How Should Expert Judgment Inform the Legalization Debate?

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Five hundred economists can't be wrong, can they?

In June 2005, the Marijuana Policy Project (MPP) released Jeffrey Miron's white paper, "The Budgetary Implications of Marijuana Prohibition." Miron provides the most thorough analysis to date on the question of government expenditures on drug prohibition, culminating in an estimate that "legalizing drugs would save roughly $44.1 billion per year in government expenditure on enforcement of prohibition." Costs are uninformative unless benchmarked to the costs of alternative interventions (cost effectiveness), the benefits they provide (benefit-cost analysis), or our willingess to pay (contingent valuation). Savings on prohibition enforcement might mean little if offset by increased social costs involving public safety, public health, or lost productivity. Such costs are extremely difficult to forecast and involve numerous uncertain parameters – the responsiveness of demand to a change in law, and the responsiveness of these harms to a change in demand.

Nevertheless, Miron's report was released with great fanfare, in tandem with an open letter endorsed by over 500 professional economists, urging the country "to commence an open

and honest debate about marijuana prohibition (Hardy, 2005; MPP, 2005). That a call for open debate is even necessary says something about the American political climate during the thirty-year War on Drugs (1969 to 2009).

But the letter went further, saying: "We believe such a debate will favor a regime in which marijuana is legal but taxed and regulated like other goods." This isn't entirely surprising; an earlier survey of professional economists (Thornton 1991) found that a majority (52% vs. 38% with 9% abstaining) said that they would "favor the decriminalization of illegal drugs." For some economists – most notably the late Milton Friedman – the legalization question seems like a no-brainer. Take a handful of stylized facts about addiction; the conventional wisdom about America's "Great Experiment" with alcohol prohibition; a few back-of-the-envelope calculations; some simple comparative statics diagrams; some optimistic assumptions about taxation, prevention, and treatment; toss in a taste for liberty over paternalism, and you have a seemingly open-and-shut case.

The new analysis by Donohue, Ewing, and Peloquin (in this volume) offers far less certainty, far more candor, and a great deal more complexity and nuance. Donohue and colleagues start with the questions, not the answers. They recognize that there are a great many open empirical questions, and they make some progress toward tackling them – especially their new analyses of the link between drug enforcement and violence. The paper recognizes and explains a key point that many academic writers fall to grasp: The question of whether and how to legalize drugs is actually a difficult one, and it is difficult in ways that make it more intellectually interesting.

Why is it difficult? There are several reasons (see MacCoun, 1998; MacCoun & Reuter, 1997, 2001; MacCoun, Reuter, & Schelling, 1996). First, one side argues about the risk of

increased drug use, while the other side argues about the likely reduction in harm per use. Yet total harm is a function of average harm per dose times the number of doses; if legalization raises use and lowers average harm, the net effect could be either an increase or decrease in total harm. Second, there are many different types of drug-related harm; some are due to prohibition, and some are due to the drugs themselves. Moreover, only some are quantifiable, and legalization might change not just the quantities but their distribution across neighborhoods and age groups. Finally, legalization advocates write as if the burden of proof is on prohibitionists; this may be true in some Rawlsian "original position," but it is dubious as a political position.

But let's not be nihilistic. Presumably experts are good for something in this domain. Put aside the political value (if there is one; see MacCoun & Paletz, 2009) of appealing to the collective authority of the economics profession. Normatively, what role should expert consensus play in reasoned deliberation about issues like legalization?

"Appeals to authority" are fallacious as a matter of deductive logic, but they may have inductive value in establishing general professional acceptance, at least under the older Frye standard for admissible expert testimony (*Frye v. United States,* 293 F. 1013, D.C. Cir. 1923). Moreover, there is considerable research showing that when properly elicited, aggregated expert opinions can be far more accurate than those of most individual experts, especially when we don't know which experts are the best ones (Clemen & Winkler, 1999; Goossens, Cooke, Hale, & Rodic-Wiersma, 2008: Green et al., 2007).

An aggregation of experts is no panacea, and it is possible to oversell "the wisdom of crowds" (Surowiecki, 2004). Aggregation cancels out noise, but it can amplify shared group biases (Kerr, MacCoun, & Kramer, 1996). And those biases seem particularly likely when the judgments being aggregated occur at a high level of abstraction, where the coloring effects of

ideology, emotion, and point-of-view are most likely. But for narrowly focused empirical questions, it can at least give us a rough "current best guess."

