

# WORKING P A P E R

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## What Can We Learn from the Dutch Cannabis Coffeeshop Experience?

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In 1976 the Netherlands adopted a formal written policy of non-enforcement for violations involving possession or sale of up to 30 grams of cannabis. In the US, the "gateway theory" is usually seen as an argument for being tough on cannabis, but surprisingly, the notion of a gateway effect was part of the impetus for allowing coffeeshops to sell small quantities (MacCoun & Reuter, 2001). Rather than seeing an inexorable psychopharmacological link between marijuana and hard drugs, the Dutch hypothesized that the link was sociological, and they sought a way to "separate the markets" to keep soft drug users out of contact with hard drug addicts and dealers.

There are currently around 700 retail cannabis outlets in the Netherlands – about one per 29,000 citizens (one per 3000 in Amsterdam; Bieleman & Snippe, 2006; Bieleman et al., 2008). The industry employs 3400 workers (Bieleman & Snippe, 2006), and the owners have their own union (the Bond van Cannabis Detaillisten).

They sell somewhere between 50 and 150 metric tons of cannabis at a value of perhaps 300 to 600 million euros a year (see Appendix). They do not pay VAT – the European Court of Justice won't let them -- but they pay various income and corporate taxes (NIS News, 2010; van Dijk, 1998, pp. 381-382; van der Steen, 2010). It is estimated that a quarter of the 4.5 million tourists who visit Amsterdam go to a coffeeshop and that 10 percent of them cite that as a reason why they came (Amsterdam Tourist Information, 2008; van Laar et al., 2010).

The Dutch experience is challenging to characterize, because it is a moving target. The Dutch policy continues to evolve in response to internal and external political pressures as well as the nation's inherently pragmatic "learning by doing" orientation to drug problems. In 1995, the 30 gram limit was reduced to 5 grams, and a 500 gram limit was set for coffeeshop stocks. In 2008 the Netherlands banned tobacco smoking in the coffeeshops (and all other commercial establishments) (Stinson, 2008) and they have been attempting to close shops within 250 meters of schools (Clements, 2008).

Most importantly, beginning in the late 1970s, a set of guidelines were developed for regulating the technically illicit retail sales in open commercial establishments; as formalized by the Public Prosecution Service, coffeeshop owners are not be prosecuted for selling cannabis providing they comply with five rules (the so-called "AHOJ-G" rules):

1. "they may not sell more than 5 grams per person per day
2. they may not sell ecstasy or other hard drugs
3. they may not advertise drugs
4. they must ensure that there is no nuisance in their vicinity
5. they may not sell drugs to persons aged under 18 or even allow them on the premises.

The sale of cannabis will continue to be an offence. If the rules set out above are not observed, the premises are closed down and the owners or management may be prosecuted. Under the official drug guidelines, coffee shops may stock up to 500 grams of cannabis without facing prosecution. Municipalities may impose additional rules on coffee shops in order to avoid nuisance” (Openbaar Ministerie, 2010).

Enforcement of these rules didn't have real teeth until 1997, when officials began closing coffeeshops for non-compliance. Between 1997 and 2007, the number of retail cannabis outlets dropped 40 percent, from 1,179 to 702 (Bieleman et al., 2005, 2009).

In the past few years, the Dutch have had lively debates about the coffeeshop model. (See ABC, 2008; NIS News, 2006, 2008, 2010; NRC Handelsblad, 2008; IHT, 2007.) To eliminate the so-called "backdoor" problem of legal inconsistency, some officials argue that municipalities or coffeeshop owners should be allowed to legally cultivate cannabis in order. Others contend that this would violate international UN and EU agreements. Some officials have called for a complete ban on sales to non-Dutch tourists; others contend that this would violate Dutch human rights laws. But most officials, and most Dutch citizens, stand by the basic approach as an expression of Dutch *gedoogcultuur* (“culture of permissiveness”) and as a pragmatic "least worst" solution. (For an enlightening historical account, see Amsterdam Tourist Information, 2007.)

The purpose is not to judge the Netherlands or inform its own decisions about the future, but to see what California can learn about potential policy options and outcomes by drawing on the Dutch experience. Regardless of how one feels about the Dutch system, there is little doubt that the US and indeed the world can learn from the Dutch willingness to experiment, and their energetic and thorough efforts to document their policies and outcomes.

A blanket caveat at the outset: In 1993, I coauthored an essay documenting the daunting analytical pitfalls of making cross-national comparisons of drug policies and outcomes (MacCoun, Reuter, Kahan, & Saiger, 1993). But within a few years, our reticence largely evaporated:

The Pompidou Group’s multi-city study (Hartnoll, 1994) places the following banner atop many of its tables of cross-city drug indicators: *Warning! These data are not directly comparable.* That label is perfectly justified, and we are tempted to affix the same flag on each of the tables and figures that follow. But pragmatically, there is little point in assembling comparative data unless one is prepared to risk error and make comparisons, and to make it easier for readers to do the same. Moreover there is good reason for doing so. Given the difficulties of "learning by doing" in any one nation’s battle against drug problems, people inevitably look to cross-national comparisons for guidance. Our hope is to clarify what can and can’t be learned from them. (MacCoun & Reuter, 2001)

## PREVALENCE AND PATTERNS OF CANNABIS USE

A decade ago, MacCoun and Reuter (1997, 2001a, 2001d) examined Dutch cannabis prevalence relative to its neighbors, but the data were very sparse and of uncertain comparability. In 2010 there is a great deal more data on cannabis use in Europe, and it is generally of better quality, largely due to the tremendous efforts of two international consortia, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA, <http://www.emcdda.europa.eu/>) and the semi-annual European School Survey Project on Alcohol and Other Drugs (ESPAD, [www.espad.org](http://www.espad.org)).

### Are the Dutch More Likely to Use Cannabis?

Figure 1 shows the ESPAD and USA (Monitoring the Future; MTF) data for 15-16 year old students. Three features of the rankings are noteworthy. First, the US rate exceeds the Dutch rate, but they are fairly close – indeed roughly equivalent within sampling and measurement error. Second, both the US and the Netherlands rank high relative to most other nations, but geography seems to play a big role; nations in Eastern Europe and Scandinavia tend to have lower levels of use than most countries in Western Europe. And third, in recent years many European countries have rates of student marijuana use that either match or exceed the Dutch rate – including Italy, Belgium, Ireland, the UK, France, and Switzerland. (Other data sources not shown suggest that Spain is also in this category.)

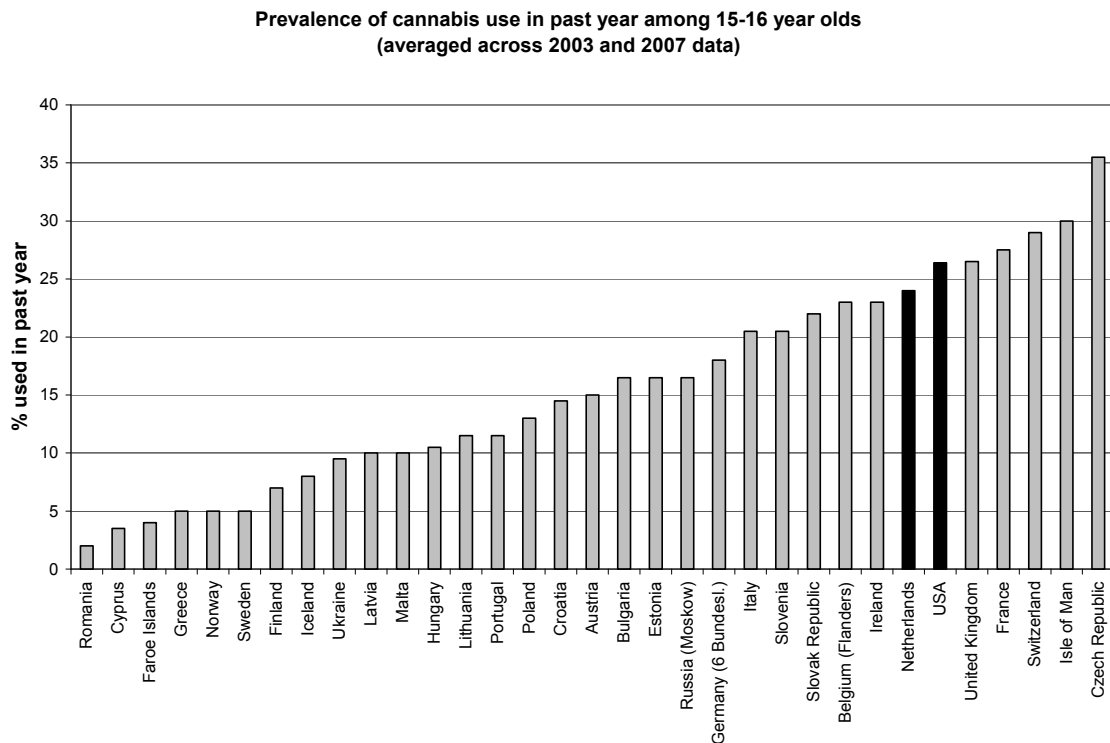


Figure 1. Annual prevalence of cannabis use among 15-16 year olds (averaged data from 2003 and 2007). SOURCE: ESPAD and MTF.

