Commentaries on Caulkins *et al.* (2012)

THE LONG AND WINDING ROAD TO CANNABIS LEGALIZATION

Although some countries have quasi-legalized cannabis use (the Netherlands), made cannabis available for medical purposes (California currently has more than 1000 medical marijuana shops) or allowed the growing of a small number of cannabis plants for personal use (Australia), in most countries (the Netherlands included) cannabis supply, distribution and use is prohibited [1]. Nevertheless, cannabis is the most popular illicit drug. In 2009, between 2.8% and 4.5% of the world population aged 15–64 years, corresponding to between 125 and 203 million people, had used cannabis at least once in the past year [2]. Clearly, prohibition does not work and the debate on legalization of cannabis gains momentum. This debate is often emotional, with strong views of both proponents and opponents. Those who are in favour of legalization tend to ignore the negative health effects of cannabis use. Those who are against legalization ignore the fact that legal substances such as alcohol and tobacco also have bad health effects [3].

Caulkins *et al.* [4] provide an interesting contribution to the legalization debate. Rather than discussing the pros and cons of legalization they discuss legalization design choices: the level of taxes and whether taxes should depend on cannabinoid levels, rules on home cultivation, advertising restrictions and design adjustments over time.

The use of cannabis is widespread, but many individuals use for only a short period. Others use it on a regular basis, but are still recreational users for whom cannabis use is comparable to drinking a beer every now and then. It is difficult to predict what will happen if such an unprecedented policy change as legalization of cannabis is introduced. Legalization will affect cannabis use mainly—although not exclusively—through the change in price, which in itself will depend upon one of the legalization design choices, the level of taxes. When considering price effects, the dynamics of cannabis use are important. Usually, some youngsters start using cannabis between ages 15 and 25 years. If they have not done so before age 25 they are very unlikely to do this later in life. From an Amsterdam study it appears that about half of youngsters start using cannabis, but about 20% of them use cannabis for less than 1 year. Median duration of use is about 10 years, while about 30% of users persist [5].

There is hardly any study on the relationship between cannabis price and dynamics in use. A study based on

Australian data shows that a lower price lowers the age of initiation but has no effect on the duration of cannabis use [6]. It is also not immediately clear how the intensity of cannabis use will change. It could be that a price drop affects only the extensive margin, i.e. attracts casual users without increasing frequent use. It could also be that a price reduction does not affect overall use but does affect frequent use. The effects of a cannabis price drop are likely to be strongest for youngsters. For the purpose of illustration, Fig. 1 shows the association between cannabis price and cannabis use of American youngsters.

In the period 1991–1997 in the United States there was a drop in real cannabis prices of almost 60%, while between 1997 and 2007 cannabis price increased by 150%. These price fluctuations were accompanied by changes in ever use between 30 and 45% and changes in last 30 days use between 15 and 25%. Although the plots in Fig. 1 cannot be interpreted as causal, they suggest
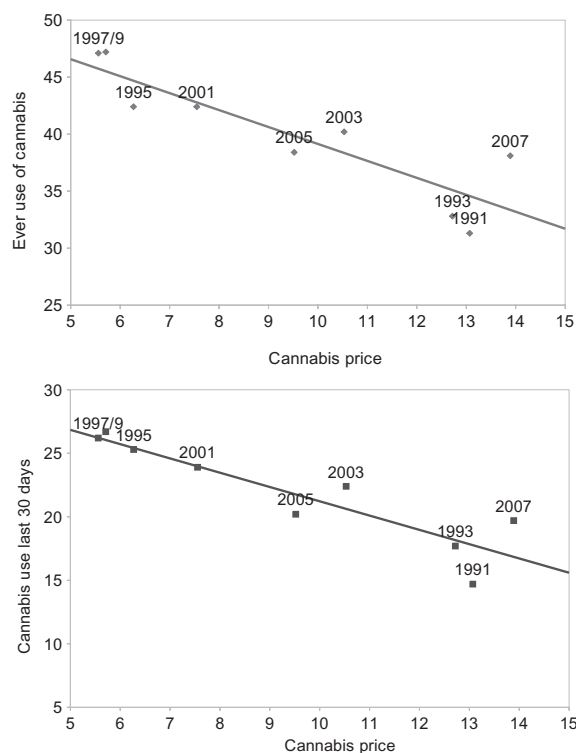

Figure 1 The association between cannabis prices and cannabis use of youngsters; United States 1991–2007. (a) Ever cannabis use (%); (b) cannabis use last 30 days (%). Source: Cannabis use among 9th to 12th graders: Youth Risk Behavior Survey; median cannabis price in constant 2007 dollars per gram for small quantities (less than 10 g) [14]

that both intensive and extensive margins of cannabis use will be affected by legalization. Legalization might cause a drop in cannabis price of 75% [7]. Although this is substantial, it is within the range of actual price changes in the United States in past decades. The price drop caused by legalization would mean no more than a return to mid-1990s prices.

