY2020



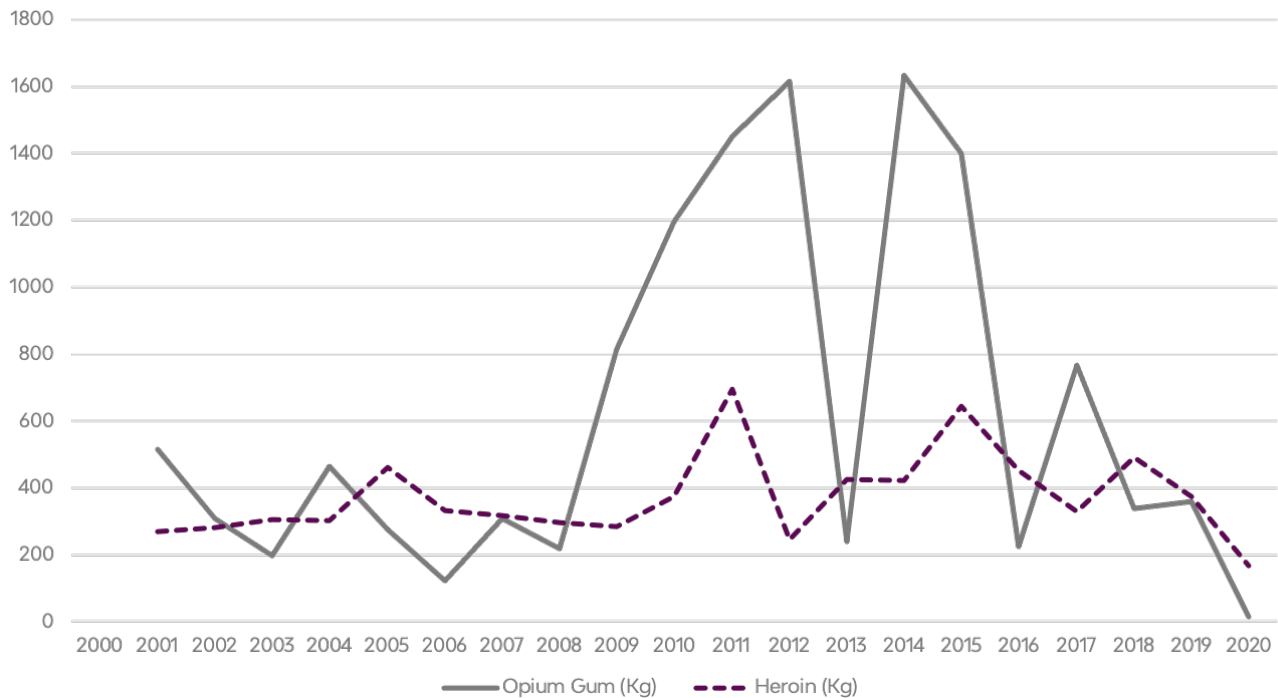
Source: Annual Report of the Mexican President (various years).

**Figure 7:** Total Mexican Government Seizures of Cocaine (in Metric Tons), FY2001 to FY2020



Source: Annual Report of the Mexican President (various years).

**Figure 8:** Total Mexican Government Seizures of Opium and Heroin (in kilograms), FY2001 to FY2020



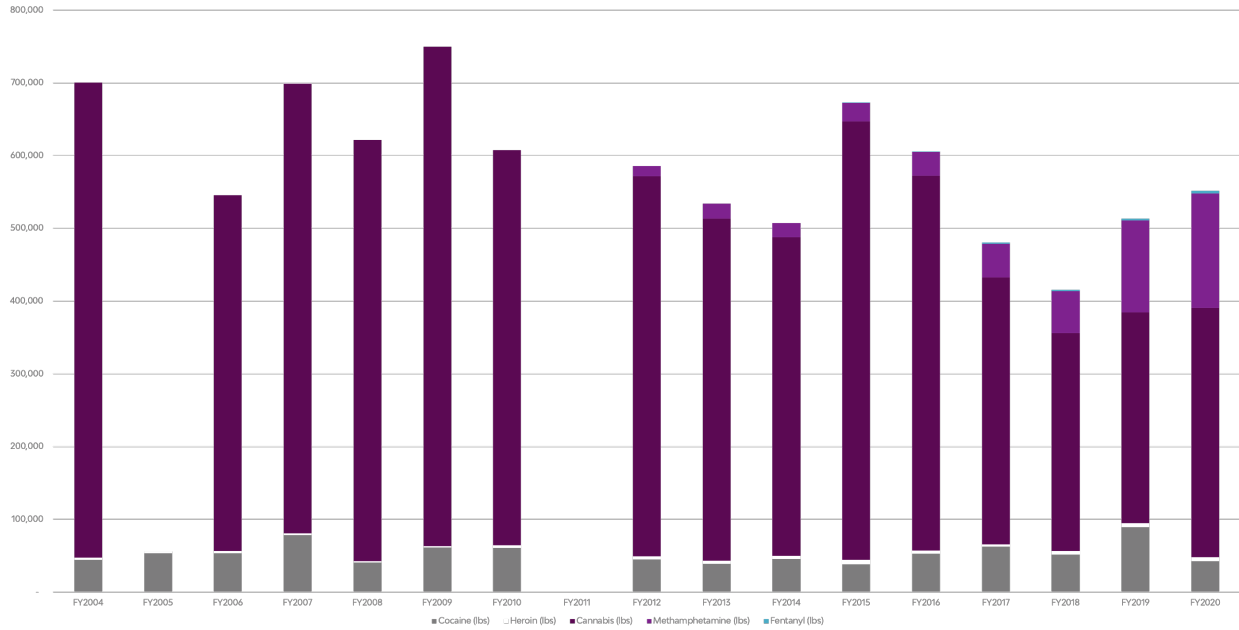
Source: Annual Report of the Mexican President (various years).