An Application: Forecasting the Price Effect of Cannabis Legalization

At the time of this writing (April 2010), the State of California faces two roads to the legalization, regulation, and taxation of the commercial retail cannabis: Assembly Bill 2254 in the state legislature,[1] and an initiative to appear on the November 2010 state ballot.[2] Forecasting the effects of these proposals is enormously difficult. How they would be implemented is unclear, and their impact on consumption, tax revenues, public health, and public safety is quite uncertain.

But it would be useful to at least provide a rough order-of-magnitude range for one key outcome – the effect on cannabis consumption – because it helps drive so many of the other outcomes. Laws influence drug use through many different mechanisms (deterrence, price, availability, stigma, and forbidden fruit effects; see MacCoun & Reuter, 2001), but the price mechanism is probably the most tractable analytically, and it arguably has the most import for informing policy design.

To produce at least a rough forecast of the price effect of legalization. we consider the current street price of cannabis, plausible estimates of the new post-tax retail price, and the price elasticity of demand (the percent change in consumption for a 1 percent change in price).

There are various relevant estimates in the literature, none very solid, and I won't review them here. To reduce the inherent subjectivity of using such estimates, in October of 2009 I informally polled 4 nationally recognized experts on the economics of drug use, none of whom have endorsed marijuana legalization.[3] I asked them to provide their plausible low and high

guesses as to the current street price, their judgment of the likely price under a plausible legalized tax regime, and the price elasticity of demand. I then averaged these low and high estimates with my own (I am "Expert 5" and the least expert of the group) to come up with the values reported in Table 1.

Insert Table 1 here

Table 1 provides 5 x 2 x 2 x 2 = 40 sets of parameter estimates. I narrowed the set by considering only low-low and high-high pairs of past and future prices, leaving 5 x 2 x 2 = 20 sets of estimates.

As seen in Table 2, I then created 20 forecasts of the price effect of legalization on demand, net of any non-price mechanisms, under a constant elasticity of demand model, where

$$Q = aP^b$$

and

$$\%\Delta Q = \frac{P_{New}}{P_{Old}} - 1.$$

Note that these are my own infererences from the expert inputs; my experts were not asked to provide such forecasts directly – a point I return to below. But the derived projections suggest an increase in demand of around 35 (if the true demand curve is a convex power function).

Insert Table 2 here

The highest estimate implies a whopping 17-fold increase, though it is an outlier among the 20 estimates I computed; the second highest estimate is 84 percent (constant elasticity). The outlier is based on an assumed 88 percent drop in the price, and a subsequent and painstaking analysis I recently published with my colleagues Beau Kilmer, Jonathan Caulkins, Rosalie Pacula, and Peter Reuter (Kilmer et al., 2010), suggests that a pre-tax drop of 75 to 80% is by no

means implausible. So the actual effects of a change in policy will be highly sensitive to the post-tax price. Kilmer et al. (2010) argue that it is extremely difficult to simply tax the price back up to pre-legalization levels because tax evasion is very likely. On the other hand, the equilibrium price could be higher if there is sufficient inelasticity in the supply curve; Kilmer et al. (2010) assume and defend an infinite elasticity of supply, but also note that almost all empirically estimated supply elasticities in the agricultural literature are below 5 and a great many are below 2. And recent steep decreases in alcohol taxes in several Nordic countries have produced less of an impact on consumption than predicted by price elasticity models (Room et al., 2010). So there is not only uncertainty about these estimates; there is uncertainty about what they imply for behavior.

Caveats and Two Empirical Benchmarks

These calculations ignore three potential complications that some experts think are important: Short- vs. long-term elasticity, the elasticity of participation vs. the elasticity of demand, and elasticities per age group. But the whole point of the exercise is to provide a very rough order-of-magnitude forecast to inform the debate. There are plenty of alternative scenarios that could undermine the logic of these calculations, but they are all very speculative, and if we treat them as equally plausible, then we are back to a uniform Bayesian prior, which seems far too pessimistic. Also, as seen in the appendix, these experts considered a very broad range of elasticities relative to what we have observed over a great many years of data in the alcohol and tobacco literatures.

How well do these projections match the available evidence? There are two case studies that in some ways approximate the kind of change that Californians are contemplating.

