

What can we learn from the Dutch cannabis coffeeshop system?

Robert J. MacCoun

Goldman School of Public Policy and UC Berkeley School of Law, University of California, Berkeley, CA, USA

ABSTRACT

Aims To examine the empirical consequences of officially tolerated retail sales of cannabis in the Netherlands, and possible implications for the legalization debate. **Methods** Available Dutch data on the prevalence and patterns of use, treatment, sanctioning, prices and purity for cannabis dating back to the 1970s are compared to similar indicators in Europe and the United States. **Results** The available evidence suggests that the prevalence of cannabis use among Dutch citizens rose and fell as the number of coffeeshops increased and later declined, but only modestly. The coffeeshops do not appear to encourage escalation into heavier use or lengthier using careers, although treatment rates for cannabis are higher than elsewhere in Europe. Scatterplot analyses suggest that Dutch patterns of use are very typical for Europe, and that the 'separation of markets' may indeed have somewhat weakened the link between cannabis use and the use of cocaine or amphetamines. **Conclusions** Cannabis consumption in the Netherlands is lower than would be expected in an unrestricted market, perhaps because cannabis prices have remained high due to production-level prohibitions. The Dutch system serves as a nuanced alternative to both full prohibition and full legalization.

Keywords Cannabis, drug policy, legalization, marijuana, prevalence, prices, treatment.

Correspondence to: Robert J. MacCoun, Goldman School of Public Policy, University of California, Berkeley, CA 94720-7320, USA.

E-mail: maccoun@berkeley.edu

Submitted 22 October 2010; initial review completed 13 December 2010; final version accepted 20 June 2011

INTRODUCTION

In 1976 the Netherlands adopted a formal written policy of non-enforcement for violations involving possession or sale of up to 30 g of cannabis. The 'gateway theory' has long been seen as an argument for being tough on cannabis, but interestingly, the Dutch saw that concept as a rationale for allowing retail outlets to sell small quantities [1]. Rather than seeing an inexorable psychopharmacological link between marijuana and hard drugs, the Dutch hypothesized that the gateway mechanism reflected social and economic networks, so that separating the markets would keep cannabis users out of contact with hard-drug users and sellers.

This essay examines what the available data can tell us about how these retail coffeeshop sales may have influenced cannabis use and its consequences. Three types of indicators are examined: the prevalence and intensity of cannabis use; market indicators, including prices, purity, seizures and enforcement; and treatment data as a partial indicator of harms to users. Other types of consequences (for public safety, public order, economic productivity,

family life, health and personal enjoyment) are not examined because they are so difficult to quantify and because they pose such severe causal identification problems.

This essay does not seek to judge the Netherlands or critique its internal policy decisions—which as we will see are undergoing significant change. Rather, the goal is to see what other jurisdictions might learn about potential policy options and outcomes by drawing upon the Dutch experience and their energetic efforts to document their policies and outcomes. There are daunting analytical challenges in making cross-national comparisons of drug policies and outcomes [2], but if we want to identify more effective policies we need to make comparisons across jurisdictions, and it is surely better to make provisional judgments than provincial ones [3].

A BRIEF OVERVIEW OF THE COFFEESHOP SYSTEM

Although the numbers are currently dropping, the most recent systematic count identified around 700 retail cannabis outlets in the Netherlands—about one per 29 000

citizens (one per 3000 in Amsterdam) [4]. The industry employs 3000–4000 workers, and the owners have their own union (the Bond van Cannabis Detaillisten) [5]. The shops sell somewhere between 50 and 150 metric tonnes of cannabis at a value of perhaps €300–600 million a year (see Appendix S1 for three different methods of estimating these figures; supporting information details are given at the end). They do not pay VAT—the European Court of Justice will not let them—but they pay various income and corporate taxes [6,7]. It is estimated that a quarter of the 4–5 million tourists who visit Amsterdam visit a coffeeshop, and that 10% of them cite that as a reason why they came [8].

The Dutch experience is challenging to characterize, because it is a moving target. The Dutch policy has continued 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-g limit was reduced to 5 g, and a 500-g limit was set for coffeeshop stocks. Since the late 1970s, a set of guidelines has emerged for regulating the technically illicit retail sales in open commercial establishments. As formalized by the Public Prosecution Service, coffeeshop owners are not to be prosecuted for selling cannabis provided that 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 offense. 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, coffeeshops may stock up to 500 g of cannabis without facing prosecution. Municipalities may impose additional rules on coffeeshops in order to avoid nuisance' [9].

Enforcement of these rules did not 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%, from 1179 to 702 [4,5].

In the past few years, the Dutch have had lively debates about the coffeeshop model [10,11]. In 2008 the Netherlands banned tobacco smoking in the coffeeshops (and all other commercial establishments) [12] and they have been closing shops located near schools [13]. To eliminate the so-called 'backdoor' problem of legal inconsistency, some officials argue that municipalities or coffeeshop owners should be allowed to cultivate cannabis

legally. In 2010, the European Court of Justice ruled that the town of Maastricht may ban foreigners from buying cannabis there [14].