In terms of seizures by U.S. border authorities, we also found substantial evidence that illicit drug flows have changed measurably over time. The data on U.S. Customs and Border Patrol seizures span from Fiscal Year 2004 to Fiscal Year 2020, and are shown in Figure 9 and Figure 10 across five categories of illicit drugs (heroin, cannabis, methamphetamine, and fentanyl). Historically, the volume of seizures at ports of entry has been considerably lower than the volume of seizures between ports of entry. While OFO regularly seized between 500,000 and 700,000 pounds of illicit drugs at U.S. ports of entry from 2004-2020, the USBP seized an average of 1.5 million pounds over the same time period. However, while overall volume of seizures at ports of entry has remained around or above half a million pounds annually throughout the time-period studied, there was a demonstrable downward trend in the volume of illicit drugs seized between ports of entry.<sup>42</sup> It is worth noting that – across all these categories of illicit drugs – there appeared to be relatively little change in the seizure amounts reported by border authorities for FY 2019 and FY 2020. This is striking because it suggests

<sup>42</sup> Though the decreases in U.S. border seizures are not as substantial as those seen in eradication and seizures in Mexico, there is still a gradual decline beginning in FY2014 for seizures between Ports of Entry and a less consistent decline beginning in FY2010 and then again in FY2016 for seizures at Ports of Entry. Again, we consider possible explanations for the deviant trends in Mexican government and U.S. border seizures later in our analysis.

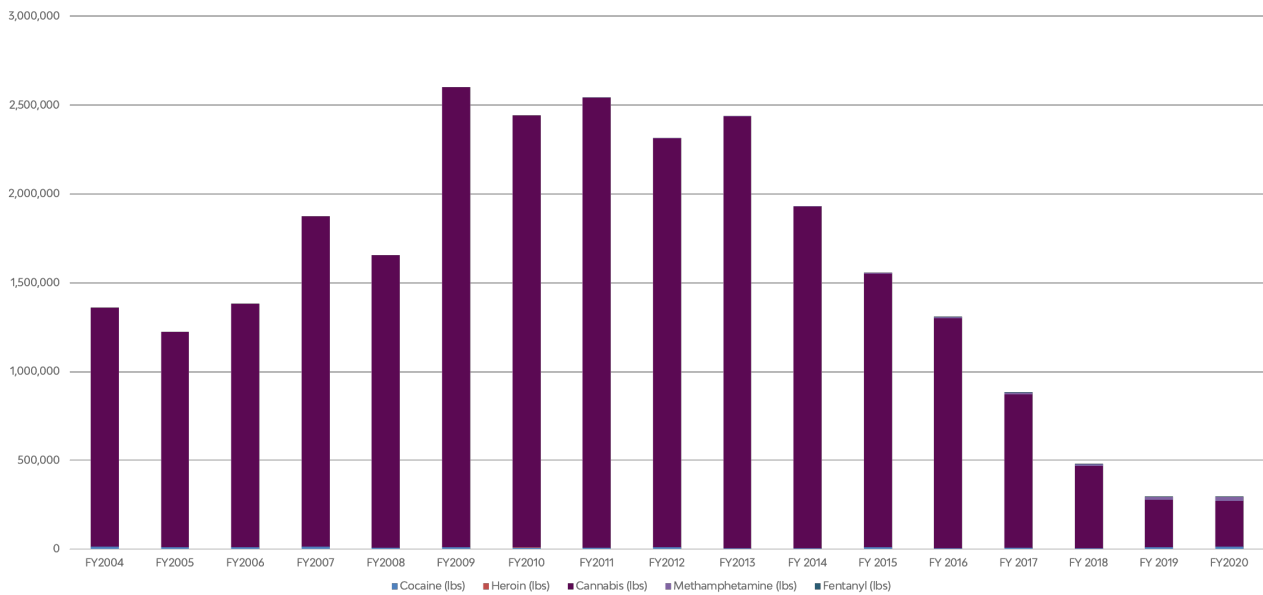
that COVID-era measures to restrict border crossings starting in March 2020 had little observable effect on illicit drug seizures.

**Figure 9:** Office of Field Operations (OFO) Seizures of Selected Illicit Drugs at Ports of Entry, Fiscal Year 2004-Fiscal Year 2020



Source: CBP.

**Figure 10:** U.S. Border Patrol Seizures of Selected Illicit Drugs Outside Ports of Entry, Fiscal Year 2004-Fiscal Year 2020



Source: CBP.



It is also clear that cannabis has long represented the vast majority of bulk tonnage in illicit drug seizures by U.S. border authorities, especially outside of ports of entry where other illicit drugs represent a tiny – indeed, almost invisible – fraction of all seizures. This is not surprising, given that cannabis has long been the most widely consumed federally prohibited illicit drug in the United States. By some estimates between a third and half of U.S. residents over the age of five consume cannabis in their lifetime, with at least one in twenty reporting “current” use within the last month. By comparison, generally no more than 15% of U.S. residents report prior use of any other prohibited psychotropic substances.<sup>43</sup>

At the same time, there are also clearly changing dynamics over time, and the volume of cannabis seizures has clearly decreased substantially even as other drug seizures have increased substantially. At the apex of illicit cannabis flows in 2009, the roughly 3.3 million pounds of cannabis seized that year represented 98% of the approximately 3.4 million pounds of illicit drugs seized at U.S. borders. Yet, by 2020, illicit cannabis seizures dropped to 600,000 pounds – their lowest level in decades – and accounted for a little more than 70% of the 846,658 pounds of illicit drugs seized by U.S. border authorities. Thus, the larger shift described here appears to reflect both the declining amounts of cannabis flowing into the United States, but also the increasing amounts of other illicit psychotropic substances that have begun to fill the gap. Mexican DTOs have been instrumental in contributing to the illicit production, trafficking, and distribution of opioids and psychostimulants in recent years.<sup>44</sup>