Are Dutch youth more likely to try cannabis than they might be without the coffeeshop system? One way of addressing this question is to compare how Dutch youth rank relative to other European nations with respect to the use of other substance. Figure 2 shows that Dutch students do indeed rank higher for lifetime prevalence of cannabis than for tobacco use, getting drunk, or use of other illicit drugs.<sup>1</sup>

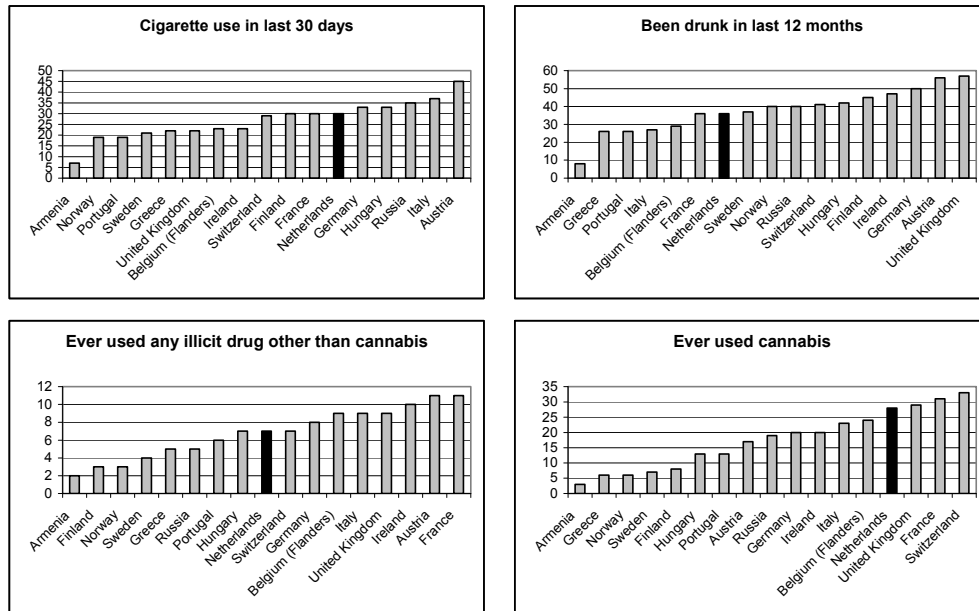


Figure 2. Prevalence of (a) past-month cigarette use, (b) past-year drunkenness, (c) lifetime use of any illicit drug other than cannabis, and (d) lifetime use of cannabis. SOURCE: ESPAD.

Because 15-16 year olds are not allowed to frequent the Dutch cannabis coffeeshops, we might expect to see a larger effect among young adults. It is possible to compare estimates in the 15-34 year age group from various European nations; Figure 3 presents averages for nations with at least 3 estimates over the period 1998-2005.<sup>2</sup> Over that period, the Netherlands rate was well above Sweden, but below that of many of its neighbors.

<sup>1</sup> An alternative interpretation is that Dutch students are substituting cannabis for other substances; the evidence for such substitution is mixed, but the best estimates run counter to the substitution hypothesis, at least in the US and Australia (Pacula, forthcoming).

<sup>2</sup> These years were chosen because they allow the inclusion of the three available Dutch estimates, from the years 1998, 2001, and 2005.

**Average prevalence of cannabis use in last year  
among 15-34 year-olds, in the years 1998-2005**

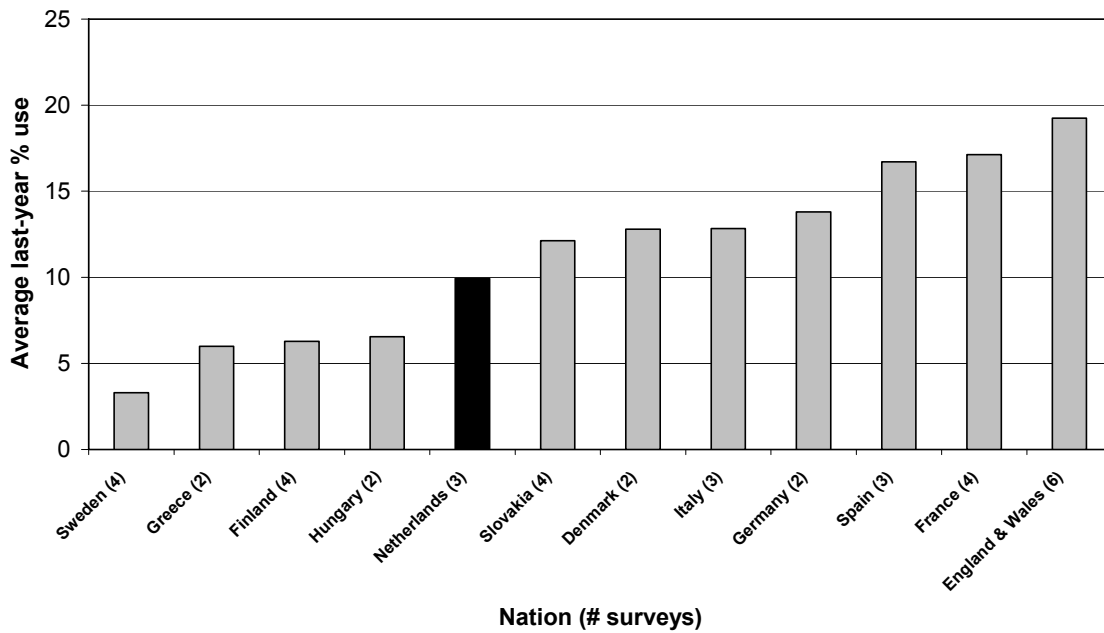


Figure 3. Average prevalence of cannabis in last year among 15-34 year olds (averaged over the decade 1998-2008). SOURCE: Author's calculations from EMCDDA 2009 (Figure GPS-4) data, averaged for years 1998-2008.

Figure 4 is a scatterplot showing the strong correlation ( $r = .76$ ) between perceived availability of cannabis (the percentage of 15-16 year olds who say that it is somewhat or very easy to obtain) and past-year prevalence of use, for 35 nations averaged across two years of data collection (2003 and 2007). Note that this association is not a direct test of the effects of availability on use; it is very likely that users do have higher ease of obtaining cannabis than non-using students, and both items may be picking up the shared effects of one's peer group. But as one might expect, the Dutch youth do report higher than average availability of cannabis. Still, they fall well short of the levels reported in the USA and some other countries, and the Dutch data fit right on the trend line.

Perceived availability and last-year prevalence of cannabis among students 15-16 yrs old

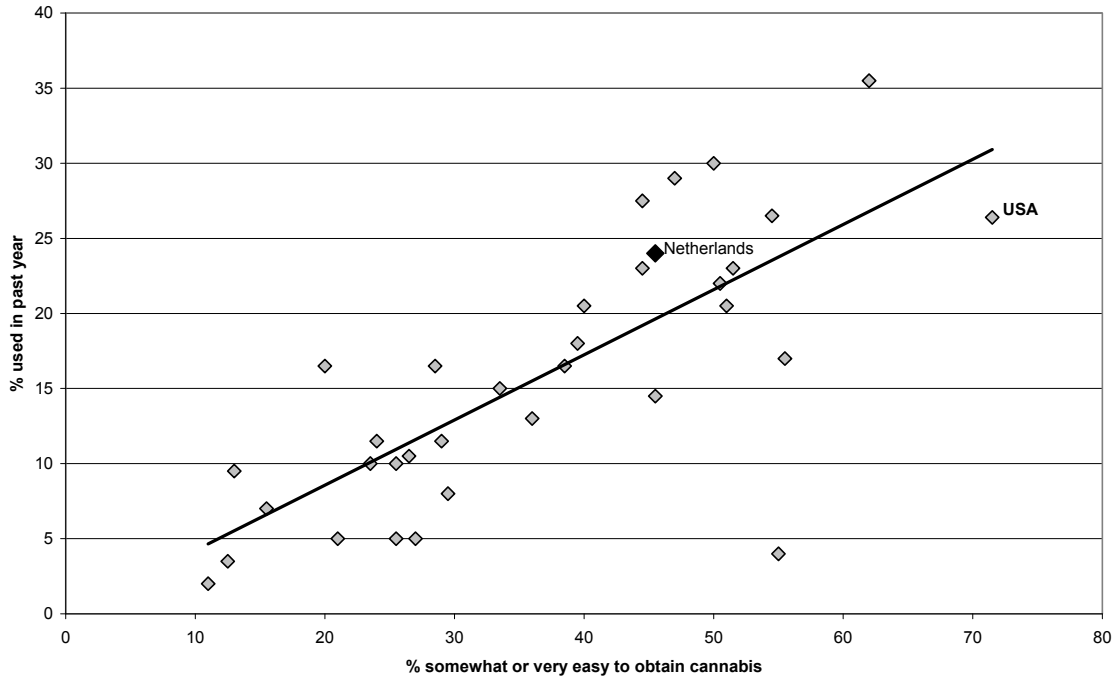


Figure 4. Association between perceived availability and past-year use among 15-16 year olds in 35 nations (average of 2003 and 2007 estimates). SOURCE: ESPAD 2003 and 2007, MTF 2003 and 2007.

Access to Dutch cannabis could have effects on the perceived (and actual) availability among non-Dutch citizens as well, as long alleged by officials in Belgium and other neighboring countries. Figure 5 suggests this is plausible. There is an inverse association ( $r = -.31$ ) between students' perceptions of availability and the actual distance between their country and the Netherlands, even including one discrepant data point (Spain). But this is circumstantial evidence – there is surely "spatially autocorrelated error" due to other shared features of culture and geography -- and data on drug tourism and smuggling are too sparse to permit a stronger test.

