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RESEARCH

Legalising Drugs Prudently: The Importance of Incentives and Values

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Various jurisdictions are legalising not just cannabis possession and use, but also large-scale commercial production, distribution and sale. Potential problems with that form of legalization raise questions about how best to implement a legalisation. This paper analyses the interests of the suppliers and regulators to help lawmakers and voters decide what over-arching architecture for legalisation might be prudent. In particular, it suggests banning for-profit companies and/or vesting regulatory authority in an agency that views its mission as protecting heavy users from suppliers' excesses, rather than serving the interests of the cannabis industry.

Keywords: Cannabis; marijuana; drug policy; legalisation; decriminalisation; policy analysis

Introduction

Uruguay, Canada, and many US states have legalized cannabis for recreational not just medical use. Legalization can take many forms (Caulkins et al. 2015; Caulkins & Kilmer 2016). Vermont and Washington DC limited it to possession, use, home production, and gifting. Spain and Belgium tolerate cannabis clubs that allow members to pool home-growing privileges (Decorte et al. 2017). Uruguay allows that and also government-controlled sale through pharmacies (Cerdá & Kilmer 2017). Canada and many US states go further, allowing a (regulated) commercial industry to produce and market cannabis for profit. The American public supports some form of reform. As Dehnam (2019) reports, by 2016 more than 60% of respondents answered 'yes' when asked, 'Do you think the *use* of marijuana should be made legal or not?' (emphasis added). However, bolder changes, particularly the commercial model, receive less support. When asked to choose between prohibition, legalizing medical marijuana, decriminalization, and a commercial model, only 37% opt for the last (Mason-Dixon 2019). (Here and throughout we use the term 'marijuana' when that was the word used by a survey whose results we are reporting).

A considerable literature discusses the pros and cons of various regulatory options (e.g., Room et al. 2010; Kilmer et al. 2013; MacCoun 2013; Rolles & Murkin 2013; Kilmer 2014; Pacula et al. 2014; Fijnaut & De Ruyver 2015). Instead of asking what regulations would be ideal, e.g., for an omnipotent social planner, this paper asks what supply and regulatory architectures are appropriate, given the realities of political processes and economic incentives in a modern democracy. It articulates four foundational observations about drug demand, industry incentives, and power, and then proceeds to recommendations that flow from those observations.

The discussion focuses on cannabis, but some ideas might carry over to other substances. Data concerning use are mostly drawn from the US household surveys, which are well-run, large, and freely available; most analysis herein can be replicated using the online analysis tools available at <https://www.icpsr.umich.edu/icpsrweb/ICPSR/series/64>.

Foundational Premise #1: Heavy users are prone to abuse cannabis

Most people who try cannabis happily use it without developing dependence or suffering any adverse consequences, but a distressing proportion of those who use on an ongoing basis do. A common source for estimates of the lifetime risk of cannabis dependence is Anthony et al.'s (1994) analysis of 1990–1992 data from the National Comorbidity Study. They found that 4.2% of respondents reported having had enough

problems with cannabis use to meet the criteria for dependence at some point in their lives to date and 46.3% reported having ever tried cannabis even once. Dividing 4.2% by 46.3% suggests that 9.1% of those who ever tried cannabis went on to develop dependence by the time of the interview. The proportion among younger initiates was 15.3%.

Similar rates apply in other Western countries. Fergusson and Horwood (2000) report that 69% of 1,265 children in the Christchurch cohort study had tried cannabis by age 21 and 9% had already developed cannabis dependence, for a $9/69 = 13\%$ risk of dependence by age 21. By age 25, that proportion had grown to 16% (Boden et al. 2006). In an Australian sample, 12% were dependent at the time of data collection (mean age 21); lifetime rates would be higher to the extent that some who had been dependent no longer were so and others may not yet have progressed to dependence (Coffey et al. 2002).

For various reasons, capture rates may be higher now, notably because of the sharp increase in cannabis potency (ElSohly et al. 2016; Chandra et al. 2019), but suppose for the moment that in the future 9–15% of those who try cannabis will become dependent. That would still not mean that *using* cannabis on an ongoing basis creates little risk of dependence because many people who *try* cannabis only use it a handful of times, and effectively all of the dependence risk falls on those who use it more than minimally.