There is a large epidemiological literature on adverse health effects [8] and recent evidence suggests that there is a negative causal effect of cannabis use on health [9,10], but in the grand scheme of risky health behaviours cannabis use has a modest contribution [11]. All the linkages to assess the health effects of legalization have one element in common: uncertainty. Therefore, opinions of individuals who have had personal experience with cannabis use may be helpful. From an analysis of Australian data it appears that past cannabis users are more in favour of legalization than non-users. Apparently, for individuals with personal experience the pros of legalization are more important than the cons [12].

The legalization design choices Caulkins *et al.* [4] discuss are important. It seems to me that taxes should be sufficiently high to discourage cannabis use and sufficiently low to drive out illegal supply. Furthermore, taxes should depend on cannabinoid levels, home cultivation should be allowed under restrictions and advertising should be banned. The nature of the legalization debate can be summarized in one word: ignorance. Therefore, the most important design choice of legalization is the flexibility to adjustment, allowing for learning by doing. There are many relationships about which researchers are uncertain, debating whether they are causal or mere associations. As long as nowhere in the world is cannabis legalized it is difficult to gain any clear idea about the consequences of legalization [13]. Removing the veil of ignorance that surrounds the legalization debate requires a great deal of additional research effort. However, researchers rarely agree, and even if they agree it is doubtful whether that would convince politicians to proceed with cannabis legalization. Conducting further research and hoping that an evidence-based cannabis policy will emerge is wishful thinking. Rather than muddling through for several decades it would be wise to start moving on the long and winding road to cannabis legalization. This would make life more comfortable for cannabis users, remove criminal organizations from the scene, allow for the possibility of quality control, provide governments with tax revenues and make it possible for researchers to collect empirical evidence. In short, it is time for politicians to walk down the legalization road 'to boldly go where no man has gone before'.

Declaration of interests

None.

Keywords Adverse health effects, cannabis use, design choice, illegal supply, legalization, price effects.

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ADDITIONAL CONSIDERATIONS

The authors bring a welcome degree of rigor to this helpful effort to analyze recent cannabis legalization efforts in California [1], especially considering the relative paucity of scientific data.

Public support for making cannabis legal has shifted dramatically in the last two decades, particularly in the

last few years. The gap in support, as measured by Gallup in regular polling, narrowed from 24 points (36 in favor; 60 opposed) in 2005 to a remarkable four points (46 versus 50) in 2010 [2]. The majority of liberals, 18–29-year-olds, voters in western states, Democrats, Independents, moderates and men now support legalizing cannabis.

If this trend persists, which seems likely, a majority of Americans will soon support making cannabis legal. It is therefore incumbent upon public policy experts and public health advocates to think critically about optimal policies for regulating cannabis.

Our organization advised the drafting of California Assemblyman Ammiano's far-reaching bills introduced in 2009 and 2011 to fully legalize cannabis (AB 390 and AB 2254), and we advocated for the passage of both proposals. Although AB 390 never came up for a floor vote, it was the first cannabis legalization bill to win a committee vote in a state legislature.

Conversely, Proposition 19 nearly became law, winning 46.5% of the vote [3]—and its approach to making cannabis legal merits greater scrutiny and clarification.

This voter initiative represented a substantially narrower proposal than the Ammiano bill. Proposition 19 eliminated penalties for possession of up to one ounce by adults 21 and older, permitted cultivation by adults for personal use within a private 25-square-foot parcel and delegated all authority to cities and counties rather than mandating a state-wide system.

Not widely recognized outside of California, this 'local control' provision would have ensured a slow and modest implementation of commercial cannabis sales. Most localities probably would not have permitted sales of recreational cannabis, at least at the outset. It is worth noting that 15 years since Californians legalized medical marijuana by passing Proposition 215, only 60 cities and counties have formally regulated cannabis dispensaries, while 276 have blocked their establishment or banned them outright [4]. Even if Proposition 19 had won, commercial sales would have been far more limited than most people assumed.

Ballot initiatives to legally regulate cannabis will probably appear on the Colorado [5] and Washington [6] ballots in 2012. Both are far more tightly drafted than the California proposals, reflecting public health concerns as well as the desire to reassure ambivalent voters who favor legalization in principle but are wary of how it will work in practice. The Washington initiative, for instance, does not allow for home cultivation of cannabis in any amount.