The Dutch experience. MacCoun & Reuter (1997, 2001) examine the de-facto legalization of cannabis in the Netherlands in some detail; it is the closest experience we have to full cannabis legalization. Our best available data involve prevalence rather than total demand, so I will focus on past-month users who probably account for the lion's share of the consumption. Although the Dutch depenalized use in the 1970s, there was little impact until the retail coffeeshop outlets began proliferating in the 1980s. Past-month prevalence from 8.5 percent to 11.5 percent between 1984 and 1992, and Reuter and I argue that the growth in this period (relative to other nations) was plausibly attributable to aggressive commercialization (later scaled back by Dutch authorities). This implies a potential increase of around 35 percent in past-month use. Importantly, even this increase was short-lived.[4] By 2005, Dutch cannabis prevalence was below that of Spain, England, Italy, and France, and well below that of the US.[5] But the Dutch system is not a good analog for full-scale legalization because Dutch prices have stayed relatively high, probably due to enforcement against high-level traffickers, as well as retail prices that cover the coffeeshop rent and amenities.

The drinking age experience. Increases in the legal minimum drinking age (usually from 18 to 21 yrs) are a form of partial prohibition because those who were once able to purchase legally can no longer do so. Although the effects of creating a prohibition and ending a prohibition may not be symmetrical, the drinking age literature provides another real world check on our order-of-magnitude estimates. Estimates of the effect of the raised age requirement on consumption and traffic fatalities are in the 5 percent to 30 percent range (see Wagenaar & Toomey's 2002

meta-analysis of 241 studies from 1960-2000; Carpenter & Dobkin, 2009). But again, the drinking age did not produce any sizeable price drop.

What If These Forecasts Are Wrong?

My use of the expert forecasts ignores possible complexities in price effects, and as noted above, price is not the only relevant mechanism. Indeed, somewhat surprisingly, prices are not notably lower in the Netherlands, perhaps because they have retained enforcement against high level traffickers. So if we take the Dutch experience as an estimate of the non-price effects of legalization, and add it to our price effect to try to get at the total effect on use, then something near a doubling of cannabis consumption seems plausible. Note that I am not predicting a doubling; the evidence doesn't permit any confident point estimates because there is so much parametric and structural uncertainty. But it is not inconceivable, and advocates for legalization ought to be able to defend the change even under such a scenario.

What would a doubling of past-month prevalence look like? About 3 million Californians age 12 or older used cannabis at least once in 2006 (11 percent of that population) and about 2 million used in the previous 30 days (7 percent).[6] A doubling would bring past-month use to 3.9 million users -- by historic standards, a substantial swing in use. At the same time, that level of use would match the past-month prevalence rate in 1979 (13 percent of the adult population). In other words, a doubling would match our not-too-distant historical experience.

I have not attempted to forecast the social consequences of such an increase in use. Interestingly, between 1975 and 1980, when cannabis use was at its historical peak, fewer than 1 in 20 American adults cited drugs as "the most important problem" facing the nation in Gallup

polls. (In contrast, 1 in 4 adults cited drugs as the most important problem in 1989, when cannabis use was near its historical low point for the 1975-2010 period.)

Of course, one difference between 1979 and today is that cannabis is now consumed in more potent forms[7], and it is possible (though not yet established) that this poses greater risks of addiction and hazardous use. This suggests that the public health consequences of cannabis legalization might be mitigated by taxing cannabis by THC potency rather than by bulk weight, which might discourage high-potency forms, encourage low-potency forms, and encourage users to "internalize" any costs created by increased intoxication.

And other ways of implementing legalization might have less impact on consumption. As argued in greater detail elsewhere (Kleiman, 1992; MacCoun & Reuter, 2001), a less risky policy option would be to simply allow the legal cultivation of small numbers of plants for personal use. This is the approach that was adopted by Alaska in the 1970s, readopted there recently, and was also adopted in South Australia. Existing data are sparse, but do not suggest that either jurisdiction experienced significant increases in consumption. A home cultivation policy creates adminstrative and enforcement difficulties, but these are manageable problems – especially relative to our current prohibition or to the complexity of a taxable retail sales model.

Of course, such a model would also bypass one of the major arguments for the current California proposal – its potential for generating revenue.

Endnotes

[1] Assembly Bill 2254 ("Marijuana Control, Regulation and Education Act:") was introduced in 2009 as AB 390; see http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab_2251-2300/ab_2254_bill_20100218_introduced.pdf.

[2] The Regulate, Control and Tax Cannabis Act of 2010; see http://www.taxcannabis.org/index.php/pages/initiative/

[3] I have chosen to keep the experts' identities anonymous to protect the confidentiality of their responses, and because some of them take issue with the implications I derive from their inputs.