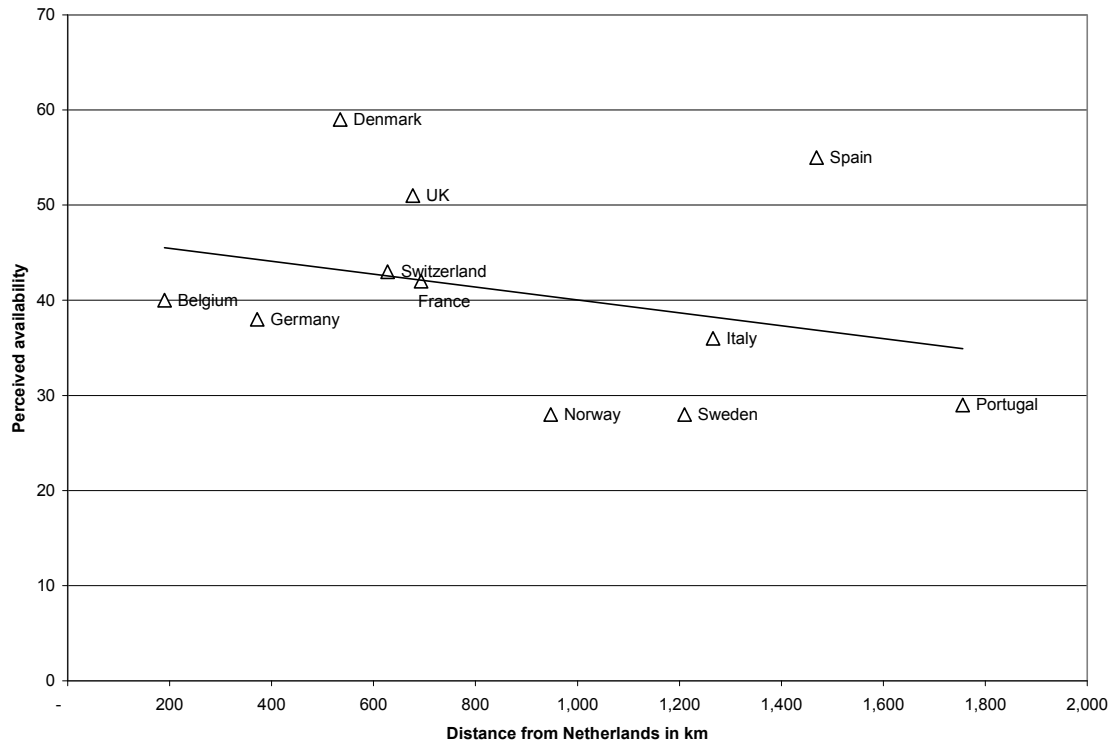


Figure 5: Inverse correlation between distance from the Netherlands and perceived availability of cannabis. SOURCES: Author's calculations based on ESPAD 2007 (Table 28) and basic geographic data.

### Are the Dutch More Likely to Escalate Their Cannabis Use?

By facilitating relatively easy access to cannabis, it is conceivable that the Dutch system might alter the length, intensity, and duration of a cannabis using "career." Table 1 shows some evidence for this in student data. The Dutch youth are somewhat more likely to have used frequently, and they are somewhat more likely to start using early (before age 13), compared to their European neighbors, and in this respect they bear a closer resemblance to students in the USA. They perceive less risk from regular cannabis use than their peers in either Europe or the USA.

Table 1: Frequency and perceived risks of cannabis use among students. (SOURCE: ESPAD 2007),

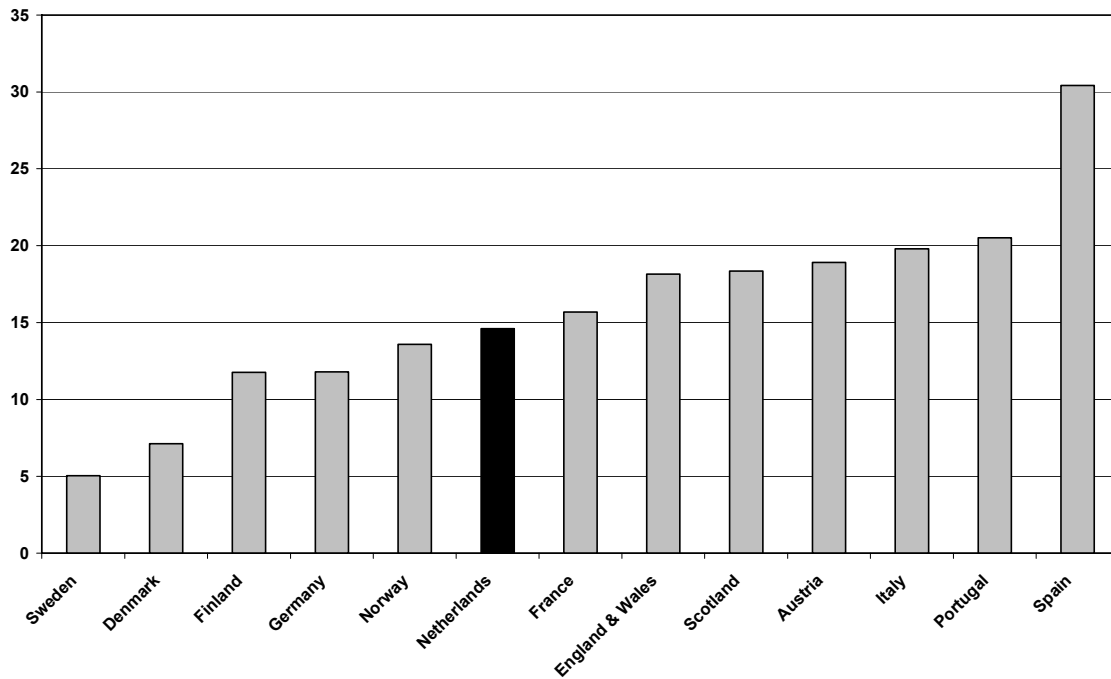
	Netherlands	European average	USA
Frequency of lifetime use of cannabis			
10-19 occasions	4	2	3
20-39 occasions	2	1	3
40+ occasions	7	3	8



Used 10+ times in last year	9	4	10
Used 6+ times in past month	6	2	6
Age of onset 13 or younger	6	4	8
% perceive "great risk" from cannabis use			
try once or twice	11	33	23
smoke occasionally	12	40	37
smoke regularly	52	71	66

When we look to data for all adults, however, it is much harder to see any evidence that the Dutch system produces an increase in the intensity or duration of using careers. For example, one might expect that Dutch adults would be more likely to escalate from casual experimentation to regular use, but the "continuation rate" in Figure 6 (top panel)--defined as the ratio of past-month to lifetime users -- doesn't support this conjecture. And student data (Figure 6, bottom panel) show that the current use rate among Dutch students is quite close to what we would predict knowing only their lifetime prevalence rates.

Past month cannabis users per 100 lifetime cannabis users, circa 2005



Association between lifetime and past-month prevalence of cannabis among students 15-16 yrs old

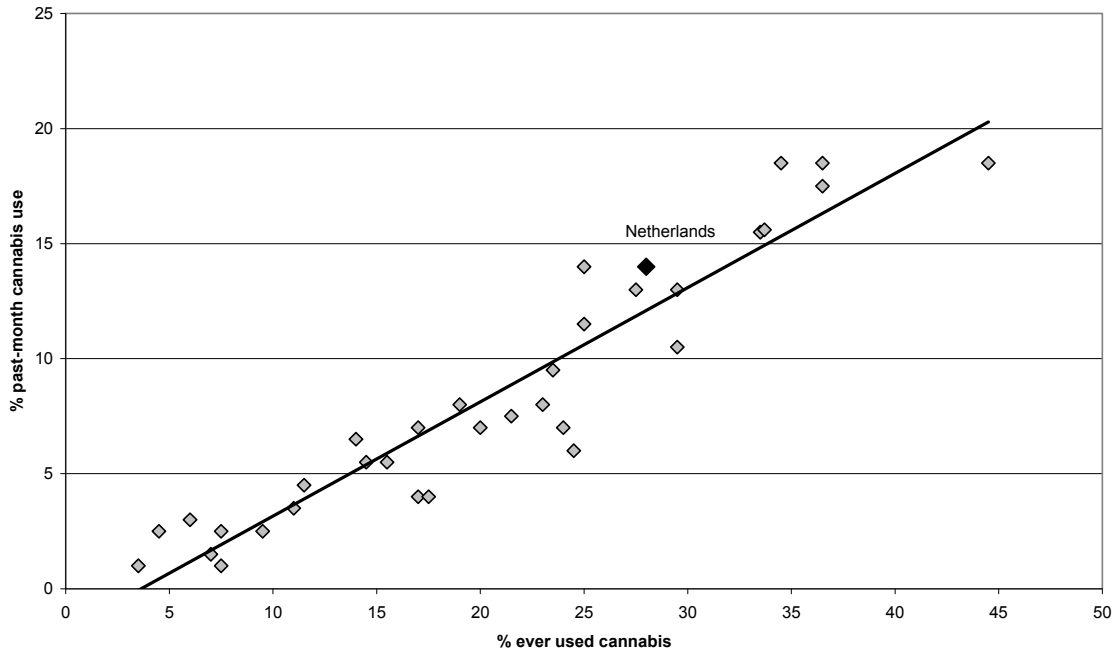


Figure 6. "Continuation rate": Past-month cannabis users per 100 people who have tried cannabis (top panel), and association between lifetime and past-month use among students. SOURCE: Author's calculation from data in EMCDDA 2009 and ESPAD 2007.

But what about regular Dutch users – do they consume use more cannabis than they might in other countries with less availability? A comparison of regular users in Amsterdam and San Francisco (Reinerman, Cohen, & Kaal, 2004) found quite similar rates of self-reported use (Table 2). In both cities, the Dutch 5 gram limit would provide a month or more of use for the typical regular user.

Table 2.

Average quantity of cannabis used per month in past 3 months	Amsterdam*	(cumul. %)	San Francisco*	(cumul. %)	Implied days of use for a 5 gram purchase:
Less than 2 grams	41	41	52	52	75 or more days
2-4 grams	21	62	17	69	38 to 75 days
4-14 grams	27	89	22	91	11 to 38 days
14-28 grams	1	90	7	98	5 to 11 days
>28 grams	9	99	2	100	5 or fewer days

SOURCE: \*Reinerman, Cohen, & Kaal, 2004, Figure 2

One might expect that the ready availability would serve to extend the length of a using career. Figure 7 (top and bottom panels) examines this issue using two different types of prevalence (past month vs. past year), two different years (2001 vs. 2005), and surveys by two different Dutch organizations (CEDRO vs. IVO).<sup>3</sup> Both panels tell the same basic story: Dutch users appear to "mature out" of cannabis use at a faster rate than their American counterparts.