The tobacco literature often only considers someone to have been a smoker if they have smoked at least 100 cigarettes. Those who have smoked fewer than 100 cigarettes are seen as not being relevant for understanding health harms (or industry revenue). The same principle could be applied to cannabis. US household surveys no longer ask about the total number of use occasions, from initiation to date, but older surveys did. They show that about one-third of those who admit trying cannabis report having used it 100 or more times in their lives. Since almost no one who uses less often develops dependence, we should triple the 9–15% figures to 27–45% to approximate the lifetime risk of developing dependence for someone who uses cannabis 100 or more times.

Furthermore, 'dependence' was the more severe of two levels of substance use disorder (SUD) distinguished before the newer Diagnostic and Statistical Manual of Mental Disorders (DSM) merged them into the broader category of SUD. The other form was labelled 'abuse'. About 1.5 times as many people met the criteria for "abuse or dependence" as met the stricter criteria for dependence (4.0 million vs. 2.6 million according to the 2017 US survey). Hence, the lifetime risk that heavy cannabis use will lead to abuse or dependence is quite high.

Liberalising cannabis policies can be expected to increase the prevalence of use and, to an even greater extent, the intensity of use for various reasons (Kleiman 1992, 2015; Kilmer et al. 2010; Caulkins et al. 2015), including because legalization pushes prices down (Smart et al. 2017) and lower prices induce greater use (Gallett 2014). For example, Burgard et al. (2019) find that the load of cannabis metabolites in wastewater in one city in Washington State increased by 9% per quarter after legalization. Likewise, Hasin et al. (2016, 2017) estimate based on NESARC-III data that the 12-month and lifetime rates of CUD increased faster in states that passed medical marijuana laws than in those that did not (Hasin et al. 2017).

Foundational Premise #2: Cannabis abuse can be harmful

Systematic reviews identify multiple health-harms associated with heavy and prolonged cannabis use (Volkow et al. 2014; Hall 2015; NASEM 2017) above and beyond the fact that cannabis smoke contains carcinogens at levels comparable to that of tobacco smoke (Moir et al. 2007). Psychotic episodes are a particular concern (Di Forti et al. 2015, 2019).

Nonetheless, some question whether society should worry about legalisation increasing cannabis abuse and dependence. After all, caffeine also induces tolerance, withdrawal and other hallmarks of substance use disorder, and the DSM has labelled caffeine-use disorder as a condition meriting study (Meredith et al. 2013). Yet few think caffeine abuse rises to the level of being a societal problem.

Comparisons with alcohol are common. They usually conclude that alcohol is more dangerous, which it certainly is if one focuses on death risk (Lachenmeier & Rehm 2015), although some conclude cannabis is more harmful for other outcomes, such as impairment of memory and other cognitive functions in youth (e.g., Morin et al. 2018). Furthermore, alcohol regulation is far from perfect inasmuch as societal costs of alcohol abuse are enormous (Babor et al. 2003), so the presumption that it is wise to apply regulatory models for alcohol to cannabis has been challenged (Hall 2017).

Here we briefly look at the relative rates at which past-month users of alcohol and cannabis self-report various problems with that use, beginning with abuse or dependence. In 2013, 20 million Americans self-reported past-month marijuana use and 4.1 million self-reported enough problems with that use to meet DSM-IV clinical definitions for marijuana abuse or dependence. (We use the term "marijuana" not "cannabis"

because that is how the survey question was worded). Based on parallel questions in the same survey, the corresponding figures for alcohol were 136 million past-month users and 18.9 million suffering alcohol abuse or dependence.

All of those figures may be under-estimates because they are based on self-report, but the ratio of ratios is worth considering. The ratio of marijuana abuse and dependence to current use ($4.1/20 = 0.21$) is about 60% higher than is the corresponding ratio for alcohol ($18.9/136 = 0.13$). So at least in the United States in 2013, marijuana appeared to generate more abuse and dependence per user than did alcohol. For the more serious diagnosis of dependence, marijuana produced 140% more victims per user, since the ratios were 0.14 for marijuana vs. 0.06 for alcohol.

SAMHSA imputes abuse and dependence from answers to about a dozen questions concerning specific problems. There is a discernible pattern to the responses (Caulkins 2016). Cannabis looks the worst, relative to alcohol, on questions about life functioning. For example, the marijuana ratio was 2.8 times higher than the alcohol ratio for the question:

Sometimes people who drink alcohol [use marijuana or hashish] have serious problems at home, work or school—such as: Neglecting their children; Missing work or school; Doing a poor job at work or school; Losing a job or dropping out of school. During the past 12 months, did drinking alcohol [using marijuana or hashish] cause you to have serious problems like this either at home, work, or school?