However, the most significant development was the Dutch cabinet's announcement on 27 May 2011 that the coffeeshops would be run as private clubs for Dutch citizens [15]. Memberships per club will probably be initially capped at 1500, and foreign visitors [even those from the European Union (EU)] will be excluded. As discussed in more detail below, this change will significantly impact the sizable 'drug tourist' market, and is likely to result in a significant reduction in the number of active coffeeshops. The proposed policy change is startling, because Dutch officials have long resisted international pressure, standing by the coffeeshop model as an expression of Dutch *gedoogcultuur* ('culture of permissiveness') and as a pragmatic 'least worst' solution [6].

So why this change, and why now? The Cabinet cited nuisance, sales to tourists and increases in problematic use by youth, but the complexities of recent coalition politics are probably a factor as well; in particular the rising influence of Geert Wilders' far-right party. The 2009 Lisbon treaty may also have played a role: Articles 83 and 86 allow for the establishment of a European Public Prosecutor's office that could pursue 'cross-border' crimes such as drug trafficking [16]. What is striking is that the proposed policy shift would not actually eliminate the 'backdoor problem' that many see as an unworkable contradiction. Rather, the Dutch will have essentially internalized the contradiction, accepting it for their own citizens but no longer allowing it to influence foreigners.

PREVALENCE AND PATTERNS OF CANNABIS USE

When Reuter and I examined Dutch cannabis trends for the 1980s and 1990s, the data were very sparse and of uncertain comparability [17]. In 2010 there are a great deal more relevant data, and are generally of better quality, due largely to the tremendous efforts of two international consortia, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA [18]) and the semi-annual European School Survey Project on Alcohol and Other Drugs (ESPAD [19]).

Are the Dutch more likely to use cannabis?

Table 1 (columns 2, 3 and 4) shows ESPAD and US (Monitoring the Future; MTF [20]) data for 15–16-year-old students. Three features of the prevalence data are noteworthy. First, the US rates exceed the Dutch rates, but they are roughly equivalent within sampling and measurement error. Secondly, both the United States and the

Table 1 Drug use and perceived availability among students aged 15–16 years, averaged for the years 2003 and 2007.

Country	Cannabis						Other	
	Life-time prevalence	Last year prevalence	Past month prevalence	Mean use 40+ times	Mean first use by age 13	Fairly/very easy to obtain	Been drunk in past 12 months	Ever used other illicit drugs
Austria	19.0	15.0	8.0	3.0	4.0	33.5	62.5	9.5
Belgium	28.0	23.0	14.5	5.5	6.0	44.5	38.0	8.5
Bulgaria	21.5	16.5	7.5	3.0	3.5	38.5	50.5	6.5
Croatia	20.0	14.5	7.0	3.0	3.0	45.5	45.5	5.0
Cyprus	4.5	3.5	2.5	1.0	1.5	12.5	21.5	4.0
Czech Republic	44.5	35.5	18.5	8.0	7.5	62.0	58.0	10.0
Denmark	24.0	19.0	9.0	3.0	5.5	55.5	77.5	6.0
Estonia	24.5	16.5	6.0	2.5	4.5	28.5	55.0	9.5
Finland	9.5	7.0	2.5	0.5	1.5	15.5	54.5	3.0
France	34.5	27.5	18.5	7.5	8.0	44.5	32.5	9.0
Germany	23.5	18.0	9.5	3.5	7.5	39.5	55.5	9.5
Greece	6.0	5.0	2.5	1.0	1.0	21.0	31.5	4.0
Hungary	14.5	10.5	5.5	1.0	2.0	26.5	44.0	6.0
Ireland	29.5	23.0	13.0	5.5	7.5	51.5	59.5	9.5
Italy	25.0	20.5	14.0	5.5	4.0	40.0	32.0	8.5
Latvia	17.0	10.0	4.0	1.0	3.5	25.5	51.0	8.0
Lithuania	15.5	11.5	5.5	1.0	2.0	24.0	54.5	7.0
Malta	11.5	10.0	4.5	1.0	2.5	23.5	38.0	6.5
Netherlands	28.0	24.0	14.0	6.5	7.0	45.5	41.0	6.5
Norway	7.5	5.0	2.5	1.0	2.0	27.0	47.0	3.0
Poland	17.0	13.0	7.0	2.0	2.0	36.0	39.5	7.0
Portugal	14.0	11.5	7.0	2.5	3.5	29.0	27.0	6.5
Romania	3.5	2.0	0.5	0.0	0.0	11.0	31.0	2.5
Slovak Republic	29.5	22.0	10.5	3.5	6.0	50.5	53.5	7.5
Slovenia	25.0	20.5	11.5	4.5	6.0	51.0	49.5	6.5
Sweden	7.0	5.0	1.5	0.5	1.5	25.5	46.0	3.5
United Kingdom	33.5	26.5	15.5	7.0	11.0	54.5	62.5	9.0
United States	33.5	26.4	15.6	9.0	8.0	71.5	34.5	19.0
Mean	20.4	15.8	8.5	3.3	4.4	36.9	46.2	7.2
SD	10.4	8.5	5.3	2.6	2.7	15.3	12.8	3.2
Median	20.8	15.8	7.3	3.0	3.8	37.3	46.5	6.8