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<sup>3</sup> The US data from NSDUH were collected using in-person interviews with a computer assisted personal interviewing (CAPI) method for sensitive questions. The 2001 Dutch survey (Abraham et al., 2002) includes data from 3,000 respondents who used CAPI, and 15,000 respondents who were allowed to choose among face-to-face, CAPI, paper, or web-based responding; this produced statistically significant effects on responses but they were small and so the datasets were merged. The 2005 survey (see Rodenburg et al., 2007) includes data from 4,516 people who completed an in-person computer-assisted personal interviewing (CAPI) method for sensitive questions, and 20,282 citizens who provided data using a web-based online survey; because the latter data appeared to suffer from greater selective non-response, the prevalence estimates come from the CAPI subsample.

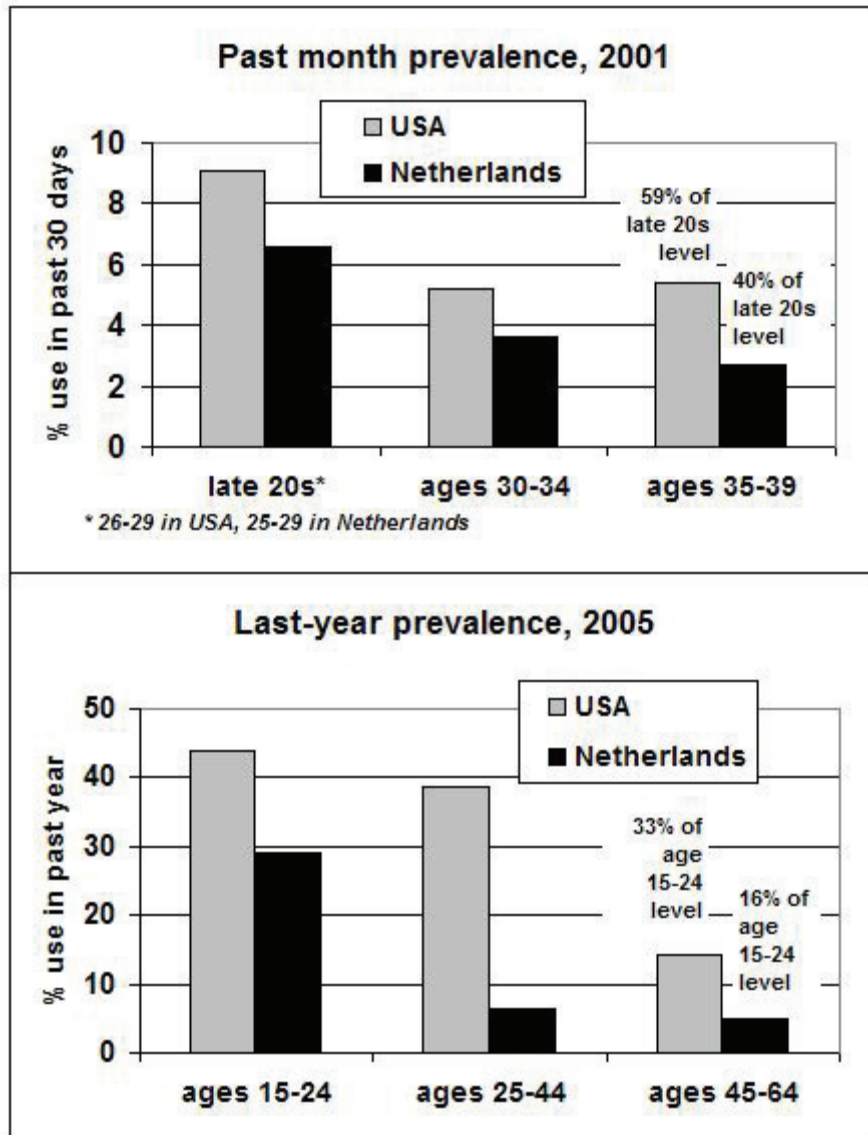
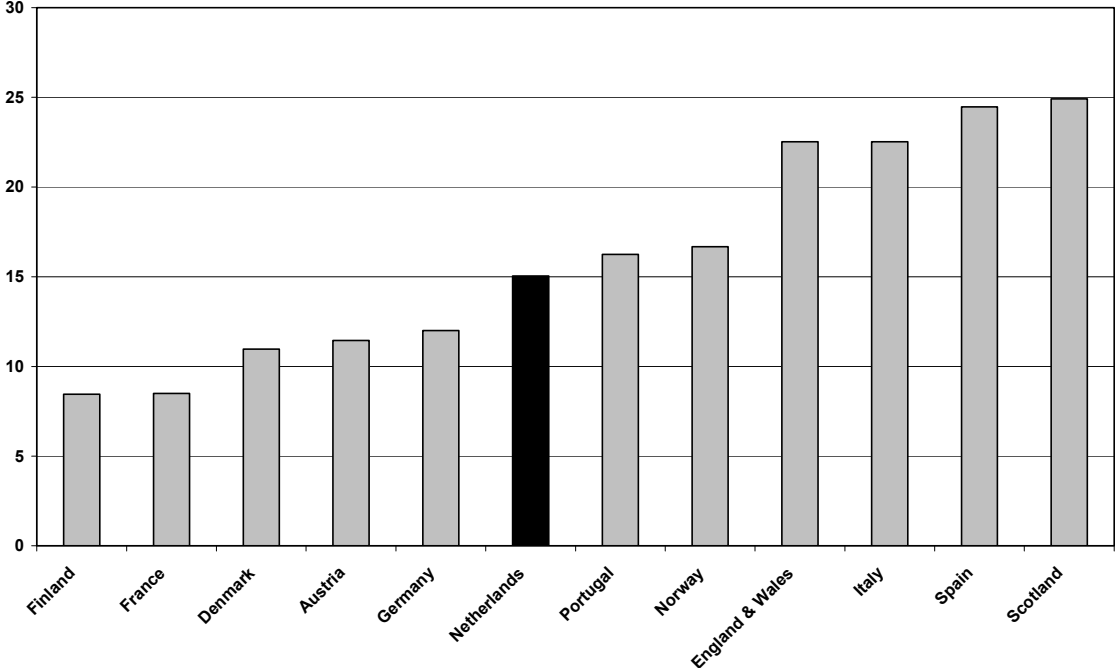


Figure 7. Past-month prevalence (2001) and last year prevalence (2005) by age group. SOURCES: US data from NSDUH 2001 and 2005 (Table 20B); 2001 Dutch data from Abraham, Kaal, & Cohen (2002; CEDRO; Table 4.5); 2005 Dutch data from Rodenburg et al. (IVO, 2007, Table 4.3).

### Does the Dutch System Affect the "Gateway" Association with Hard Drugs?

As noted earlier, a key part of the rationale for the Dutch coffeeshop system was the hypothesis that "separating the markets" would weaken the statistical "gateway" association between cannabis and hard drug use (see MacCoun & Reuter, 2001 for a more elaborate discussion). Figure 8 presents the ratio of people who have tried cocaine (top panel) or amphetamines (bottom panel) to those who have tried cannabis. (Heroin use is too rarely reported in the surveys to permit a similar estimate.) These ratios provide some evidence for a weakened gateway in the Netherlands.

Lifetime cocaine users per 100 lifetime cannabis users, circa 2005



Lifetime amphetamine users per 100 lifetime cannabis users, circa 2005

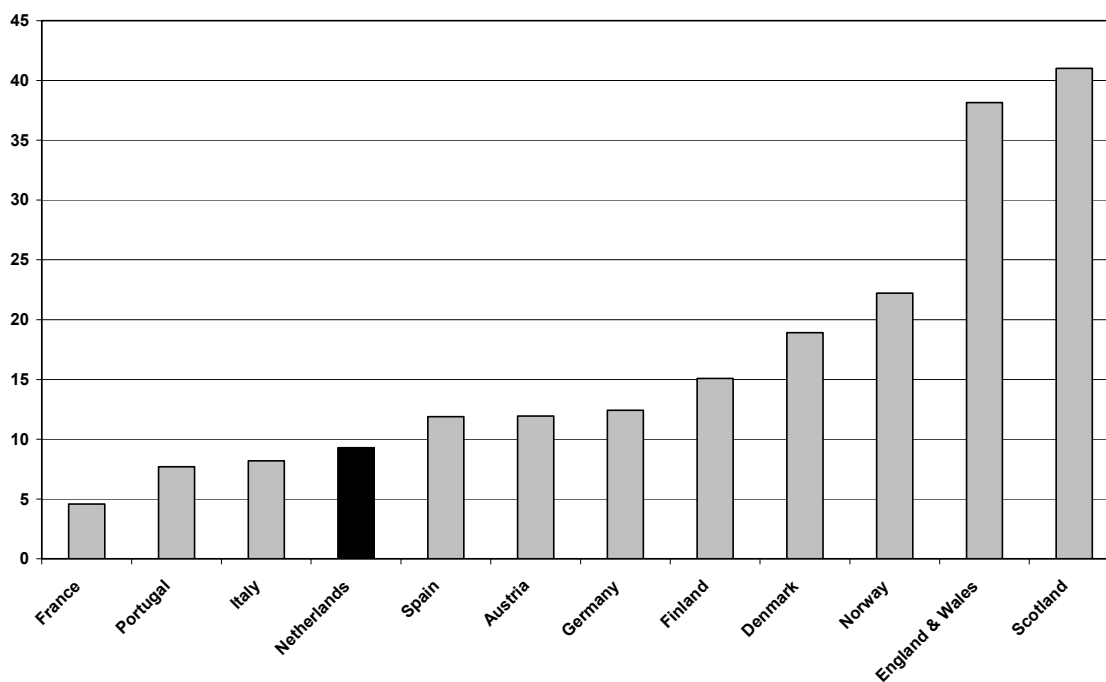


Figure 8: Ratio of lifetime cocaine (top) or amphetamine (bottom) use to lifetime cannabis use. SOURCE: Author's calculations using data from EMCDDA 2009, Tables GPS-1 and GPS-5.

Another way to examine this question is to see whether perceived ease of access to cannabis is correlated with the lifetime prevalence of the use of any illicit drug *other* than cannabis among students. Figure 9 shows that there is a clear correlation ( $r = .61$ ), but the Dutch use of the other illicit is somewhat lower than predicted, and the US is well above the predicted rate. These data don't necessarily support the "weakened gateway" hypothesis, but they clearly challenge any claim that the Dutch have strengthened the gateway to hard drug use.