Cannabis also generates greater rates of people saying they tried to limit or cut down their use, but failed. The only commonly answered question for which alcohol's ratio was larger was 'Did you regularly drink alcohol and then do something where being drunk might have put you in physical danger?' (0.08 for alcohol vs. 0.07 for cannabis).

So not only is cannabis abuse and dependence fairly common among those who use cannabis regularly, cannabis users also report that it interferes with life functioning at rates per user that are as great or greater than those for alcohol. Legalisation could make cannabis use look relatively safer if it leads to a flood of occasional users who experience no problems, but in the long run it could just as easily go the other way, with lower prices, higher potency, and greater advertising, facilitating escalation to problematic patterns of use.

Foundational Premise #3: The cannabis industry is prone to abuse heavy users

Heavy cannabis use may be a public health concern, but it is a profit opportunity for industry. Indeed, it is not just a profit opportunity, it is *the only* important profit opportunity. Simple arithmetic shows that controlled, occasional use by adults accounts for only a tiny sliver of cannabis consumption.

To be specific, consider consumption by those who:

1. Are 21 and over (the legal age in US states that have legalized),
2. Do not suffer substance abuse or dependence (with any intoxicant, not just cannabis), and
3. Use on fewer than 10 days in the past month (as a proxy for use only on weekends)

The US household survey does not ask about quantities used; people have difficulty answering questions about grams of cannabis or milligrams of THC. The best survey measure for present purposes is the number of days of use.

Respondents to the 2013 survey report 287 million days of cannabis use in the past month, with 229 million (80%) coming from respondents who are 21 or older. 137 million (60%) of those days come from people who do not self-report enough problems to merit a diagnosis of substance abuse or dependence. Hence, fewer than half of use days ($80\% * 60\% = 48\%$) are by adults who are not identified as having abuse or dependence problems. (The true proportion may be lower since many people are in denial about the problems created by their addiction).

Most of that comes from frequent users. Those consuming fewer than 10 days per month report only 13 million past-month days of use, or 4.7% of the 287 million total. Since frequent users tend to use a greater amount per day of use, their share of consumption is probably more like 3%.

Two things reconcile this with the oft-cited fact that most cannabis users suffer no adverse consequences. First, not all daily users are harmed by that use. Second, one heavy user consumes a lot more than does one occasional user (Burns et al. 2013). So the typical user is very different from the person involved in the

typical episode of use, as a little more arithmetic shows. (This time we include people who report use in the past year but not the past month).

In the 2013 survey, 53.4% of past-year users reported using on 52 or fewer occasions in the past year. That means the median or typical cannabis user consumes about once a week.

Suppose though we asked about the typical or median day of use. Imagine creating a table with a row for each frequency of use, in order. Fill in each row with the number of people using that often times the number of days of use. For example, the row for the 2 million people who report using twice in the last 12 months contains the number 4 million, since those 2 million people produced 4 million days of use. The survey respondents collectively reported 3.9 billion days of use, so we can march down the ordered table until we reach the $3.9/2 = 1.95$ billionth day of use. We have to go a long way down the table because the 53.4% of past-year users who consume weekly or less often account for just 7% of the days of use. Indeed, we have to go all the way down to the row for people who report using 312 days in the last year—or about 26 days per month.

We can do a similar exercise with grams consumed. RAND conducted web surveys in seven European countries and in the state of Washington that showed users pictures of piles of cannabis alongside everyday objects like coins, paper clips, and credit cards (Kilmer et al. 2013; van Laar et al. 2013). These prompts helped respondents answer what otherwise would be difficult questions about the weight of cannabis consumed. The key finding is that people who report using daily or near-daily average about 1.6 grams per day of use, and that is about two to three times as much per use day as for the occasional users (c.f., Caulkins et al. 2019). Light et al. (2014) obtained similar results in Colorado.

Folding that information in with the survey data on number of days used suggests that the 13% of past-year users who report using every day in the last month account for 45% of the days of use and more than 50% of the grams consumed. Hence, the typical gram of marijuana is used by someone who reports using every single day in the past month.

Since 1.6 grams is enough for 3–4 joints and the effects of each joint can last for several hours, the following striking statement may literally be true: The majority of cannabis in the U.S. is consumed by people who spend the majority of their waking hours under its influence.