Source: author's calculated averages using data from European School Survey Project on Alcohol and Other Drugs (ESPAD) (2003, 2007) and Monitoring the Future (MTF) (2003, 2007). MTF (2003 and 2007): Table 1 (life-time), 2 (last year), 3 (past month), 6 (risk), 12 (availability); ESPAD (2003, Table 28c; 2007, Tables 31A and 41A), MTF (2009, Tables 1–3, 6 and 12). SD: standard deviation.

Netherlands rank highly relative to most other nations. Thirdly, 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 United Kingdom, France and Switzerland.

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 substances. Table 1 suggests that Dutch students do indeed rank higher for life-time prevalence of cannabis than for getting drunk or the use of other illicit drugs.

Figure 1 is a scatterplot showing the strong association 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. This is not a direct test of the effects of availability on use; it is very likely that users can obtain cannabis more easily than non-using students, and both variables may be picking up the shared effects of one's peer group, but as one might expect, Dutch youth report higher than average availability of cannabis. Nevertheless, they fall well short of the levels reported in the United States and some other countries, and the Dutch data fit right on the trend line.

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 intensity

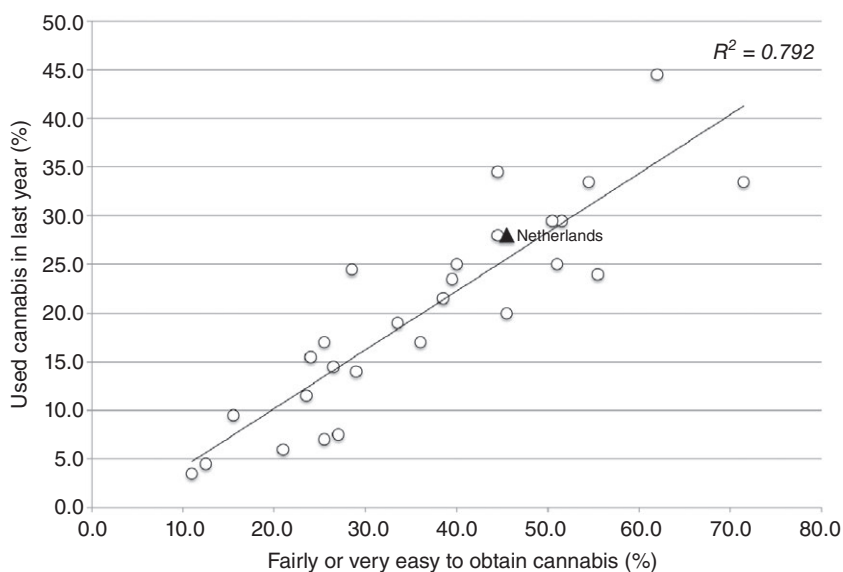


Figure 1 Association between perceived availability of cannabis and its use in past year for students aged 15–16 years (average of 2003 and 2007 data). The black triangle represents the Dutch estimate. Source: See Table 1

and duration of a cannabis using ‘career’. Table 1 shows some evidence for this in student data. 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 United States.

One might expect that Dutch citizens would be more likely to escalate from casual experimentation to regular use, but student data (Fig. 2, top panel) show that the current use rate among Dutch students is quite close to what we would predict knowing only their life-time prevalence rates. When we include data for adults (Fig. 2, bottom panel), we find that the Dutch ‘continuation rate’ is actually lower than one would predict based on similar rates in other countries.

Regarding regular Dutch users, do they use more cannabis than they might in other countries with less availability? A comparison of regular users in Amsterdam and San Francisco [21] found quite similar rates of self-reported use. The most common response in both Amsterdam (41%) and San Francisco (52%) was ‘less than 2 grams’ in the past 3 months, well short of the maximum allowed coffeeshop purchase (5 g). Almost all (89% in Amsterdam and 91% in San Francisco) reported using less than 15 g over 3 months.

One might also expect that the ready availability would serve to extend the length of a using career. Figure 3 examines this issue using Dutch national surveys in 2001 (top panel [22]) and 2005 (bottom panel [23]). Both comparisons tell the same basic story: Dutch

users appear to ‘mature out’ of cannabis use at a faster rate than their American counterparts.