The increase in seizures of these other illicit drugs at the border is clearer in **Figure 11**. It appears, for example, that drug traffickers have not turned to cocaine as an alternative to cannabis. For most of the period studied, cocaine represented the second largest amount of illicit drugs seizures, with an average of around 60,000 pounds seized annually (with a standard deviation of around 20,000 lbs.) from 2004 through 2021. Cocaine constituted around 2-4% of all drug seizures by U.S. authorities until 2017, when they began to represent an increasing share of total seizures (growing from 5.3% in 2017 to 21% in 2020). Yet, although their share of the total amount of drugs seized has increased noticeably in recent years, cocaine seizures have not increased dramatically in terms of total volume. In short, thus far, cocaine

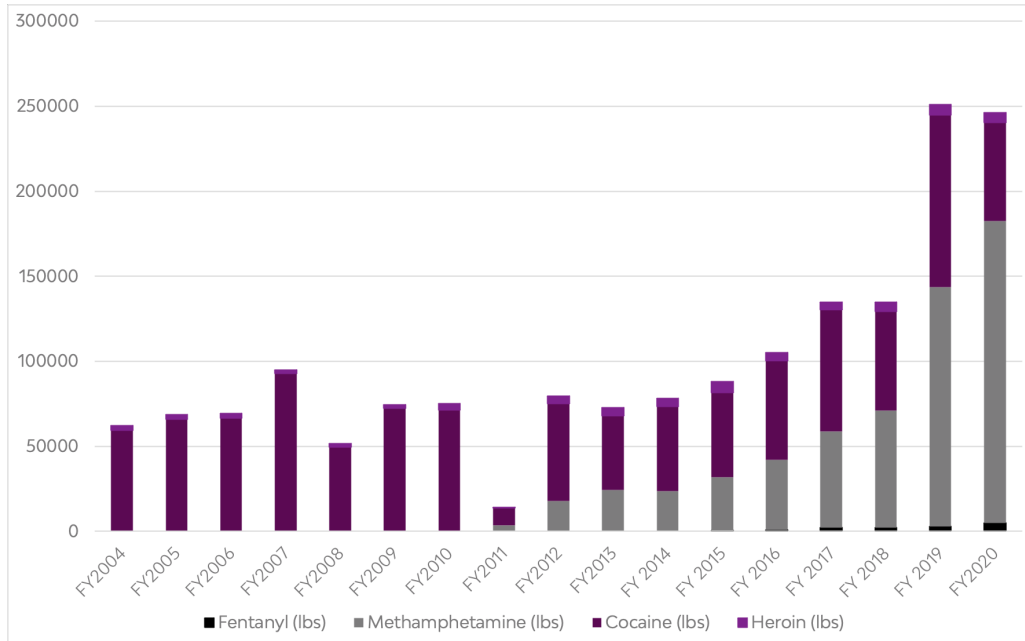
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<sup>43</sup> In 1992, prior to the earliest successful legalization efforts, the Substance Abuse and Mental Health Services Administration (SAMHSA) found that about 33% of those surveyed in the National Household Survey on Drug Abuse (NHSDA) reported at least some prior use of cannabis and about 4.4% reported use within the past month. Based on these data, SAMHSA estimated that there were approximately 68 million people that had tried cannabis during their lifetime and 9 million “current” (past month) users. In the same survey, 11% of respondents reported past use of cocaine (0.6% within the past month), 9% of respondents reported past use of LSD (0.3% within the past month), around 0.9% reported past use of heroin (estimates on past month use were imprecise and not reported). U.S. Department of Health and Human Services, *National Household Survey on Drug Abuse: Main Findings 1992*. ONDCP Drugs & Crime Clearinghouse, DHHS Publication No. (SMA) 94-3012, January 1995 <https://www.ojp.gov/pdffiles1/Digitization/153970NCJRS.pdf>

<sup>44</sup> See, for example: Nancy Cortes, “The Drug War and the Resurgence of Mexico’s Heroin Trade,” Justice in Mexico Working Paper Series, Volume 14, Number 2, May 2015.

seizures have increased in relative, not absolute terms, suggesting that perhaps Mexican DTOs have not significantly modified their cocaine trafficking practices and/or U.S. demand for cocaine has remained relatively constant over the past two decades.

**Figure 11:** Combined Seizures of Cocaine, Heroin, Methamphetamine, and Fentanyl by USBP and OFO, FY04-FY20 Totals



Source: CBP.

Meanwhile, seizures of other drugs – methamphetamine, heroin, and fentanyl – have grown substantially in *both* absolute and relative terms. The total mass and proportion of methamphetamine seized by U.S. authorities have grown exponentially, eventually surpassing the amount of cocaine seized for the first time in 2018. More specifically, U.S. border seizures of methamphetamine grew from just 3,715 pounds seized in 2011 to 177,696 pounds seized in 2020. Similarly, while the bulk tonnage of heroin seized at U.S. borders is quite small, the amounts seized grew steadily over the period studied, nearly doubling from 2,945 pounds in 2004 to 5,768 pounds in 2020. In terms of proportion, the share of total seizures accounted for by heroin increased sevenfold from .1% to .7% over these same years. Finally, while fentanyl seizures were not publicly reported until 2015, the amounts seized grew dramatically – over 6,800% – from just 70 pounds in 2015 to more than 4,776 pounds seized in 2020, with its share of increasing from just .1% in 2015 to 1.6% in 2020.

To test claims that the shifts in production and seizures of cannabis and other illicit psychotropic substances are related to cannabis legalization, we conducted bivariate regressions for each of our models. Consistent with our hypotheses, we found statistically significant evidence that the proportion of the U.S. population with access to legal cannabis

has been negatively correlated with cannabis seizures and positively correlated with heroin and methamphetamine seizures at the border. However, we did not find corresponding statistically significant evidence of a relationship between the proportion of the U.S. population with access to legal cannabis and seizures and Mexican or U.S. seizures of cocaine – and only mixed support for fentanyl – for reasons we consider later in our discussion.