**Perceived availability of cannabis and  
lifetime prevalence of other illicit drug use among students 15-16 yrs old**

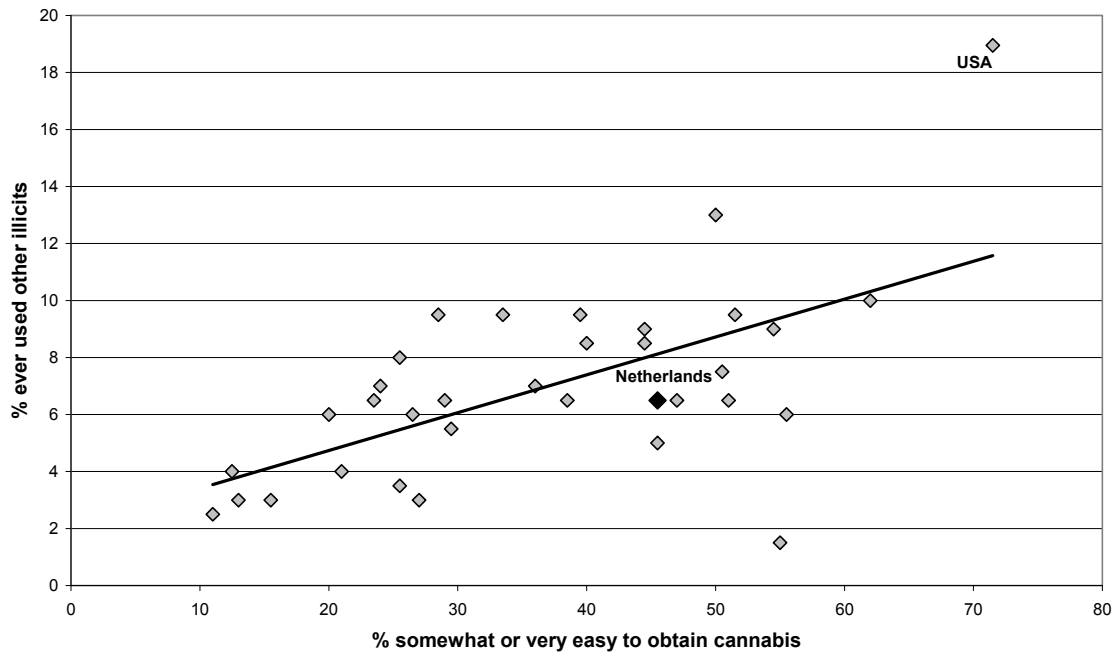


Figure 9. Association between perceived availability and lifetime prevalence of any illicit drug other than cannabis among 15-16 year olds in 35 nations (average of 2003 and 2007 estimates). SOURCE: ESPAD 2003 and 2007, MTF 2003 and 2007.

There are several other lines of indirect evidence. Concordance rates for marijuana use by twins in the Netherlands and Australia are similar, which could suggest a common developmental pathway irrespective of law or culture (Lynskey, Vink, & Boomsma, 2006). Using a bivariate duration model, van Ours (2003) – a labor economist who studies "stepping stones" in other economic contexts -- finds evidence consistent with a causal gateway effect in Amsterdam, but he concludes that:

"the multiple use of both drugs is mostly related to correlated (unobserved) heterogeneity. A lot of individuals with a greater susceptibility to consume cannabis also have a greater susceptibility to use cocaine. The Dutch policy to separate the markets of soft drugs and hard drugs does not seem to be irrational. Whatever the opinion on Dutch drug policy, it is clear from this study that allowing controlled use of soft drugs does not have the detrimental effect of stimulating the consumption of hard drugs."

### **THE COMMERCIALIZATION HYPOTHESIS**

In a 1997 article in *Science*, MacCoun and Reuter argue that the effects of the 1976 Dutch policy change evolved over time. They presented data suggesting that no detectable effects on cannabis use among Dutch citizens in the first six or seven years,

which they characterized as "the depenalization era." But MacCoun and Reuter argued that :

In the 1984 to 1996 period, which we characterize as a progression from depenalization to de facto legalization, these surveys reveal that the lifetime prevalence of cannabis in Holland has increased consistently and sharply. For the age group 18-20, the increase is from 15% in 1984 to 44% in 1996; past month prevalence for the same group rose from 8.5% to 18.5%...

MacCoun and Reuter (1997) argued that the increases in use between 1984 and 1992 were not paralleled in other nations, and that a plausible explanation was the rapid expansion of retail cannabis outlets. As seen in Figure 10 (top panel), the increase in cannabis use among Dutch 16-20 year olds coincided with a steep increase in the number (and visibility) of cannabis coffeeshops, at least in Amsterdam, where Dutch geographer A. C. M. Jansen (1991) conducted a detailed census for the years 1985 to 1988. (Unfortunately, there are no systematic annual estimates of the total number coffeeshops for the nation as a whole until a decade later.)



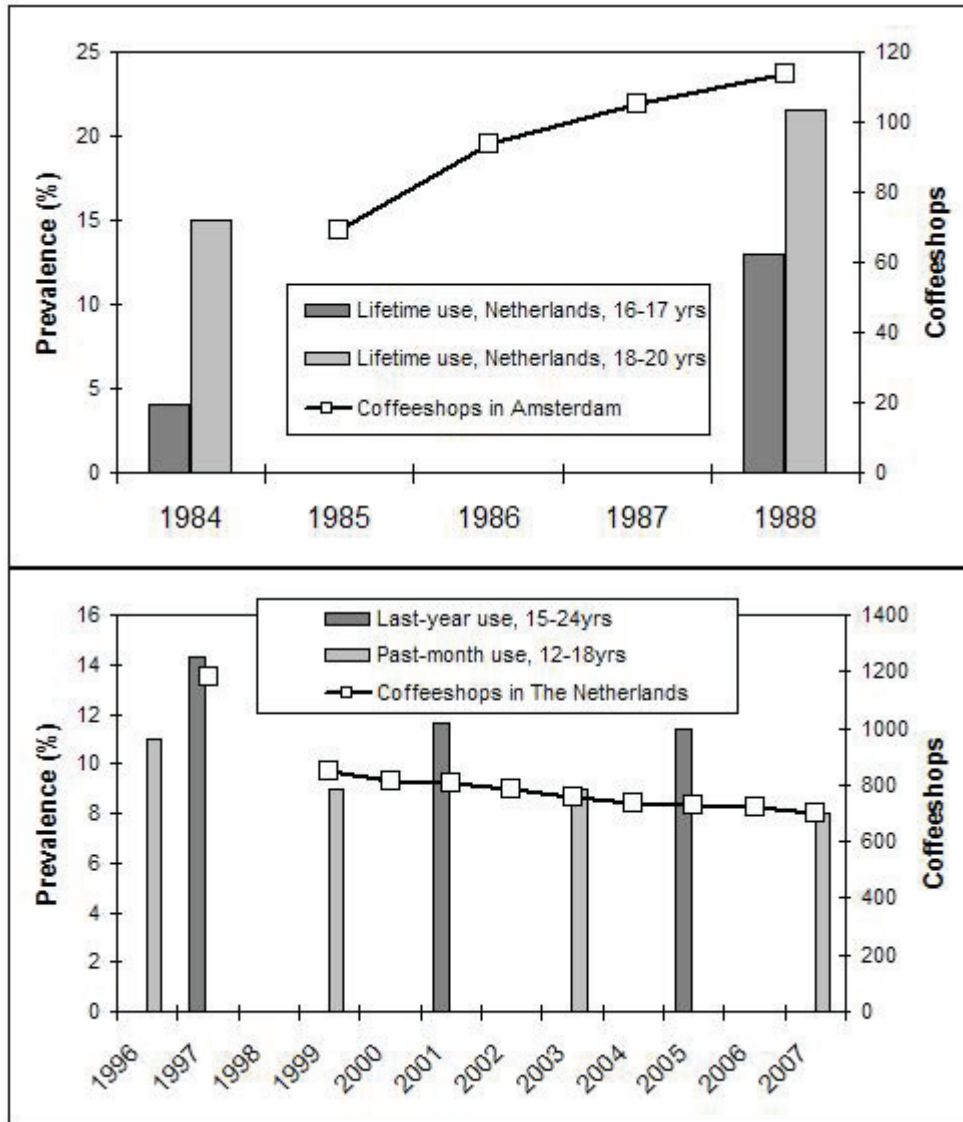


Figure 10. SOURCES: Top panel: Prevalence data from Trimbos Institute surveys and coffeeshop data from Jansen (1991), as reported in MacCoun & Reuter (1997). Bottom panel: Prevalence data from EMCDDA; coffeeshop data from Beileman et al. (2008).

MacCoun and Reuter argued that:

The increases in Dutch prevalence from 1984 to 1992 provide the strongest evidence that the Dutch regime might have increased cannabis use among youth. Why would the removal of criminal penalties for possession and small-scale sales require 8 years to have an effect? We hypothesize that this is the consequence of the gradual progression from a passive depenalization regime to the broader de facto legalization that allowed for greater access and increasing levels of promotion, at least until 1995, when the policy was revised.

Since 1997, MacCoun and Reuter's commercialization thesis has been debated in the literature, and a number of scholars have disputed it (Abraham, Cohen, & Beukenhorst,

2001; de Zwart & van Laar, 2001; Korf, 2002; Reinerman, Cohen, & Kaal, 2004). The paper is occasionally cited in the mass media and on the web; and authors often selectively cite either the "no effect of depenalization" argument or the "commercialization increases use" argument, and some have grossly misrepresented the statistical arguments of the paper (see MacCoun, 2001).

Here, we consider and respond to some of the most potent counterarguments (also see MacCoun & Reuter, 2001a, 2001b, 2001c, 2001d).