[4] The later decline is also consistent with our commercialization hypothesis, since government closings reduced the number of cannabis coffeeshops (which require a government license) by 40 percent between 1997 and 2007.

[5] See http://www.emcdda.europa.eu/; http://www.espad.org/

[6] See http://www.oas.samhsa.gov/2k7State/California.htm

[7] Some contest this claim based on very real flaws in government estimates, but an examination of any issue of *High Times* magazine suggests that higher potency is a point of pride in the industry.

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APPENDIX: Parametric range in tobacco and alcohol literatures and in the expert poll.

	Price elasticity of demand			
	Lower absolute estimate	*Higher absolute estimate*	*Absolute difference*	*as % of lower*
Tobacco literature (Gallet and List 2002 meta-analysis of 523 estimates)				
Short vs long run	0.40	0.44	0.04	10%
Double log vs. linear	0.37	0.45	0.08	22%
Myopic vs. rational	0.38	0.44	0.06	16%
MLE vs. OLS	0.32	0.40	0.08	25%
Alcohol literature (Gallet 2007 meta-analysis of 1172 estimates)				
Short vs long run	0.52	0.82	0.30	58%
Beer vs wine	0.36	0.70	0.34	94%
Double log vs. linear	0.60	0.64	0.05	8%
Myopic vs. rational	0.67	0.77	0.10	15%
MLE vs. OLS	0.43	0.61	0.18	42%
Marijuana (my poll of 5 experts)				
Mean low vs. mean high estimate	0.05	1.24	1.19	2483%
Lowest vs. highest estimate	0.02	1.50	1.48	7400%

Table 1: Expert Poll Data

	Expert						
	1	2	3	4	5	**MEAN**	**MEDIAN**
Street price							
low	$4	$4	$10	$5	$5	$5.60	$5.0
high	$25	$12	$10	$15	$15	$15.40	$15.0
Price elasticity of demand							
low	-0.2	-0.2	-1.0	-0.5	-0.5	-0.48	-0.5
high	-1.4	-0.8	-1.0	-1.5	-1.5	-1.24	-1.4
Price under tax model							
low	$0.50	$4	$6	$5	$3.50	$3.80	$4.0
high	$20	$12	$6	$10	$10.50	$11.70	$10.5

Table 2: Deriving Projections Under Constant Elasticity of Demand Model

Implied Growth in Demand*	**1**	**2**	**3**	**4**	**5**	**MEAN**	**MEDIAN**
low x low	0.52	0.00	0.67	0.00	0.20	0.20	0.12
low x high	17.38	0.00	0.67	0.00	0.71	0.62	0.37
high x low	0.05	0.00	0.67	0.22	0.20	0.14	0.20
high x high	0.37	0.00	0.67	0.84	0.71	0.41	0.65
AVERAGE	4.58	0.00	0.67	0.27	0.45	**0.34**	**0.33**

**Ceteris paribus; does not include other effects on demand.*

MacCoun, R. J. (2011). How should expert judgment inform the legalization debate? In P. Cook, J. Ludwig & J. McCrary (eds.), Controlling crime: Strategies and payoffs. University of Chicago Press.Â Altered state? Assessing how marijuana legalization in California could influence marijuana consumption and public budgets. (65 page peer-reviewed report.) Santa Monica, RAND. â€¢ How Should Expert Judgment Inform the Legalization Debate?â€ Save to Library. by Robert MacCoun. â€¢ The Marijuana Legalization Debate. Save to Library. by Robert MacCoun. â€¢ Considering Marijuana Legalization. Save to Library. by Robert MacCoun. â€¢ â€œWhen Are N Heads Better (or Worse) Than One?â€: biased Judgment in. Save to Library. by Robert MacCoun.Â â€¢ Response to comment by Herbert Kleber:'The best should not be the enemy of the good. Save to Library. by Robert MacCoun. He evaluates predictions from experts in different fields, comparing them to predictions by well-informed laity or those based on simple extrapolation from current trends. He goes on to analyze which styles of thinking are more successful in forecasting. Classifying thinking styles using Isaiah Berlin's prototypes of the fox and the hedgehog, Tetlock contends that the fox--the thinker who knows many little things, draws from an eclectic array of traditions, and is better able to improvise in response to changing events--is more successful in predicting the future than the hedgehog, who kn...Â Chapters 2 and 3 measured expert performance against correspondence benchmarks of good judgment. The test was â€œgetting it rightâ€: affixing realistic probabilities to possible futures.