To begin, we conducted a series of statistical tests for relationships between the proportion of the U.S. population with access to legalized cannabis and our multiple dependent variables that serve as proxies for production of cannabis in Mexico (H1) and flows of cannabis into the United States (H2). The results of each test are illustrated in Table 1. For H1, we model our statistical tests by looking first at the effects of our independent variable (proportion of the U.S. population with access to legalized cannabis) on Mexican cannabis production, using our proxy variables: Mexican government eradication by hectare (Model 1) and Mexican government seizures of cannabis by metric ton (Model 2). Here we find a strong, negative and statistically significant correlation between the legalization of cannabis in the United States and the amount of Mexican cannabis eradication and seizures. That is, our findings suggest that as the proportion of the U.S. population with access to legal cannabis has increased, Mexican government eradication and seizures have decreased, which appears to suggest declining production of illicit cannabis in Mexico.

For H2, we model our statistical tests by looking at the effects of our independent variable (U.S. population with access to legalized cannabis) on cannabis trafficking into the United States, using our proxy variables: U.S. Border Patrol seizures of cannabis between ports of entry levels (Model 3) and U.S. Customs and Border Protection seizures of cannabis at U.S. ports of entry, or POEs, (Model 4). Here again we find a strong, positive and statistically significant correlation between Mexican cannabis eradication and seizures. This suggests that as the percentage of the U.S. population with access to legal cannabis has increased, seizures of cannabis by U.S. border authorities have decreased both at and between ports of entry, lending further indications that illicit trafficking of cannabis has declined.

**Table 2:** Linear Regression Results for Effect of U.S. Population with Access to Medical or Recreational Cannabis

	Model 1: Mexican Cannabis Eradication (ha)	Model 2: Mexican Cannabis Seizures (mt)	Model 3: U.S. Border Patrol Cannabis Seizures (lbs.)	Model 4: U.S. Port of Entry (POE) Cannabis Seizures (lbs.)
Constant	35,292.922 (<.001)	1,811.811 (<.001)	2,610,032.14 (<.001)	722,226.393 (<.001)
% of U.S. Population w/ access to either Recreational or Medical Cannabis	-573.278 (<.001) ***	-19.836 (.002) **	-25,716.972 (<.001) ***	-6,050.871 (<.001) ***
R squared	.690	.338	.375	.747
Number of cases	19	24	16	14

P values shown in parentheses. (\*) indicates statistical significance at the .05 threshold; (\*\*) indicates statistical significance at the .01 threshold; (\*\*\*) indicates statistical significance at the .001 threshold. (--) indicates that a result is not statistically significant.

Absent the legalization of cannabis in the United States, we would expect the Mexican government to eradicate a constant of 35,292.92 hectares of cannabis annually, on average. At 6,000 pounds of cannabis harvest per hectare, this could hypothetically produce an estimated yield of 221,623,920 pounds of cannabis.<sup>45</sup> At a conservatively estimated wholesale price in Mexico of \$25 per pound, we estimate that the value of the cannabis eradicated by the Mexican government prior to any effects of U.S. legalization to equate to roughly \$5.4 billion of unrealized wholesale revenues for drug traffickers.<sup>46</sup> Yet, based on our findings, for every one

<sup>45</sup> One hectare equals 2.47 acres. One acre can produce an estimated 2,500 pounds of cannabis, according to a study by RAND. Thus, we assume that one hectare can presumably produce 6,000 pounds of cannabis. In 2001, the National Drug Intelligence Center (NDIC) reported that the wholesale price for low grade Mexican marijuana was approximately \$330-500 per pound, a fraction of the price of domestically produced marijuana (\$2,550-6,000 per pound). National Drug Intelligence Center, *California Central District Drug Threat Assessment*, May 2001, <https://www.justice.gov/archive/ndic/pubs0/668/marijuan.htm>

<sup>46</sup> We use \$25 as a low-end basis for our estimates for cannabis prices in Mexico. However, firm data on wholesale prices in Mexico for illicit drugs (prior to crossing the border) are scarce, and the UNODC’s cross national comparison lacks data on Mexico. Anecdotal reports suggest that a pound of cannabis can go for less than \$100 per pound and as little as \$15 per pound in some Mexican communities. See: “Retail and wholesale drug prices,” United Nations Office of Drug and Crime, <https://dataunodc.un.org/drugs/prices>; Mike Gallagher, “Cartels Still Find Good Money In Weed,” *Albuquerque Journal*, February 13, 2017, <https://www.abqjournal.com/947779/cartels-still-find-good-money-in-weed-2.html>; Dane Schiller, “Mexican Marijuana Is Still Plentiful -- And Cheap,” *Houston Chronicle*, Dec. 24, 2007. <https://www.chron.com/news/houston-texas/article/Mexican-marijuana-is-still-plentiful-and-cheap->

percent increase in the U.S. population that has gained access to legal medical or recreational cannabis, we find at least a 1.66% decrease (573.3 hectares) in the amount of cannabis eradicated by Mexican authorities, resulting in reduction of seizures worth an estimated \$86 million. For every one percent increase in the U.S. population with access to legalized medical or recreational cannabis, we also find a corresponding decrease of at least 1% in the amount of cannabis seized by Mexican authorities annually, which equates to roughly 20.2 metric tons, or 44,533.38 pounds, worth an estimated \$1.1 million at conservatively estimated wholesale prices.<sup>47</sup>

Meanwhile, at the U.S. border, for each one percent increase in the U.S. population that gains access to legal medical or recreational cannabis, we find an approximate decrease of 1% (roughly 25,717 pounds) in the amount of cannabis seized annually by the U.S. Border Patrol, and drop of at least 0.8% (over 6,000 pounds) in OFO seizures at ports of entry. Thus, with an estimated U.S. street value of \$3,000 per pound in 2020 (a questionable metric that is frequently used by U.S. authorities to gauge their impact), U.S. borders authorities saw an \$95 million decrease in the annual value of seizures for each one percent increase in the U.S. population with access to legalized cannabis.<sup>48</sup>

## Other Illicit Drug Seizures in Mexico and the United States

For comparative purposes, we ran similar statistical tests for other categories of illicit drugs, specifically cocaine, heroin, methamphetamine, and fentanyl. As noted above, the data available to analyze trends in the smuggling of these illicit drugs (especially synthetic drugs) is more limited than for cannabis, given a lack of eradication data from the Mexican government (due in large part to the nature of the production and supply chains for these drugs) and the lack of seizure data reported by U.S. border authorities for certain years. Nonetheless, we were able to find at least partial support for our third hypothesis that the production of other illicit drugs will increase as legal cannabis becomes more available in the U.S. market, as well as our fourth hypothesis that the trafficking of such drugs into the United States will also increase.