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 [24]. Figure 4 presents the ratio of people who have tried cocaine (top panel) or amphetamines (bottom panel) to those who have tried cannabis in various European national surveys over the decade 1998–2008. (Heroin use is too rarely reported in the surveys to permit a similar estimate.) The estimates all suggest that cocaine and amphetamine use are below what one would predict for the Netherlands. Although hardly conclusive, these data are consistent with the notion that the coffeeshop system might ‘weaken the gateway’.

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 [25]. Using a bivariate duration model, van Ours finds evidence consistent with a 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’ [26].

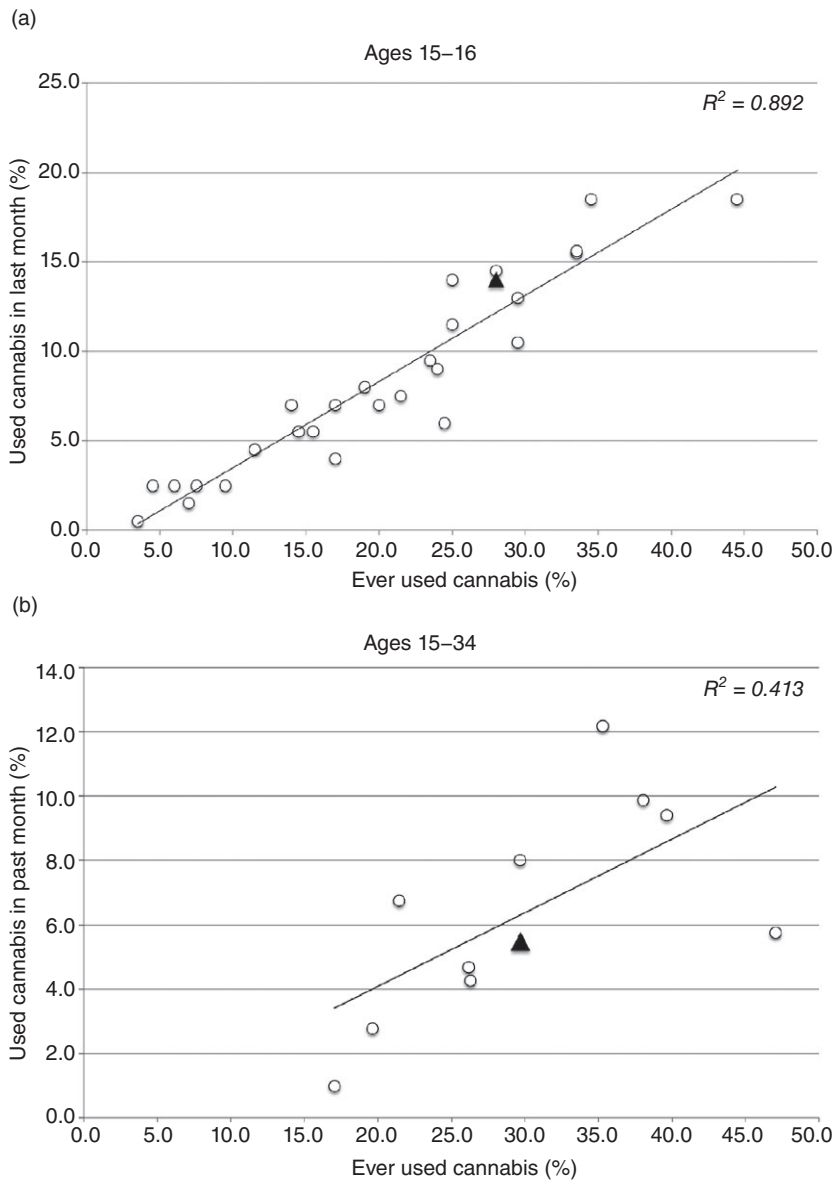


Figure 2 Association between life-time and past-month prevalence of cannabis use. (a) Students aged 15–16 (averaged across years 2003 and 2007). The black triangles estimate Dutch estimates. For sources, see Table 1. (b) People aged 15–34, various European nations (various years between 1998 and 2008). Source: European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), GPS-2 and GPS-6

The commercialization hypothesis

Reuter and I have suggested that the Dutch cannabis system emerged in two phases, with distinct effects [17,27]—an initial ‘depenalization’ phase with no detectable effects on cannabis use, and a second phase (approximately 1984 and 1996) in which the percentage of 18–20-year-olds who had ever used cannabis rose from 15% to 44%, with past-month prevalence rising from 8.5% to 18.5%. During this latter period, prevalence trends were either flat or declining in the United States, Oslo, Catalunya, Stockholm, Denmark, Germany, Canada

and Australia. We characterized this period as the Dutch ‘commercialization era’, arguing that it was plausibly attributable to the rapid expansion of retail cannabis outlets, at least in Amsterdam [28]. The differences between Amsterdam and smaller Dutch cities were more pronounced than one sees in urban–non-urban comparisons for the United States, perhaps due to Amsterdam’s disproportionately large share of the coffeeshops in the Netherlands.