In sum, we have three contrasting descriptions of typical use, all simultaneously true.

- The typical marijuana user consumes once a week or less often
- The typical day of marijuana use involves someone who uses nearly daily
- The typical gram of marijuana is used by a daily user who spends the majority of his or her waking hours under the influence

Cannabis companies cannot expand sales significantly by selling to occasional users; their only pathway to major sales expansion is inducing more people to use daily or near daily. Hence, cannabis companies' profit interests are at odds with the welfare of their customers, and of society more generally.

The next question is whose side regulators will take.

Foundational Premise #4: Regulators are prone to neglect the needs of heavy users

A regulatory agency could focus on any of three interests.

- The regulated companies
- Typical consumers
- The minority of consumers who use heavily and are harmed by that use

The first two have political clout; the third does not. In an ideal world public agencies would be defenders of the weak; in the real world, clout often wins out.

The idea that regulated industries exercise clout to bend rules to their benefit is not new (Stigler 1971), and there is no reason to expect the cannabis industry to be any different. The cannabis advocacy movement has been morphing into the cannabis industry lobby (Brookings 2015), with former House speaker John Boehner leading the charge in the US as head of the National Cannabis Roundtable. As Melin and Kochkodin (2019) report, 'If [Boehner's] former colleagues in Congress help make marijuana federally legal, he'd be eligible to receive Canopy shares worth about \$16 million as of Thursday's market close in exchange for his stake in Acreage.' The industry has gotten cosy with powerful former politicians in Canada as well.

As Melin and Kochkodin also note, former prime minister Brian Mulroney is another of Acreage's directors, and his daughter Caroline oversaw the cannabis industry in Ontario as the province's attorney general in 2018–2019.

The brazenness of the cannabis industry can be striking. Oregon's Cannabis Tax Act proposition of 2012 (which almost passed) would have charged a newly constituted Oregon Cannabis Commission with responsibility for overseeing the industry. The proposition stipulated that five of the seven commissioners 'shall be elected at large by the [licensed] growers and processors.' In other words, regulatory capture would have been built in.

That plan didn't pass, but reality under the 2014 proposition which did pass is also troubling. At one point, one-third of the Oregon Liquor Control Commission's cannabis rules advisory committee hailed from industry (four entrepreneurs on the production side and the founder of a cannabis testing company, as well as the chief petitioner for the proposition). Needless to say, the FDA does not allow pharmaceutical representatives to play a similar role.

It would also be surprising if a regulatory bureaucracy didn't pay attention to the interests of typical consumers in a democracy. Median voters hold power in elections, and we'd expect median users to be on the minds of cannabis regulators. As noted above, the median user consumes only weekly. Most such people are fully in command of their consumption and can reasonably be treated the way government agencies treat any other consumer—as competent adults who can look after their own interests.

Controlled users want many conveniently-located stores offering a wide variety of products, clear and accurate labelling, and low prices—which implies both low taxes and a minimum of burdensome regulations that drive up production costs. That list of desiderata overlaps with the industry's wish list. Indeed, the cannabis industry can, like the alcohol and gun industries, call on a cadre of happy customers whenever its interests are threatened by the prospect of unfavourable laws or regulations.

By contrast, the public health interest lies in protecting people suffering from dependent and abusive patterns of consumption, but there are relatively few such people. The 4.0 million people who report enough problems on the 2017 survey to meet DSM criteria for marijuana abuse or dependence are outnumbered almost four to one by the 15.3 million adults who use 50 or fewer times per year. They also tend to be somewhat less educated and poorer, which matters inasmuch as political and bureaucratic institutions respond to money, not just headcounts.

It is no surprise that industry wants problem users to consume more or that their doctors generally want them to consume less, but heavy users' accountants also ought to weigh in on the side of moderation. At the time of the 2013 survey, they spent about 4.5% of their household income on cannabis, a much greater proportion than the 0.25% share among controlled, adult users. (That holds even after excluding those who report reselling some of what they bought, people who understandably would be spending heavily).

In sum, political pressures may nudge regulators to serve the industry (which lobbies and makes campaign donations) and modal users (who are numerous, relatively affluent, and unharmed by their use), not the circumstances surrounding the typical gram of use. Typical use involves daily users who spend a lot of money on—and the majority of their waking hours under the influence of—a performance-degrading drug.