Again, we conducted a series of statistical tests for relationships between the proportion of the U.S. population with access to legalized cannabis and the production or trafficking of the four major categories of illicit drugs other than cannabis for which we were able to obtain data: cocaine (**Table 2**), heroin (**Table 4**), methamphetamine (**Table 5**), and fentanyl (**Table 6**). These

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[1795923.php](https://www.npr.org/sections/parallels/2014/12/01/367802425/legal-pot-in-the-u-s-may-be-undercutting-mexican-marijuana); John Burnett, “Legal Pot In The U.S. May Be Undercutting Mexican Marijuana,” *National Public Radio*, December 1, 2014. <https://www.npr.org/sections/parallels/2014/12/01/367802425/legal-pot-in-the-u-s-may-be-undercutting-mexican-marijuana>.

<sup>47</sup> Each year the numerator for the equation decreases, meaning that the percent decrease increases slightly. Thus, over time, our model predicts that the amount of the decrease in eradication increases slightly.

<sup>48</sup> This presumes that the total annual value of reduced Border Patrol seizures amounted to roughly \$77 million and the total amount of POE seizures amounted to \$18 million, for a total of \$95 million.

tests allowed us to assess the validity of our alternate hypotheses that there is a relationship between increased access to legalized cannabis in the United States and greater seizures of other drugs in Mexico (H3) and by U.S. border authorities (H4), presumably indicating a shift by traffickers to other sources of revenue.

In the case of cocaine, we find no support for either of our related hypotheses (H3 or H4). Again, this drug is not cultivated in Mexico, so there are no data on eradication efforts by the Mexican government. The results for Mexican cocaine seizures (Model 5) were statistically significant and accounted for 28.1% of the variation in the model, with negative coefficient (-.338) that suggests that for every 1% decrease in the U.S. population with access to legalized cannabis there is at least a 1.2% decrease in the amount of cocaine seized by Mexican authorities (**Table 2**). However, for both U.S. Border Patrol (Model 6) and POE seizures (Model 7), the results were not statistically significant for cocaine. Based on these results, it appears that increasing availability of cannabis to the U.S. population has some impact on seizures by the Mexican government but little or no impact on seizures by U.S. border authorities. This finding suggests that, at best, the impact of U.S. cannabis legalization on cocaine has had mixed results, and even so has resulted in a minimal effect on Mexican cocaine seizures.

**Table 3:** Effect of % U.S. Population with Access to Medical or Recreational Cannabis on Cocaine Seizures in Mexico and at U.S.-Mexico Border

	Model 5: Mexican Cocaine Seizure (mt)	Model 6: U.S. Border Patrol Cocaine Seizures (lbs.)	Model 7: U.S. Port of Entry (POE) Cocaine Seizures (lbs.)	Model 5: Mexican Cocaine Seizure (mt)
Constant	27.645 (<.001)	11440.129 (<.001)	48496.620 (<.001)	27.645 (<.001)
% of U.S. Population w/ access to either Recreational or Medical Cannabis	-.338 (.006) **	-30.247 (.549) --	144.403 (.501) --	-.338 (.006) **
R squared	.281	.024	.033	.281
Number of cases	24	16	15	24

P values shown in parentheses. (\*) indicates statistical significance at the .05 threshold; (\*\*) indicates statistical significance at the .01 threshold; (\*\*\*) indicates statistical significance at the .001 threshold. (--) indicates that a result is not statistically significant.

In the case of heroin, we find no support for H3 but strong support for H4 (See **Table 3**). For Mexican government heroin eradication efforts (Model 8) and seizures (Model 9), the results were not statistically significant. For both U.S. Border Patrol (Model 10) and POE seizures

(Model 10), the results were highly statistically significant ( $p < .001$ ).<sup>49</sup> Based on these results, it appears that increasing availability of cannabis to the U.S. population has little or no impact on eradication and seizures by the Mexican government. It is worth noting that Mexican government heroin eradication data were unavailable for 2020 and seizure data were unavailable for 2014, 2016, and 2018, which may have affected the statistical significance of our findings for H3. Interviews with Mexican security experts suggest that opium production was a lower priority during the administrations of Mexican presidents Enrique Peña Nieto (2012-2018) and Andrés Manuel López Obrador (2018-2021), which helps to explain the lack of effort or reporting. Either way, there is insufficient evidence to conclude that Mexican heroin production has been affected by increased U.S. availability of legal cannabis.

On the other hand, there is robust and statistically significant evidence for our hypothesis (H4) that heroin seizures by U.S. border authorities – our proxy indicators for flows of illicit drug trafficking into the United States – increased measurably in relation to the percent of the U.S. population with access to legalized cannabis (See **Table 4**). Based on the results in Model 10 and 11, we estimate that for each one percent increase in the U.S. population with access to legalized cannabis, there is an increase of 12.5 pounds of heroin seized by the U.S. Border Patrol and 56.6 pounds seized at Ports of Entry. With an estimated average wholesale price of \$28,174.39 per pound (\$67,074.91 dollars per gram) from 2012-2020, this amounts to an increase of roughly \$1.9 million in the wholesale value of U.S. heroin seizures associated with each 1% increase in the legal availability of cannabis in the United States.<sup>50</sup>

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<sup>49</sup> Annual border seizures of cocaine showed the lowest annual variability out of all of the illicit drugs analyzed, with an average annual seizure rate of 60,959 pounds and a standard deviation of 19,932 pounds (about 33%), reflecting significant fluctuations in seizures from 2004 to 2020.