While we agree with much of what the authors say regarding the potential risks of increased cannabis consumption, we question the authors' choice to disregard 'subjective benefits derived from intoxication (pleasure)' and other potential benefits.

Millions of Americans use cannabis not just 'for fun' but because they find it useful for many of the same reasons that people drink alcohol or take pharmaceutical drugs. There is a growing body of evidence that moderate cannabis use not only poses minimal harms but provides substantial health benefits. These include anti-inflammatory, anti-anxiety and notably anti-cancer properties documented in many government-supported studies [7–9]. The *Lancet*, Britain's leading medical journal, observed in 2003 that 'we are only just beginning to appreciate the huge therapeutic potential of this family of compounds' [10]. Given the science that already exists, implicitly assuming that only harms are associated with increased consumption of cannabis does not seem right.

Any model for legally regulating cannabis production and distribution must be compared not just with an ideal scenario but with the realities of contemporary cannabis prohibition. While the authors correctly identify tremendous uncertainties associated with alternatives to present-day prohibitions, they are insufficiently attentive to the probable consequences of persisting with the *status quo*—mass arrests for low-level possession, staggering race-based imbalances in cannabis law enforcement, out-of-control youth access, unregulated content and the crime, violence and corruption endemic to an underground economy of this size.

The original criminalization of cannabis was grounded not in reasoned analysis but in racial prejudice and politics [11]. We hope that the authors' fine analysis will inform current and future thinking regarding how best to regulate legal cannabis. It would be a shame, however, if the valid concerns they raise undermine momentum for reform by distracting attention from the very real and immediate failures and harms of current policies. Legalizing cannabis may be risky, but its benefits almost certainly outweigh its potential harms.

Declarations of interest

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PRACTICAL EXPERIENCE WITH LEGALIZED CANNABIS

Caulkins *et al.* astutely identify the major policy challenges confronting cannabis legalization, in particular the likelihood of dramatic price declines, the concomitant risk of increased consumption and abuse, and the difficulty of preventing diversion to the black market if significant taxes or other restrictions are imposed [1].

The authors' prediction of dramatic cost reductions is confirmed by current experience in Israel, where medical cannabis gardens have been established under the supervision of the Health Ministry. The Israeli program produces high-grade medical cannabis outdoors at a cost of $.79/g ($22 per ounce), and sells it for up to $1.58/g ($44/oz) [Mimi Peleg, personal communication]. This is equivalent to the authors' price estimate for indoor grow houses, and almost an order of magnitude lower than prevailing prices on the gray market in California.

A different perspective is provided by the state-approved medical cannabis system in the Netherlands, where pharmacy-grade cannabis is grown indoors by Bedrocan BV under tightly regulated conditions and distributed through the Dutch Ministry of Health. Bedrocan's cannabis is currently sold at a price of €42.5/5 g (= $11.60/g, comparable to the price on the illicit market [Tjalling Erkelens, personal communication]. The high price of Bedrocan's product is not due to taxes, but to the highly exacting pharmaceutical-grade production and testing conditions required by the Dutch government. Despite the high price, black market competition is not a problem, because cannabis is readily available at lower prices in coffee houses.

Regulation should therefore be considered alongside taxation as a tool for maintaining prices. In addition to raising the costs of production, regulation raises prices through licensing fees that are passed on to consumers.

An instructive historical example of successful regulation can be seen in the case of India, where cannabis was legally taxed and regulated in many states until recent decades. The Indian system was described in detail by the British Indian Hemp Drugs Commission report of 1893–94, which still stands today as the most thorough and exhaustive examination of cannabis regulation, albeit from a century ago. The commission examined the gamut of state regulatory systems in India with an eye on how to maximize tax revenues. State regimes ranged from complete prohibition to near *laissez-faire*, but typically involved some form of regulation, licensing or taxation.

The Commission singled out Bengal as having the most successful regulatory regime. In Bengal, the state licensed production and sales and imposed both a duty and licensing fees. In 1892–93 the excise tax came to 2.9 rupees per pound, while license fees added 2.5 rupees more, accounting for about half the total retail price [2]. Hemp–drug taxation was an important source of state revenues in Bengal, constituting 21% of excise revenues. The Commission concluded that a 'combination of a fixed duty with license fees for the privilege of vend constitutes the best system of taxation for the hemp drugs' [3].