Hence, if the public, and the lawmakers they elect, want legalisation to be conducted in a way that protects the public interest, the overall architecture within which producers and regulators operate will have to be slanted toward achieving that end.

Conclusion: Legalisation ought to stack the deck toward protecting heavy users

Prudent legalisation plans should recognize four premises:

- Heavy users are prone to abuse cannabis,
- Heavy cannabis use tends to be harmful, as those users themselves report,
- Industry is prone to abuse heavy users, and
- Regulators are prone to neglect public health interests.

These four premises imply that legislation enacting legalisation should stack the deck in favour of protecting public health, most notably the welfare of heavy users who lose control over their consumption. At least two basic strategies are available for achieving this.

The first is to place regulatory control in the hands of a public-health minded agency that views its job as protecting consumers from being abused by industry. Some agencies are willing to be tough on the

industries they regulate. Notable examples in the US include the FDA vis-à-vis the tobacco industry and the EPA vis-à-vis the coal industry. However, that is not the norm. Even leaving aside regulatory capture (the Interstate Commerce Commission being the textbook example), many agencies construe their role as being neutral toward industry, ensuring that companies follow the rules but not worrying whether the rules are protecting the public interest. Many American alcohol beverage control agencies operate in this fashion. Other agencies are explicitly dual mission, such as the Federal Aviation Administration being responsible for both airline safety and promoting air travel. Colorado placed regulatory control in its Department of Revenue, which has a culture of viewing tax collection as a central function; taxes depend on revenue, which for cannabis depend on sales to heavy users.

For those who believe good government is stronger than industry lobbying and political pressures, simply choosing an appropriate regulatory body may be sufficient. Others might want additional protections.

One option is keeping for-profit industry out of the picture. Rolles and Murkin (2013) warn against the two extremes of prohibition and free market supply. They argue that some middle ground approach, such as a government monopoly over production and distribution, would be safer for substances, like cannabis, that are prone to harmful use. That is the path Uruguay has adopted (Walsh & Ramsey 2015).

A government monopoly might not fit with a free-market American culture, particularly at this time when hostility toward government is so high, but as Caulkins et al. (2015) note, there are many ways to provide for legal supply besides government monopoly and commercial legalisation. One alternative would maintain all of the regulations that one sees in Canada or Colorado, but also limit licenses to non-profits or public benefit-corporations (Caulkins 2014).

Note that non-profit does not mean no tax revenue. Non-profits do not pay corporate income taxes, but there would still be sales and excise taxes, as well as income taxes on employees' earnings. There is also a history of embedding mission into non-profits' charters. States could refuse to issue a license to any organisation whose charter does not build in a voice on its governing board for the public health and child welfare communities, or for others likely to be harmed if the organisation embarked on a single-minded pursuit of profits.

Public benefit corporations are for-profit, but they have pledged to manage their organisation in ways that advance a triple bottom line of people, planet, and profits, rather than sacrificing all to maximise profits.

Softening the incentive for promoting sales to heavy users may be particularly valuable for control of advertising in the US, where First Amendment speech protections extend to commercial free speech. If the suppliers do not want to promote sales to consumers who harm themselves via that consumption, then it does not matter whether regulators can block such promotion.

Coda

This essay was motivated by cannabis legalisation, but the foundational premises probably hold for other drugs. If we restate them in more general form, they seem uncontroversial:

1. Heavy users are prone to abuse dependence-inducing intoxicants.
2. Drug abuse is harmful.
3. Industry prioritises profit over protecting customers, and recognises that most sales and profits flow from the minority of people who consume heavily (e.g., the “whales” in the gambling industry).
4. Regulatory bodies are prone to industry capture, and their political overlords are more responsive to large numbers of affluent voters than to small numbers of poor ones.

Hence, there is a risk that some heavy users will be harmed by their abuse, exploited by industry, and neglected by regulators. To minimise that risk, it is prudent to slant the basic design or ‘architecture’ of legalisation in ways that resist these tendencies.

Indeed, the argument is not fundamentally about drugs per se, but about goods and services that tend to defeat the heuristic decision-making capabilities of the average human (Kahneman 2011). Gambling might also belong in that category (Sulkunen et al. 2018). For those goods and services, a paternalistic government may want to structure laws and regulatory processes to ensure that consumers are protected from exploitation by industry. Cannabis is such a good. Many other dependence-inducing intoxicants probably are too.

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Competing Interests

The author has no competing interests to declare.

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