<sup>50</sup> The UNODC reports that the average wholesale price of heroin from 2006 through 2016 was fairly constant, at around \$156.91 per gram. With a 37% increase in heroin seizures at the border, this amounts to a total increase in the annual value of U.S. seizures of \$72 million by 2020. See: “[https://dataunodc.un.org/drugs/heroin\\_and\\_cocaine\\_prices\\_in\\_eu\\_and\\_usa](https://dataunodc.un.org/drugs/heroin_and_cocaine_prices_in_eu_and_usa)”

**Table 4:** Effect of % U.S. Population with Access to Medical or Recreational Cannabis on Heroin Seizures in Mexico and at U.S.-Mexico Border

	Model 8: Mexican Heroin Eradication (ha)	Model 9: Mexican Heroin Seizures (kg)	Model 10: U.S. Border Patrol Heroin Seizures (lbs.)	Model 11: U.S. Port of Entry (POE) Heroin Seizures (lbs.)
Constant	15674.854 ( $<.001$ )	257.274 ( $<.001$ )	-33.999 (.671)	1611.641 (.009)
% of U.S. Population w/ access to either Recreational or Medical Cannabis	18.797 (.747) --	1.545 (.258) --	12.546 ( $<.001$ ) ***	56.567 ( $<.001$ ) ***
R squared	.005	.060	.730	.569
Number of cases	24	22	16	15

P values shown in parentheses. (\*) indicates statistical significance at the .05 threshold; (\*\*) indicates statistical significance at the .01 threshold; (\*\*\*) indicates statistical significance at the .001 threshold. (--) indicates that a result is not statistically significant.

In the case of methamphetamine, there is robust and statistically significant evidence for our hypotheses that methamphetamine seizures by the Mexican government (H3) and U.S. border authorities (H4) increased in relation to the percent of the U.S. population with access to legalized cannabis (See **Table 5**). Based on these results, we estimate that for each one percent increase in the U.S. population with access to legalized cannabis, there is an increase of 428 kg of methamphetamine seized by the Mexican government, roughly 332 pounds seized by the U.S. Border Patrol and nearly 2,832 pounds seized at Ports of Entry. With an estimated average U.S. wholesale price of \$5,000-10,000 per pound and a nearly 900% increase in methamphetamine seizures at the border 2012-2020, this amounts to an increase of around \$15.7 million in the wholesale value of U.S. methamphetamine seizures at the border for each 1% increase in the U.S. population with access to legal cannabis during the time-period of our analysis.<sup>51</sup>

<sup>51</sup> Estimates for U.S. wholesale prices for Mexican methamphetamine are based on the low end estimates available from the U.S. Department of Justice for 2007. Thus, for each 1% increase in U.S. availability of legalized cannabis, we estimate that the amount of Border Patrol seizures decreased in value by \$1.6 million in BP seizures and \$14.1 million in Port of Entry seizures. <https://www.justice.gov/archive/ndic/pubs26/26594/appendc.htm>



**Table 5:** Effect of % U.S. Population with Access to Medical or Recreational Cannabis on Methamphetamine Seizures in Mexico and at U.S.-Mexico Border

	Model 12: Mexican Meth Seizures (kg)	Model 13: U.S. Border Patrol Meth Seizures (lbs.)	Model 14: U.S. Port of Entry (POE) Meth Seizures (lbs.)
Constant	3241.317(.265)	-6872.269 (.040)	-81287.192 (.067)
% of U.S. Population w/ access to either Recreational or Medical Cannabis	428.424 (<.001) ***	332.368 (<.001) ***	2831.82235 (.007) *
R squared	.472	.808	.673
Number of cases	23	9	8

P values shown in parentheses. (\*) indicates statistical significance at the .05 threshold; (\*\*) indicates statistical significance at the .01 threshold; (\*\*\*) indicates statistical significance at the .001 threshold. (--) indicates that a result is not statistically significant.

In the case of fentanyl, it was not possible to test H3 due to a lack of data availability for Mexican government seizures, but we found partial support for H4 (See **Table 6**). First, it is important to note that the availability of U.S. border seizure a six-year period from 2015-2020, during which fentanyl seizures increased exponentially from just 50 pounds in 2015 to 4,776 pounds in 2020. We did not find statistically significant evidence that seizures by the U.S. Border Patrol between ports of entry were affected by the increased availability of cannabis for the U.S. population. However, we did find statistically significant evidence for the hypothesis that OFO seizures increased at ports of entry. More specifically, we identified a constant of 506.7 pounds of fentanyl seized by the U.S. Border Patrol and 3,850 pounds seized by OFO at Ports of Entry, with only a statistically significant increase of seizures by OFO, amounting to at least 101 pounds of fentanyl per 1% increase in the U.S. population with access to legalized cannabis. Based on these findings, we conservatively estimate that the value of increased fentanyl seizures at the U.S. border amounts to at least \$458,035 for each 1% increase in the population that is able to obtain cannabis legally in their state.<sup>52</sup> The results for fentanyl could be more robust if more or different data were available. For example, it could be helpful to run the same tests with the accumulation of more data after 2025, or utilize classified data on seizures at specific ports of entry along the southern border, rather than all U.S. border seizures. For now, our findings for H4 are mixed.

<sup>52</sup> UNODC estimates that fentanyl prices range between \$4,535 and \$40,823 per pound. This amounts to an increase of anywhere between \$458,035 to \$4,123,123 in the value of U.S. fentanyl seizures associated with each 1% increase in the legal availability in the United States.

**Table 6:** Effect of % U.S. Population with Access to Medical or Recreational Cannabis on Fentanyl Seizures at U.S.-Mexico Border

	Model 1: U.S. Border Patrol Fentanyl Seizures (lbs.)	Model 2: U.S. Port of Entry (POE) Fentanyl Seizures (lbs.)
Constant	-506.763 (.554)	-3850.544 (.063)
% of U.S. Population w/ access to either Recreational or Medical Cannabis	14.304 (.391) --	101.073 (.018) *
R squared	.297	.787
Number of cases	4	5

P values shown in parentheses. (\*) indicates statistical significance at the .05 threshold; (\*\*) indicates statistical significance at the .01 threshold; (\*\*\*) indicates statistical significance at the .001 threshold. (--) indicates that a result is not statistically significant.