This commercialization thesis has been debated in the literature [29–34]). The available data fall far 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, and we have argued that a commercialization effect is both theoretically plausible and arguably consistent with evidence from experiences with the commercialization of tobacco, alcohol and gambling [1].

Between 1997 and 2005, past-year use among Dutch 15–24-year-olds declined from 14.3 to 11.4% during a period when other European countries (Germany, Spain, Italy and Sweden) were seeing increases [17]. Although it is difficult to establish causation, this pattern is also consistent with the commercialization thesis [35], because the legal age for coffeeshop purchases was raised from 16 to 18 years in 1996 [36], and the number of cannabis coffeeshops dropped nearly 40%, from 1179 in 1997 to 729 in 2005 [4].

One might expect a decline in the number of coffee-shops to be a response to declining prevalence, rather than a cause, but this is unlikely to be the primary story. First, it is doubtful that ‘drug tourism’ was declining during this period. Secondly, the majority of coffeeshop closings were due to complaints or violations of the AHOJ-G rules rather than economic considerations [4].

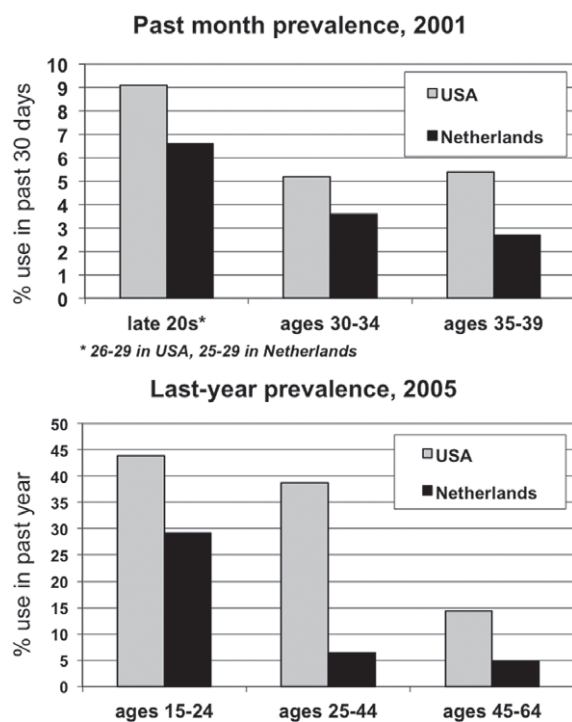


Figure 3 Past-month prevalence (2001) and last-year prevalence (2005) by age group. Sources: US data from National Survey on Drug Use and Health (NSDUH) 2001 and 2005 (Table 20B); 2001 Dutch data from Abraham, Kaal & Cohen [2002; Centrum voor Drugsonderzoek (CEDRO); Table 4.5]; 2005 Dutch data from Rodenburg *et al.* [Addiction Research Institute Rotterdam (IVO), 2007 [23], Table 4.3]

Fewer shops meant less visibility and salience and greater search time and hassle for customers.

CLIENTS IN TREATMENT FOR CANNABIS USE

Statistically, perhaps the most distinctive feature of Dutch cannabis use is that their users seem to have a higher likelihood of being admitted to treatment for cannabis use than is true for most countries in Europe (Fig. 5 top panel). It is difficult to know how to interpret this high treatment rate. It could reflect a greater need for cannabis treatment in the Netherlands, but that is difficult to reconcile with their relatively modest cannabis continuation rates (relative to Europe) and quantities consumed (at least relative to San Francisco). While the bottom panel of Fig. 5 suggests that cannabis accounts for a rising share of treatment clients in the Netherlands, this is also true in neighboring countries. (A full analysis would require data on possible age, period and cohort effects for cannabis and other drugs.)

One possibility is that the Dutch are more generous and proactive in providing treatment. Reuter [37] estimates that the Dutch government spends about €9200 per ‘problematic drug user’ on treatment; the comparable estimate for Sweden—a country with an active coerced treatment tradition—is approximately €7600.

Table 2 compares treatment admission rates for the Netherlands and the United States. The estimates of treatment may not be directly comparable (e.g. in their coverage of in-patient versus out-patient and private

Table 2 Calculating treatment rates per 1000 citizens and 1000 past-year users.

	Netherlands	United States
Treatment admissions for cannabis as primary drug in 2005	4 135	300 326
Population aged 15–64 years	11 324 401	208 050 000
Last year users	613 275	24 559 000
Estimated cannabis admissions per 1000 citizens in 2005	0.36	1.41
Estimated cannabis admissions per 1000 past-month users in 2005	6.74	11.90
Admissions per 1000 users excluding criminal justice referrals	6.07	5.95

Source: author’s calculations using data from European Monitoring Centre for Drugs and Drug Addiction (ECMDA) (2008) Tables TDI-2, TDI-3, and GPS-3; Treatment Episode Data Set (TEDS), Highlights—2005, Table 1a; and National Survey on Drug Use and Health (NSDUH) Tables 1.20A and 1.20B.