*Correlation doesn't prove causation.* Absolutely. As MacCoun and Reuter stated in 1997, "the association may not be causal; we have already seen that recent increases occurred in the United States and Oslo despite very different policies." But they also argued that the commercialization hypothesis was both theoretically plausible and arguably consistent with evidence from experiences with the commercialization of tobacco, alcohol, and gambling. There is no doubt that the data presented in the top of Figure 10, along with the other lines of evidence in MacCoun and Reuter (1997) fall well short of what contemporary methodological standards require for strong causal inference. But there is simply no other source of evidence on the effects of tolerated retail sales of cannabis in modern times.

*The Dutch are now below the US and many of their neighbors in cannabis use.* Again, we absolutely agree. But as illustrated by the quotes above, our thesis was not that the Dutch system led to a permanent increase in use relative to its neighbors. Rather, we argue that the evidence for the commercialization effect occurred in the 1984 to 1992 period. This was a period in which prevalence trends were either flat or declining in the US, Oslo, Catalunya, Stockholm, Denmark, Germany, Canada, and Australia (MacCoun & Reuter, 2001a, 2001d). As we wrote in 2001:

We hypothesize that the dramatic mid-1980s escalation in Dutch cannabis use is the consequence of the gradual progression from a passive depenalization regime to the broader de facto legalization which allowed for greater access and increasing levels of promotion, **at least until 1995 when the policy was revised.** In short, a shift from a depenalization era to a commercialization era.

... We should be clear about what we are and are not claiming. First, we are not claiming that the increases circa 1984-1992 are solely attributable to coffee shop commercialization. Second, we are not claiming that commercialization is synonymous with coffee shop transactions; commercialization also involves the heightened salience and glamorization (in the youth cultural sense) that results from widespread, highly visible promotion—in shop signs and advertisements, but also in countercultural media ads, postcards, and posters.

Although the evidence is again largely circumstantial, the subsequent decline in Dutch cannabis levels between 1996 and 2000 is also consistent with the commercialization thesis, because (as seen in the lower panel of Figure 10), it too coincided with a change in the number of coffeeshops – in this case, a decline. (Unfortunately, there are no

systematic counts of coffeeshops between Jansen's 1988 count for Amsterdam and the Intraval census studies beginning in 1996.)

One might expect a decline in the number of coffeeshops to be a response to declining prevalence, rather than a cause, but this is unlikely to be the primary story, for two reasons. First, the prevalence data are for Dutch citizens, and there is little evidence that "drug tourism" was declining during this period. Second, the majority of the coffeeshop closings were due to complaints, violations of the AHOJ-G rules, or policy decisions by local governments, rather than economic considerations (Bieleman et al., 2008; Deutsche Welle, 2007). There are of course other relevant considerations, including the fact that the legal age for coffeeshop purchases was raised from 16 to 18 years in 1996 (Monshouwer et al., 2005).

Because the decline in coffeeshops was steeper than the decline in prevalence, it is likely that over time, the remaining coffeeshops expanded their sales to meet the demand. But there are reasons to doubt that such an effect was enough to offset the impact of the closings. Fewer shops meant less visibility and salience and greater search time and hassle for customers. Also, increasing their "backdoor" inventories exposes the remaining owners to greater legal risk, and puts them on notice that visible advertising or neighborhood complaints could put them out of business. Finally, most shops can't easily expand their facilities because they are located in densely packed buildings and neighborhoods, and Dutch commercial real estate is very expensive.

*The MacCoun and Reuter analysis misleadingly mixes urban data (from Amsterdam) with national-level estimates from the USA and other countries.* MacCoun and Reuter (1997) offered 15 different contrasts between Dutch and non-Dutch estimates that matched in year and type of prevalence (lifetime, past-year, etc.). Seven compared Amsterdam data to national data from other countries. The paper was quite explicit this fact, and about the drawbacks of such comparisons, but we argued that:

American surveys indicate little difference on average between large metropolitan samples and the United States as a whole (3), but the estimates in Table 1 suggest that smaller Dutch communities (Tilburg and Utrecht) have lower rates than Amsterdam. U.S. rates are lower than that of Amsterdam, similar to that of Utrecht, and higher than that of Tilburg. (MacCoun & Reuter, 1997, p. 49)

As we later explained (MacCoun & Reuter, 2001c), these comparisons actually provide further evidence for the commercialization hypothesis. Why?

...the fact that cannabis prevalence is higher in Amsterdam is quite consistent with our hypothesis. During the 1980s, when we contend the commercialisation effect occurred, various estimates suggest that over a quarter of all Dutch cannabis coffee shops were in Amsterdam, yet Amsterdam accounted for only about 5% of the total Dutch population. As late as 1997, Abraham et al (1999) reported that last-year users from the highest-density Dutch addresses were more

likely to cite coffee shops as their cannabis source than were users from low-density Dutch addresses.

It is now possible to strengthen this argument. As seen in Table 3, 2001 is the one year where there are good estimates of both prevalence and the availability of coffeeshops, by location. While the data cannot establish a causal relationship, the table leaves little doubt that prevalence among citizens is higher in the locations with more coffeeshops.

Table 3. Last-month prevalence of cannabis and number of coffeeshops by municipal population density, 2001.

	Last-month prevalence	Number of coffeeshops
Amsterdam	13.1	280
Rotterdam	8.0	61
High density	7.5	596
Low density	2.9	97

SOURCES: Last-month prevalence data from Abraham et al (2002). Coffeeshop data from Bieleman et al. (2005).<sup>4</sup>

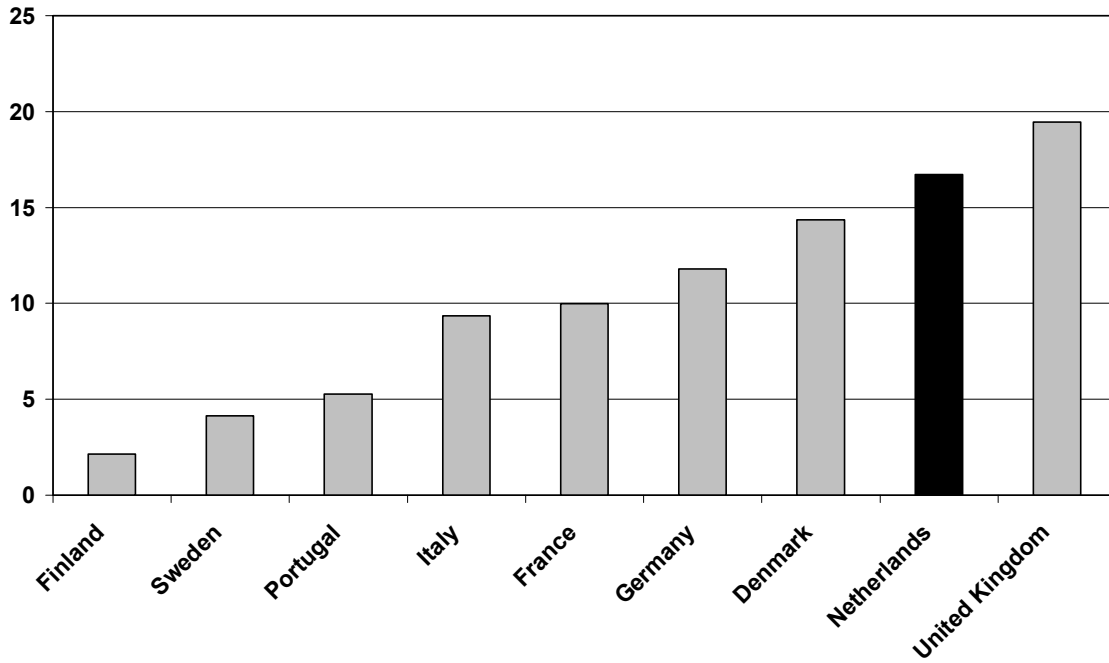
## CLIENTS IN TREATMENT FOR CANNABIS USE

Statistically, perhaps the most distinctive feature of Dutch cannabis use is that their citizens seem to have a higher likelihood of being admitted to treatment for cannabis use than is true for most countries in Europe (Figure 11 top). The finding is even more pronounced when calculated on a past-year user basis (Figure 11 bottom).

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<sup>4</sup> For the prevalence data, "high density" is the unweighted average of the estimates for municipalities with address densities between 1,500-2,500 and over 2,500; "low density" is the unweighted average of the estimates for municipalities with address densities of 500-1,000 or lower than 500. For the coffeeshops, "high density" is the sum of the estimates for municipalities with 20-50,000 or <20,000; "low density" is the sum of the estimates for municipalities with 100-200,000 or >200,000 inhabitants.

New cannabis clients per 100,000 citizens



New cannabis clients per 1000 past-year users

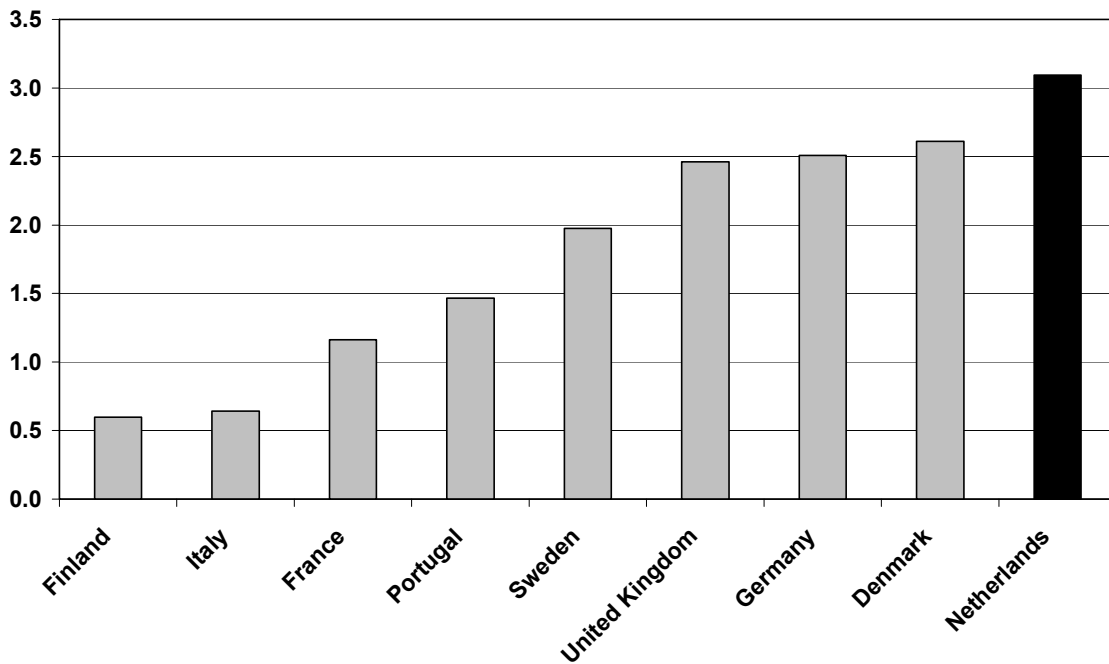


Figure 11. New treatment clients with cannabis as primary drug, per 100,000 citizens (top panel) and per 1000 past-year users (bottom panel). SOURCE: Author's calculations using

data from EMCDDA 2009 (Tables TDI-1 [new clients], TDI-3 [% with cannabis as primary drug], and GPS-3 [last-year users aged 15-64] and Eurostat-Statistics in Focus (2008; Table 2 [2007 population data]).