In short, our overall findings provide strong, statistically significant evidence that Mexican government and U.S. border seizures of cannabis have declined substantially in relation to the amount of cannabis legally available to U.S. consumers. We also find mixed support for our hypothesis that Mexican government and U.S. border seizures of other drugs—specifically, heroin, methamphetamine, and POE seizures of fentanyl—have increased. We briefly analyze the implications of our findings below.

## ANALYSIS

Our findings suggest that there is a corresponding relationship between the increased availability of legal medical and recreational cannabis in the United States and the flows of illicit drugs seized in Mexico and interdicted along the U.S.-Mexico border. That is, we find statistically significant support for our hypotheses that U.S. state-level cannabis legalization is negatively correlated with cannabis seizures and flows. Indeed, our findings show that the share of the population with access to legalized cannabis accounts for over 50% of the variation in Mexican government cannabis eradication levels and illicit cannabis seizures at U.S. ports of entry. It also accounts for a third of the variation in the Mexican government’s domestic cannabis seizures and Border Patrol seizures between ports of entry.<sup>53</sup> As such, these

<sup>53</sup> We suspect that the greater impact of legalization on cannabis eradication and seizures — compared to Mexican government seizures and U.S. seizures between ports of entry — can be explained with consideration to differences in U.S. and Mexican law enforcement, on the one hand, and the different types of smuggling that occurs at and between border ports of entry.

findings are suggestive that cannabis legalization has reduced cannabis production in Mexico and flows of illicit cannabis from Mexico to the United States. At the same time, we find that cannabis legalization is positively correlated with Mexican and U.S. border authority seizures of heroin, methamphetamine, and fentanyl. Our models account for a substantial share of the variation in the production and seizure of these drugs (as much as 80% in the case of methamphetamine seizures by Border Patrol), indicating that the trend toward legalized cannabis is at least partially associated with increased production and flows across the border. These increased seizures – which have been widely reported in news outlets because of their contribution to the current public health crisis surrounding opioids and methamphetamines – suggests that DTOs have diversified their product lines in the course of cannabis legalization.<sup>54</sup>

However, there are obvious limitations to this study, and these conclusions require further consideration. The data analyzed here are proxies for the phenomena we wish we could more clearly and accurately observe and measure: 1) the size of the market for legal medical and recreational cannabis in the United States, and 2) the illicit production and distribution of cannabis from Mexico. On one hand, our proxy measure for the size of the US legal cannabis market is admittedly crude. Every state that has legalized medical or recreational cannabis has very specific rules regulating production facilities, operation of dispensaries, and acceptable consumption practices, which creates varying conditions that affect the number of people that may consume cannabis. Thus, trying to calculate the size of legal cannabis markets and actual patterns of consumption of legal cannabis across different states would require an enormous amount of effort, with potentially limited gains in analytical precision. The models we used – relying on the total share of population for each state – had very strong statistical robustness, even without a more precise measure of legal cannabis consumption. On the other hand, law enforcement data from both Mexico and the United States are often incomplete and frequently lack geographic and temporal specificity, making it impossible to test the effects of legalization solely on the U.S.-Mexico border. A lack of adequate data is a pervasive problem in the study of illicit markets, so the authors have made pains to try to minimize the gaps and inconsistencies in the data by drawing on different U.S. and Mexican sources, which yielded consistent and convincing results.

A second and somewhat related problem is that cannabis seizures could reflect a change in the priorities of Mexican and/or U.S. authorities. Interviews with an official at the U.S. State

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<sup>54</sup> Seth Robbins, “Synthetic Drugs Flood California Crossing of US-Mexico Border,” *Insight Crime*, November 26, 2021. Retrieved September 10, 2021, <https://insightcrime.org/news/synthetic-drugs-flood-california-crossing-of-us-mexico-border/>; Gabe Gutierrez and Al Henkel, “Fentanyl Seizures at U.S. Southern Border Rise Dramatically,” *NBC News*, June 29, 2021, <https://www.nbcnews.com/politics/immigration/fentanyl-seizures-u-s-southern-border-rise-dramatically-n1272676>; Associated Press, “Mexican cartels are turning to meth and fentanyl production,” December 21, 2021, Retrieved January 12, 2022. <https://www.npr.org/2021/12/21/1066163872/mexican-cartels-turning-to-meth-and-fentanyl-production>

Department, a Mexican security consultant, and a Mexican former-intelligence officer confirmed that there indeed has been less emphasis on anti-cannabis enforcement in Mexico in recent years, due to the greater focus on opioids and psychostimulants by both governments.<sup>55</sup> Still, even if U.S. and Mexican authorities partially or fully abandoned their efforts to eradicate and seize cannabis in Mexico, appears to at least partly reflect a response to changes in the market due to cannabis legalization.

Meanwhile, it seems unlikely that U.S. border inspection efforts to detect and seize cannabis have diminished. U.S. customs and border patrol processes cast a wide net in search of any and all contraband, and U.S. border enforcement measures have been greatly increasing for the past two decades.<sup>56</sup> The authors corroborated this during site visits to U.S. customs and border protection facilities in 2020 and 2021.<sup>57</sup> During these visits CBP supervisors and agents indicated that they are required to seek, confiscate and report any substances not permitted for entry to the United States, no matter the size or nature of those prohibited substances. Given these protocols, it seems unlikely that the decrease in seizures found in this study is a result of de-prioritization on the part of U.S. border authorities.