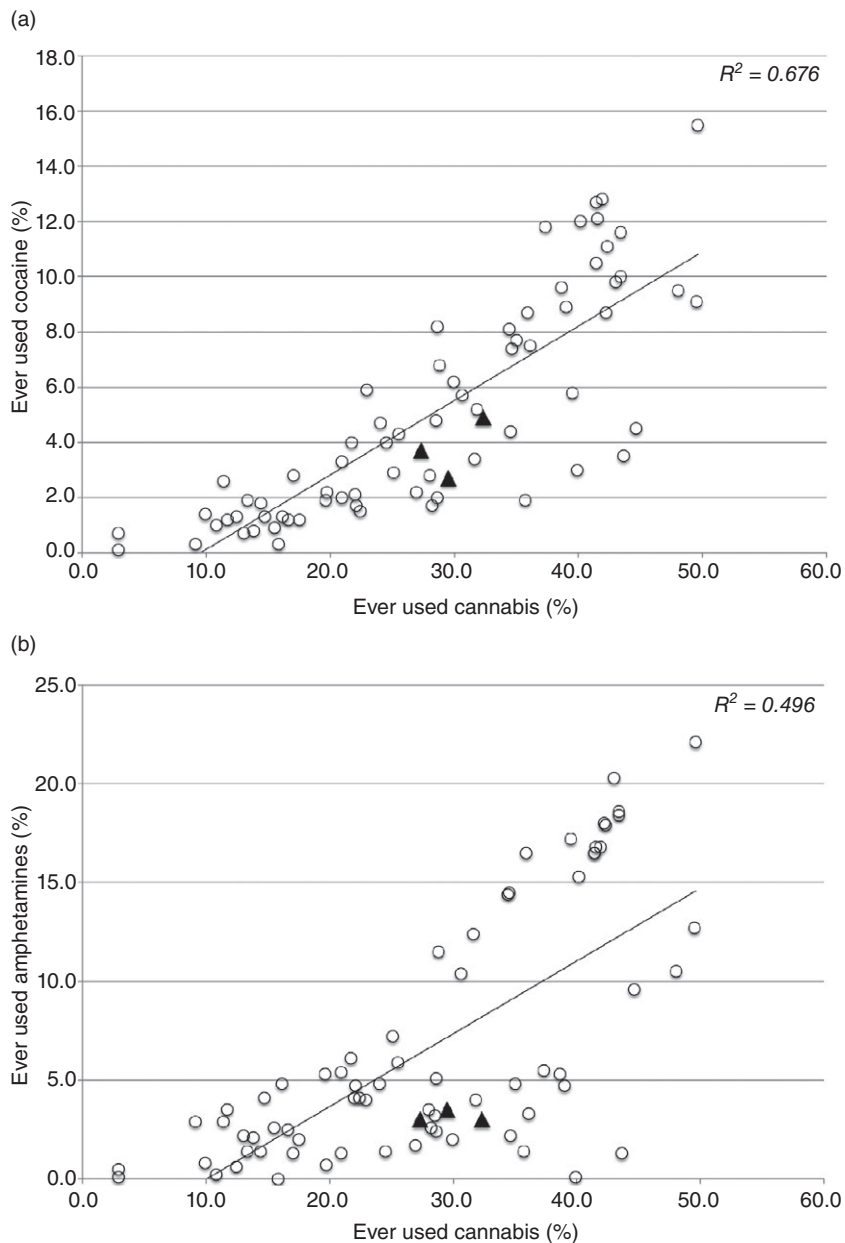


Figure 4 Association between life-time prevalence of cannabis and cocaine (a) or amphetamines (b) for people aged 15–34 years in various European surveys. The black triangles represent Dutch estimates. Source: European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), Table GPS-2

versus public treatment),¹ but it appears that on a per-capita basis, the United States has about four 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 [38]

versus about 10% of the Dutch admissions [39]. If we exclude these referrals, we end up with six 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 United States than in the Netherlands,

¹Ouwehand *et al.* [39] cite a variety of 2005 Dutch figures in the 2000–6000 range varying with respect to whether they are stocks versus flows and whether they include all admissions or first-time admissions. In 2005, 9411 Dutch clients entered out-patient treatment, 42% with cannabis as the primary drug [15], yielding 3938 cannabis admissions; I increased this by 5% based on Korf's estimate that there are roughly 20 Dutch out-patient clients for every in-patient client [28]. Both the Dutch and US figures exclude much of the private treatment population—perhaps 30% of the US market and an unknown but presumably smaller fraction of the Dutch market.