It is difficult to know how to interpret this high treatment rate. Does it reflect a greater need for cannabis treatment in the Netherlands than other countries? This is possible, but it is difficult to reconcile with their relatively modest cannabis continuation rates (relative to Europe), quantities consumed (at least relative to San Francisco), and the age curve for cannabis use (relative to the US). Another possibility is that the Dutch are more generous and proactive in providing treatment through their health care system. Reuter (2006) estimates that the Dutch government spends about 9,200 euros per "problematic drug user" on treatment; the comparable estimate for Sweden – a country with an active coerced treatment tradition -- is about 7,600 euros.

Figure 13 suggests that cannabis accounts for a rising share of treatment clients in the Netherlands and many of its neighbors, and that the trend is less pronounced in the US. (Cannabis accounts for a smaller share of treatment clients because A full analysis of this trend would require data on possible age, period, and cohort effects (the aging of cocaine and heroin addicts), but at face value, it appears that the Dutch have diverged from their neighbors in the past few years.

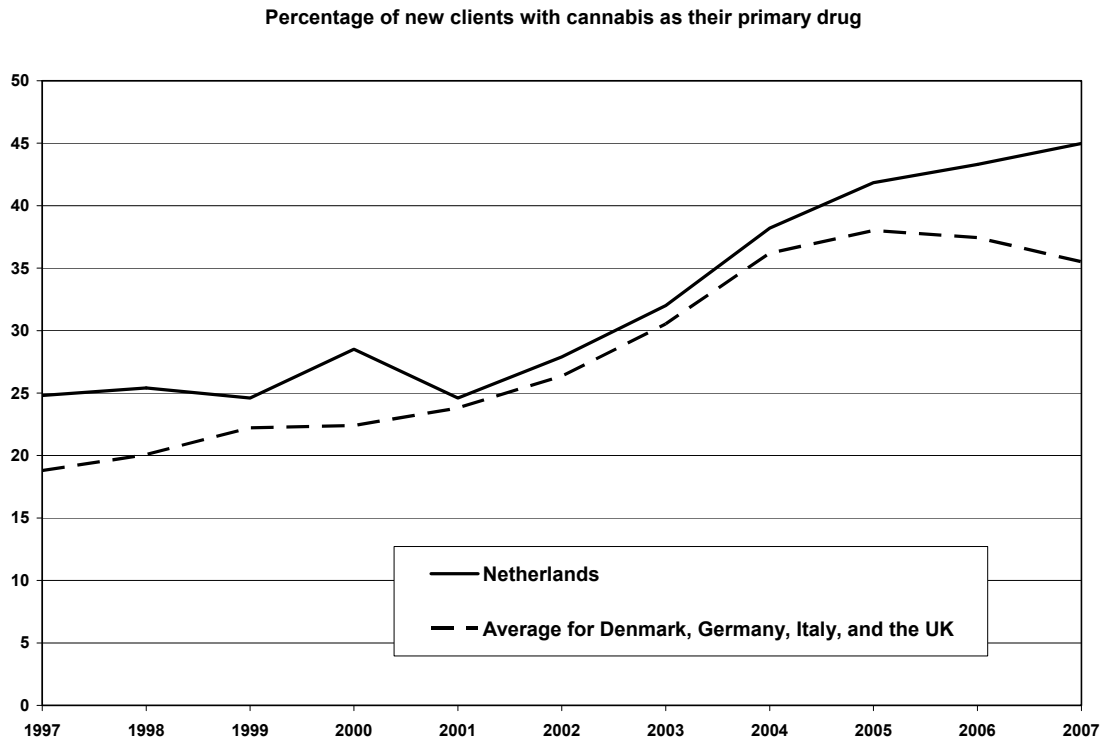


Figure 13. Trends in new cannabis treatment admissions, 1997-2007.  
SOURCE: European data from EMCDDA (Table TDI-3).

Table 4 compares treatment admission rates for the Netherlands and the US. The estimates of treatment may not be directly comparable – for both countries the numbers reflect admissions for cannabis (a flow rather than a stock variable) but it is not clear whether they are equally successful (or, rather, unsuccessful) at covering inpatient vs.

outpatient and private vs. public treatment.<sup>5</sup> But it appears that on a per-capita basis, the US has about 4 marijuana treatment admissions for every Dutch admission; on a per past-month user basis the ratio is 1.8:1. About half the US admissions are criminal justice referrals vs. about 10 percent of the Dutch admissions (TEDS; Ouwehand et al., 2006, p. 11). If we exclude these referrals, we end up with 6 admissions per 1000 past-month users in each country. So it appears that users are more likely to find their way into treatment in the US than in the Netherlands, but that the difference is probably attributable to the much greater use of criminal justice referrals in the US.

Table 4. Calculating treatment rates per 1,000 citizens and 1,000 past year users.

	Netherlands	USA
Treatment admissions for cannabis as primary drug in 2005	4,135	300,326
Population aged 15-64	11,324,401	208,050,000
Last year users	613,275	24,559,000
<i>Estimated cannabis admissions per 1,000 citizens in 2005</i>	0.36	1.41
<i>Estimated cannabis admissions per 1,000 past-month users in 2005</i>	6.74	11.90
<i>Admissions per 1,000 users excluding criminal justice referrals</i>	6.07	5.95

SOURCES: Author's calculations using data from ECMDDA (2008) Tables TDI-2, TDI-3, and GPS-3; Treatment Episode Data Set (TEDS), Highlights – 2005, Table 1a; and NSDUH Tables 1.20A and 1.20B.

## CANNABIS PRICES, POTENCY, AND SUPPLY REDUCTION

It is very likely that full-scale legalization would significantly reduce cannabis prices (see Kilmer et al., forthcoming; Caulkins, forthcoming). The Dutch do not have a true legalization regime; it is best characterized as "de facto" legalization, and even then, only at the retail level.

Table 5 shows "typical" retail prices (\$/g) circa 2007 for the USA and various nations in Western Europe as reported by officials to the United Nations Office of Drug Control (UNODC, 2009). The typical Dutch price is indeed relatively low, but not as low as Portugal and Spain, which have each decriminalized possession without legalizing sales.

Table 5. Cannabis Herb Price and Purity Data for Selected Countries, Circa 2007

<sup>5</sup> Ouwehand et al. (2006) cite a variety of 2005 Dutch figures in the 2,000-6,000 range varying with respect to whether they are stocks vs. flows and whether they include all admissions or first-time admissions. According to ECMDDA (2008), there were 9,411 Dutch clients entering treatment in 2005 and 42 percent had cannabis as the primary drug, yielding 3,938 cannabis admissions. Because this figure appears to exclude inpatient treatment; I adjusted it up by 5 percent assuming roughly 20 outpatient clients for every inpatient client (see Korf, 2001). Note that both the Dutch and US figures exclude much of the private treatment population – perhaps 30 percent of the US market and an unknown but presumably smaller fraction of the Dutch market.

(Sources: UNODC, 2009, p. 226)

Nation	Typical \$/g
Norway	\$27
Sweden	\$12
Germany	\$11
Italy	\$10
USA	\$10
France	\$8
UK	\$8
Switzerland	\$8
<b><i>The Netherlands</i></b>	<b>\$7</b>
Portugal	\$6
Spain	\$4

It is not clear how officials in each country generate these estimates, or whether they do so in a similar way. The comparisons are further muddled by the stark difference in policy between the Netherlands and the other nations.

At least for the Netherlands, two recent studies provide more rigorous estimates of Dutch prices on a purity-adjusted basis. Pijlman et al. (2005) purchased each of 4 different cannabis preparations from 50 randomly selected coffeeshops each year between 2000 and 2004. For 2004, the average Euros-per-gram price was 6 for Nederwiet, 4.9 for imported marijuana, 12.5 for Nederhasj, and 6.6 for imported hashish. This is in the \$6 to \$15 range per gram for 2004\$; interestingly the Dutch herb and resin products were more expensive than their imported counterparts. Hazekamp (2006) obtained and analyzed 13 samples obtained from 11 Dutch locations; each proprietor was asked to recommend a product for a family member who was allegedly "suffering from multiple sclerosis." He found prices in the 5 to 9 euro/gram range -- about \$6 to \$11 per gram. (This is after correcting for the fact that all but 2 of his 13 samples were less than the advertised 10 grams!) Table 6 summarized the key results of these two studies.

Table 6. Price and purity of cannabis in two Dutch studies.