At the same time, the authors acknowledge that there is still a thriving black market for cannabis in the United States, as indicated by our interview with a California law enforcement official.<sup>58</sup> This is partly due to the fact that there are still prohibitions on cannabis consumption in some states that prevent roughly a third of the U.S. population from legally purchasing cannabis. However, according to the DEA, “black market marijuana production continues to grow in California, Colorado, Oregon, Washington, and other states that have legalized marijuana, creating an overall decline in prices for illicit marijuana as well.”<sup>59</sup> In these states, state and local regulations often limit the number and operation of dispensaries, and impose age-related restrictions, leaving a relatively large number of consumers who cannot legally obtain cannabis. Moreover, the DEA reports that state-level legalization actually appears to boost illicit domestic cannabis production because legalized production provides cover for illicit producers to operate with less scrutiny from law enforcement and effectively hide their

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<sup>55</sup> Interview with former-Mexican intelligence official via Zoom on July 19, 2021; Interview with current U.S. State Department official via Zoom on July 28, 2021; Interview with Mexican security consultant via Zoom on January 14, 2022.

<sup>56</sup> Peter Andreas, *Border Games: Policing the U.S.-Mexico Divide*, Cornell Press, 2009; David A. Shirk, “The Escalation of US-Mexico Border Enforcement,” in Andréanne Bissonnette and Élisabeth Vallet (eds.), *Borders and Border Walls: In-security, Symbolism, Vulnerabilities*, Routledge: New York, 2021.

<sup>57</sup> One of the authors asked specific questions about inspection practices and protocols at a site visit to the San Ysidro port of entry to meet with CBP supervisor on January 8, 2020, and during a routine inspection by CBP agents at the commercial facility of the Otay Mesa Port of Entry on October 31, 2021.

<sup>58</sup> Telephone interview with state prosecutor for California Department of Justice on January 10, 2022.

<sup>59</sup> Drug Enforcement Agency, *National Drug Threat Assessment*, U.S. Department of Justice, March 2021, p. 50.

operations in plain sight.<sup>60</sup> Thus, another part of the explanation for declining cannabis seizures in Mexico and the U.S.-Mexico border is likely that illicit production has actually *increased* within the United States. While this does not necessarily contradict the findings of this study, it does tell a much more complicated story.

Ultimately, the results of this study show that growing availability of legalized cannabis in the United States is significantly correlated to the reduced yield of eradication and seizures in Mexico and along the U.S. border. Thus, whether it is because of reduced production and flows, reduced seizure and interdiction efforts by authorities, or increased competition from illicit domestic cannabis production within the United States, there is a real, observable, and statistically significant decline in Mexican and U.S. seizures that closely corresponds to U.S. state-level, cannabis legalization efforts. At the same time, increased availability of legal cannabis appears closely correlated to increases in opioids and psychostimulants, which appears to support the theory that drug trafficking organizations have diversified into new product areas to compensate for lost market share. Further study is arguably needed to corroborate these findings, but these initial results are strongly suggestive that cannabis legalization has been accompanied by measurable and statistically significant changes in DTO behavior.

On a final note, our findings also suggest that there may be differences between the types of smugglers that move cannabis through ports of entry, and those that smuggle cannabis between ports of entry. That is, legalization appears to have had a much larger effect in reducing cannabis smuggling at ports of entry, rather than between. This may tell us something important about the type of smuggling operations that operate either at or between ports of entry. On the one hand, because of the logistical challenges of moving cannabis in the areas between ports of entry – which tend to be isolated and dangerous crossing areas – these are used primarily by professional “wholesale” smuggling organizations.<sup>61</sup> On the other hand, individuals illegally transporting cannabis for personal consumption or small-time dealing may be historically more likely to smuggle cannabis through ports of entry. If so, when legal cannabis can be readily obtained in the United States, such low-level smugglers might be much less inclined to assume the risk of importing illicit Mexican cannabis. In either case, additional research on the differences between smuggling operations at and between ports of

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<sup>60</sup> The DEA cites the example of the Hemp Farming Act of 2018 (H.R. 5485), which legalized low-THC hemp production, creating opportunities for illicit producers to hide illegal, high-THC cannabis plants among legitimate hemp producing operations. Drug Enforcement Agency, *National Drug Threat Assessment*, U.S. Department of Justice, March 2021, p. 49.

<sup>61</sup> It is also possible that such organizations are experiencing fewer seizures because they are better able to avoid detection by U.S. authorities, were never particularly reliant on cannabis smuggling in these areas, and/or are less sensitive to reduced U.S. demand.

entry would help to gain a better understanding of the nature of cross-border smuggling networks.

## Conclusion

The results of this paper provide a novel approach to understanding the impact of cannabis legalization on drug production and trafficking. According to our findings, as medical and recreational cannabis has been legalized in a growing number of U.S. states, Mexican authorities have seized decreasing amounts of cannabis domestically and U.S. authorities have seized correspondingly smaller amounts of cannabis trafficking at and between ports of entry. This trend suggests that there has been a major shift in the drug war, due largely to U.S. state-level reforms that have moved away from criminalizing and prohibiting cannabis, the most widely used psychotropic substance in the United States. In this sense, to the extent that cannabis legalization advocates sought to reduce the cannabis revenues of international drug trafficking organizations, these efforts appear to have been successful.

However, criminal organizations involved in drug trafficking have proved themselves to be nimble and innovative, with undesirable consequences for U.S. counter-drug efforts. They have responded by ramping up the illicit production and flows of other drugs – such as heroin, and synthetic opioids and psychostimulants – contributing to an epidemic that resulted in 100,000 annual U.S. overdose deaths in 2021. Certainly, cannabis legalization was not the sole factor contributing to this devastating public health crisis. Yet, this study strongly suggests that the negative impact of cannabis legalization on the illicit revenues of criminal organizations has led to drug traffickers seek out alternative sources of income.

This is an important and relevant finding as policy makers weigh the next steps in drug policy reform. The legalization of more potent drugs – like opioids and psychostimulants – for medical and/or recreational use may similarly aid in reducing these revenue streams for organized crime groups in countries like Mexico. However, doing so will almost certainly lead those same criminal organizations to seek alternative sources of income that are similarly or more problematic, including extortion, kidnapping, industrial theft, and other predatory crimes. In this sense, any drug legalization strategy should be linked to other policy initiatives that bolster the capabilities of law enforcement to respond effectively to new and different challenges.

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