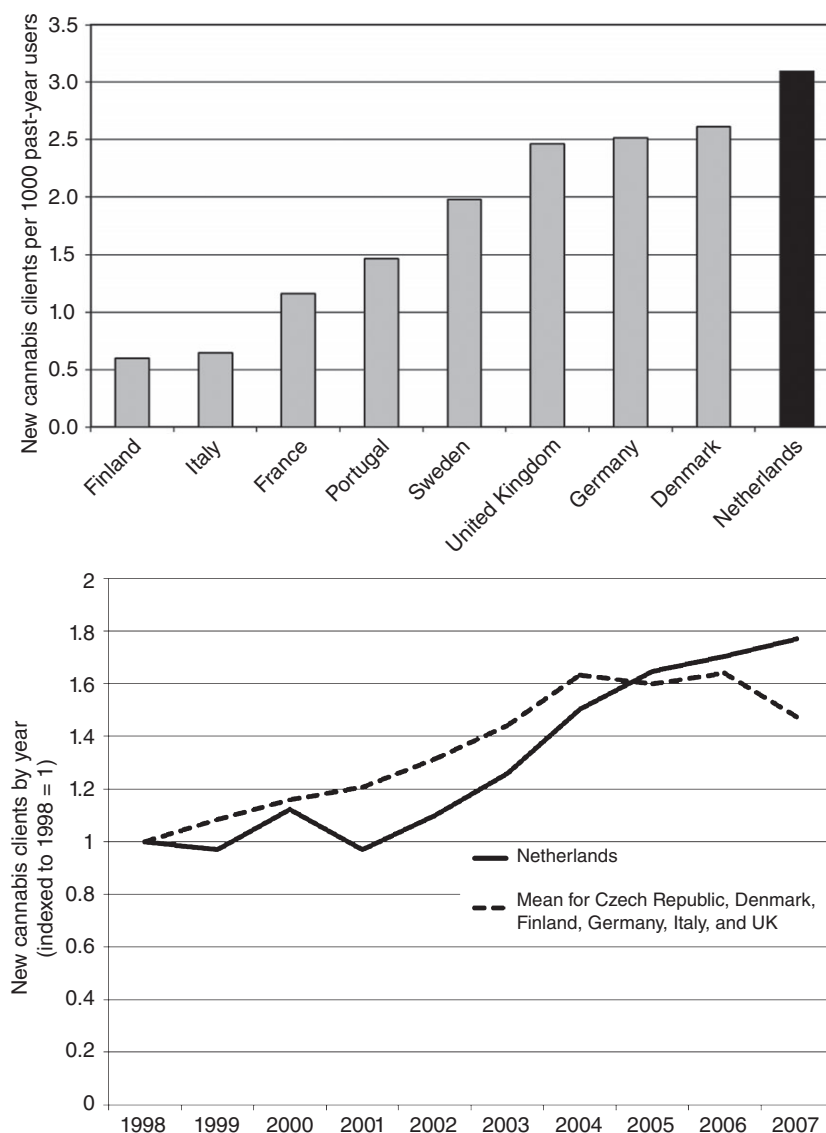


Figure 5 Top panel: new treatment clients with cannabis as primary drug, per 1000 past-year users. Source: author's calculations using data from European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) 2009 [Tables TDI-1 (new clients), TDI-3 (% with cannabis as primary drug) and GPS-3 (last-year users aged 15–64)] and Eurostat-Statistics in Focus [2008; Table 2 (2007 population data)]. Bottom panel: trends in new cannabis treatment admissions, 1998–2007. Source: European data from EMCDDA (Table TDI-3)

but that the difference is probably attributable to the much greater use of criminal justice referrals in the United States.

CANNABIS PRICES, POTENCY AND SUPPLY REDUCTION

It is very likely that full-scale legalization would significantly reduce cannabis prices [40]. 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.

The 'typical' retail price reported by government officials circa 2007 (UNODC [41]), was about \$7 per

gram of cannabis herb in the Netherlands, slightly higher than in Spain (\$4), lower than the United States (\$10) and considerably lower than in Norway (\$27). It is not clear how officials in each country generate these estimates, or whether they do so in a similar way. The comparisons are muddled further by the stark difference in policy between the Netherlands and the other nations.

Two recent studies provide more rigorous estimates of Dutch prices on a purity-adjusted basis. Pijlman and colleagues [42] estimates that for 2004, the average Euro-per-gram price was 6 for Nederwiet, 4.9 for imported marijuana, 12.5 for Nederhasj (hashish produced in the