	Euros per gram	\$s/gram	% THC	Euros per 100mg THC	\$s/100 mg THC
Pijlman et al. (2005)					
<i>Nederwiet</i>	6	7.20	20.4	2.94	3.53
<i>Imported marijuana</i>	4.9	5.88	7.0	7.00	8.40
<i>Nederhasj</i>	12.5	15.00	39.3	3.18	3.82
<i>Imported hashish</i>	6.6	7.92	18.2	3.63	4.35



Hazekamp (2006)						
<i>Minimum</i>	5.09	6.10	11.7	3.11	3.73	
<i>Maximum</i>	9.42	11.30	19.0	6.80	8.16	

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Synthesizing price data from STRIDE, the NSDUH, and High Times magazine, Gettman (2007) suggests that the typical price per gram in the USA circa 2005 was around \$7.87. In a more rigorous analysis of 2005 price data, Caulkins and Lumibao (in progress) estimate that a more accurate figure for 2005 would be around \$4.81, and possibly as low as \$3. (A third estimate falls in between at \$5.78; see Kilmer & Pacula, 2009). US samples of seized marijuana in 2005 averaged 8.14% THC (National Drug Intelligence Center, 2006). This implies a price per 100mg of THC of around \$6.41 (using Gettman's price estimate) to \$3.92 (using Caulkins & Lumibao price estimate).

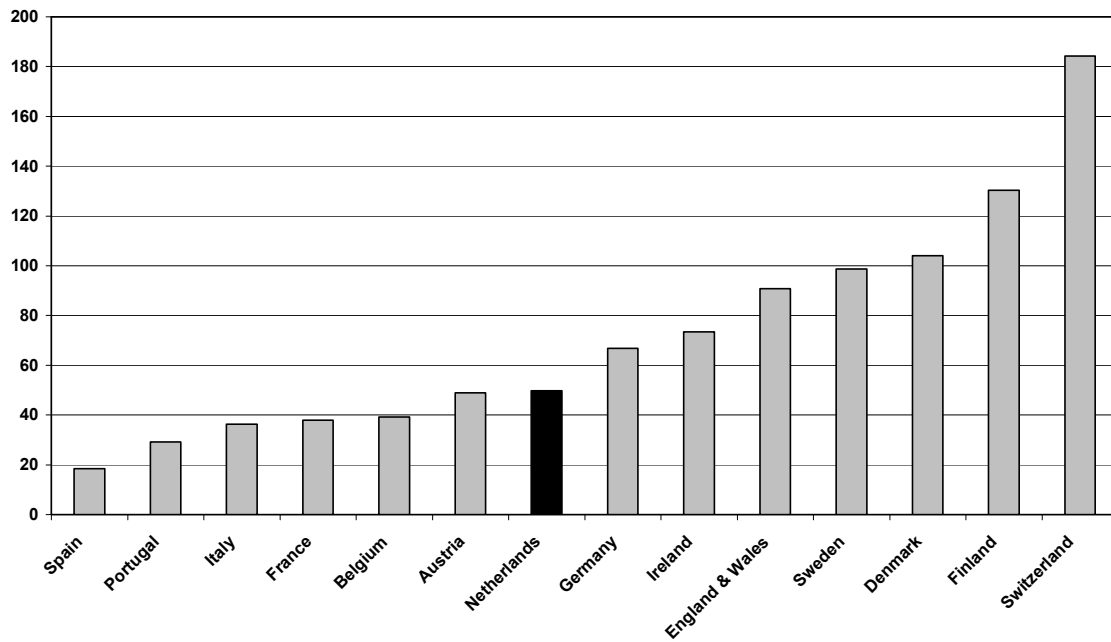
Under the Gettman estimate, 2005 prices per gram were comparable for Dutch Nederwiet and US marijuana herb on a per-gram basis, but the Dutch product was cheaper on a purity-adjusted basis. Under the Caulkins and Lumbibao estimate, the Dutch and US prices were roughly comparable on a purity-adjusted basis, but the US price would actually be lower on a per-gram basis. Note however that differences in sampling and statistical analysis make these comparisons very rough. The comparison is further complicated by the likelihood that US consumers buy less often in larger packages (receiving a quantity discount).

Why are the Dutch prices so high in a quasi-legalization regime – does this indicate that legalization has no effect on prices? Such a conclusion is unwarranted. First, the Dutch price data include retailer markups to cover the costs the owners incur in operating retail outlets in commercial neighborhoods.

Second, it seems likely that prices in the Netherlands are elevated by their unusual hybrid regime which approximates legalization at the user level, but European style prohibition at the level of the growers and traffickers (MacCoun & Reuter, 1997) – with coffeeshop owners in a grey area somewhere between. If high-level Dutch traffickers face an enforcement risk, they presumably pass this along in higher prices down the supply chain (Reuter & Kleiman, 1986).

It is extremely difficult to find good comparative data on the stringency of enforcement against cannabis growers and traffickers anywhere in Europe. In 2004, roughly 40 percent of Opium Act cases were for soft drugs; they accounted for about 2 percent of the total detention years imposed that year (van Ooyen-Houben & Meijer, 2006). Figure 14 shows that a much less direct measure – convictions for any drug offenses (averaged for 4 years to reduce noise) – the Dutch are more lenient than many but by no means all of their neighbors. Unfortunately, I have not been able to break these figures out by drug, much less by criminal charge. [NOTE: I will later try to put these on a per-user basis]

**Persons convicted of drug offenses per 1,000 population  
(average for 2000-2003)**



SOURCE: Author's calculations using data from European Sourcebook of Criminal Justice Statistics, Table 3.2.1.12.

Table 7 shows that the Dutch seize a lot more cannabis (per 100,000 citizens) than many European countries, but at a rate almost identical to the UK. This is difficult to interpret because there may be more herbal cannabis available to seize in the Netherlands, and the cannabis is probably higher in ptency; the country's prominent role in legitimate international trade surely plays a role as well. At best, we can take these data – together with routine reports of particular police actions in the Dutch media -- as an existence proof that the Dutch are clearly enforcing prohibition at the higher end of the supply chain. Presumably this is keeping prices elevated.

Table 7. Annual cannabis seizures, 2005-2007.

Country	Kg of herbal cannabis seized				MEAN	Mean kg per 100,000 citizens
	2005	2006	2007			
Denmark	130	45			88	1.6
Finland	43	33	36		37	0.7
France	3,062	3,774	3,048		3,295	5.2
Germany	3,014	2,954	3,770		3,246	3.9
Italy	2,485	4,976	4,540		4,000	6.8

<b>Netherlands</b>		<b>6,600</b>	<b>5,470</b>	<b>6,035</b>	<b>36.9</b>
Portugal	121	152	133	136	1.3
Spain	666	510	1,233	803	2.0
Sweden	186	322	106	205	2.2
United Kingdom	20,650	25,760		23,205	38.1
				MEDIAN	3.1

SOURCE: Author’s calculations using data from EMCDDA 2009 (Tables SZR-4 [seizure data] and Eurostat-Statistics in Focus (2008; Table 2 [2007 population data])).

## CONCLUSIONS

Americans are surprisingly quick to form opinions about the Dutch cannabis model, often based on stereotypes and misconceptions (see MacCoun, 2001 for examples). Whether the Dutch should go forward with this model in the future is uncertain – in recent years the country has become more conservative in various ways – and I suspect most Dutch citizens feel it is none of our business anyway. But the Dutch experience is potentially informative for Californians who are struggling to anticipate what might happen if a new law legalizes cannabis sales in the near future.

The best available evidence paints a nuanced picture. Dutch citizens use cannabis at more modest rates than some of their neighbors, and they don't appear to be particularly likely to escalate their use relative to their counterparts in Europe and the US. Moreover, there are indications that rather than increasing "the gateway" to hard drug use, separating the soft and drug markets possibly reduced the gateway, though it is difficult to test this argument with any rigor.

But the Dutch experience also raises some cautionary notes. There are several lines of circumstantial evidence that the Dutch retail system increased consumption, especially in its early years when coffeeshops were spreading, open to 16 year olds, and advertised more visibly than they do today. And if so, this increase occurred in a hybrid system in which high-level enforcement probably served to keep prices from dropping the way they might in a full-scale legalization scheme. Many people look to the Netherlands as a model for what might happen if cannabis were legalized in California. But what the Dutch have done is quite different, and far more nuanced, than what is proposed in the Assembly bill and ballot initiative that are currently (as of July 2010) under consideration in California. The Dutch system is ambiguous by design, and it is ambiguous in ways that give officials leverage over prices and sales in ways that might be far harder to achieve in a full-scale legalization regime.

## APPENDIX: What is The Dutch Cannabis Market Worth?

### Top-down estimate

According to Dutch police official Max Daniel, "Foreign buyers pay three or four times the Dutch price. ...We have estimated that at least 80 percent of what is grown in the Netherlands is exported. More than €2 billion (\$2.7 billion) worth of cannabis is exported every year." (NRC Handelsblad, 2008). Assuming a 3:1 price ratio, this implies that the local market is worth €286 million and that the total market is worth €2.5 billion.

### **Bottom-up estimate**

In 2005, about 611,518 Dutch citizens used cannabis. If we assume that total consumption is about 100 grams per past-year user (see Kilmer et al., 2010), then that implies about 61,152 kg of cannabis.

The Dutch Tourist Information (2008) claims that in 2007, 26 percent of the 4.5 million tourists in the Netherlands visit a cannabis coffeeshop – about 1,125,000 people. If we assume each one purchases 1 gram – an assumption for which we have little evidence – that would imply another 1,125 kg of cannabis, for a total domestic amount of 62,277 kg.

If this amount sold for somewhere between €5 to €9 per gram, that would imply that the domestic market was worth €311 to €560 million a year. This would be 14 to 25 percent of the top-down estimate of the total market size, consistent with the assertion that at least 80 percent of production is for export.

### **Kilmer, Pacula, & Reuter estimate**

After I made these calculations I learned of a third estimate produced by Kilmer, Pacula, and Reuter (2010), using somewhat different assumptions and calculations. For 2005, they estimate that the Dutch retail cannabis market was between 32.8 and 152.4 metric tons (MT); their best estimate was 73.3 MT. They estimate that this market's value was between €172.9 and €804.9 million; their best estimate was €386.9 million. This is reasonably close to my bottom-up estimate of 62 MT of cannabis, worth €311 to €560 million.

### **AUTHOR NOTE.**

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