The Hemp Drugs Commission report provides useful insight into the economics of a legal cannabis market. Depending on the region and quality, the retail price of ganja in India ranged from 3/8 to 20 rupees per pound

in 1893 [4], when a rupee was worth about $0.30. In today's dollars, this translates to between $2.75 and $150 per pound, consistent with the authors' low-ball cost estimates. Modern costs would probably be higher due to more advanced production techniques. The cost of a regular habit was estimated at one to six pice per day, a pice (1/64 rupee) being the smallest coin in circulation [5].

Despite the low cost of hemp drugs, the Commission observed only modest rates of consumption in India. Regular users constituted ≤ 1% of the population in every region except Calcutta, where they numbered 5.4% [6].

It is noteworthy that Bengal and other states prohibited private cultivation and limited possession in order to prevent illicit diversion. Therefore legalization did not eliminate cannabis-related crime: in 1892–93, Bengal reported 407 arrests for ganja offenses [7].

The historical example of India proves the viability of legal cannabis regulation. However, it does not provide final answers to the questions raised by Caulkins *et al.* which must be re-addressed in the context of modern American culture.

Declaration of interest

Keywords   Cannabis, India, legalization.

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RESPONSE TO COMMENTARIES

We thank the commentators for helping to move forward the discussion of specific policy options rather than broad general concepts. All three discussants offer important insights and perspectives. Specifically, Dale Gieringer suggests there are lessons to learn from the costs of production and prices in 19th-century India and of medical marijuana in Israel and the Netherlands [1]; Jan van Ours points to the importance of cannabis use dynamics, which are still poorly understood [2]; and Ethan Nadelmann and his colleagues observe that legalization comes in many forms and that some initiatives are 'far more tightly drafted' than others [3]. This is precisely the kind of more detailed policy discussion we hoped this paper might stimulate.

Most discussion and even analysis to date has compared the *status quo* with a nebulous and inadequately specified equilibrium post-legalization. However, the initial policy choices matter, transitory effects matter and the long-term equilibrium may not necessarily reflect the starting point due to mid-course changes and market dynamics. For example, prices may not fall to their final levels for some years because it will take time for the legal industry to expand. Similarly, it could take a generation or more to see the full effects on consumption; birth cohorts that are now over the age of 25 may remain primarily alcohol consumers, even if younger cohorts who grow up with legalized marijuana sustain higher rates of cannabis consumption throughout their lives. These are the kinds of dynamics we can only speculate about today. We concur with van Ours when he says: 'the most important design choice of legalization is the flexibility to adjustment, allowing for learning by doing' [2].

There is little to disagree with in these comments. We do, however, take issue with two points. First, van Ours asserts that legalization in the United States would not take prices much below levels seen in the mid-1990s [2]. However, like Gierenger, our conclusion is that production costs post-legalization can drop far below current wholesale prices, unless increased artificially by extremely stringent regulations. Hence, while most people might agree with van Ours in principle that 'taxes should be sufficiently high to discourage cannabis use and sufficiently low to drive out illegal supply' [2], we are

skeptical that such a level can be achieved, at least not without designing the entire legalization regime around that objective.

Secondly, while Nadelmann *et al.* [3] note that we did not discuss the benefits of marijuana use, we also did not address the costs; our essay focused explicitly on design choices for implementing legalization rather than an assessment of the pros and cons of legalization versus prohibition. Our analyses of the latter appear elsewhere [4–6]. While such an assessment might seem, logically, to precede the design task, we think progress on the design front could actually facilitate progress on the assessment front.

Thus, we appreciate Nadelmann *et al.*'s useful discussion of differences between California Assemblyman Ammiano's bills and California's Proposition 19, and similarly the differences between Proposition 19 and the initiatives likely to appear on the ballots in Colorado and Washington in 2012. Because of these differences, we hope partisans on both sides will stop referring to legalization as if it were a well-defined entity—something about which sweeping statements can sensibly be made. Instead, we hope the literature and public debate will make statements along the lines of: 'in our estimation, the benefits of legalization along the lines of Proposition 19 would be . . .' or 'if marijuana was taxed and advertised like tobacco, the effects would be . . .'. This would promote a more productive debate about marijuana policy.

Finally, drug policy analysts could draw profitably on expertise and experience from related fields. The Kettil Bruun Society has been discussing the nuances of alcohol control for 25 years, suggesting just how difficult it is to get this kind of regulation right. Studying gambling and prostitution markets and policies may also yield useful insights [4]. Coming up with a good design for the regulation of a legal marijuana market is a scientific, as well as political, challenge.

Declarations of interest

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