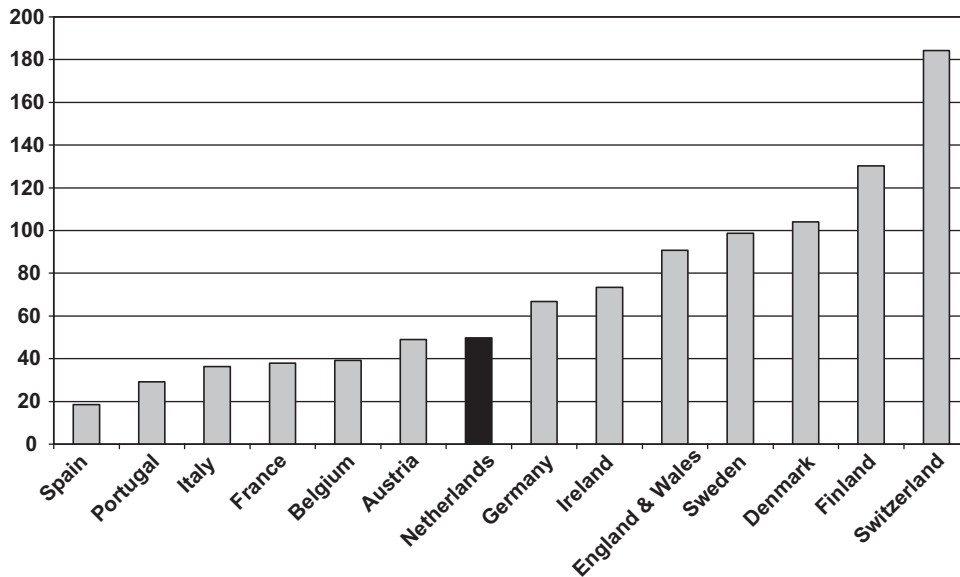


Figure 6 People convicted of drug offenses per 1000 citizens, averaged for 2000–2003 in various European nations. Source: author's calculations using data from European Sourcebook of Criminal Justice Statistics, Table 3.2.1.12

Netherlands) and 6.6 for imported hashish. This is in the \$6 to \$15 range per gram for 2004\$. Hazekamp [43] found prices in the €5–9 per gram range—about \$6–11 per gram. (All but two of his 13 samples were less than the advertised 10 g.) Across the two studies, the 9- Δ -tetrahydrocannabinol (THC) content ranged from 7% (imported marijuana, at \$5.88 per gram) to 39% (Nederhasj, priced at \$39 per gram). Prices ranged from around \$3.50 to \$8.50 per 100 mg THC.

Synthesizing price data from the System to Retrieve Information from Drug Evidence (STRIDE, the National Survey on Drug Use and Health (NSDUH)] and *High Times* magazine, Gettman suggests that the typical price per gram in the United States circa 2005 was around \$7.87 [44]. Using a more elaborate structural estimation model, Caulkins & Lumibao estimate that a more accurate figure for 2005 would be around \$4.81, and possibly as low as \$3 [45]. (A third estimate falls in between, at \$5.78 [46].) US samples of seized marijuana in 2005 averaged 8.14% THC [47]. This implies a price per 100 mg of THC of around \$6.41 (using Gettman's price estimate) to \$3.92 (using the Caulkins & Lumibao price estimate).

Under the Gettman estimate, 2005 prices 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. Using the Caulkins & Lumibao 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. Differences in sampling and statistical analysis make these comparisons

very approximate; US consumers also 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? The Dutch price data include retailer mark-ups to cover the costs the owners incur in operating retail outlets in commercial neighborhoods. However, it is also 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—with coffeeshop owners in a gray area somewhere between. If high-level Dutch traffickers face an enforcement risk, they presumably pass this along in higher prices down the supply chain [48].

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% of Opium Act cases were for 'soft' drugs (primarily cannabis); they accounted for about 2% of the total detention years imposed that year [49]. Figure 6 shows that by a 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 their neighbors. Unfortunately, these figures are not broken out by drug or specific criminal charge.

During the years 2005–07, the Dutch seized about 37 kg of herbal cannabis per 100 000 citizens, about the same as the United Kingdom (38 kg/100 000) and well above the seizure rates for Denmark, Finland,

France, Germany, Italy, Portugal, Spain and Sweden (0.7–6.8 kg/100 000).² This could reflect aggressive Dutch enforcement, the sheer amount of herbal cannabis available to seize, or both. At best, we can take these data—together with routine reports of particular police actions in the Dutch media—as an existence of proof that the Dutch are clearly enforcing prohibition at the higher end of the supply chain. This presumably raises prices for consumers.

IMPACT ON OTHER COUNTRIES

The impact of the Dutch system on other countries has been a constant source of contention, especially in the EU. More than a million tourists a year may have been visiting the coffeeshops, and an even larger amount of cannabis is exported from the Netherlands by professional traffickers.

Data on drug tourism and smuggling are too sparse to permit a direct statistical test of Dutch influence. A weaker test is geographic: across 12 nations (Belgium, Denmark, Finland, France, Germany, Italy, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom) there is an inverse association ($r = -0.50$) between students' perceptions of availability (see Table 1) and the distance from the center of their country to the center of the Netherlands; but this simply reflects shared features of culture and geography: it turns out that perceived availability within a nation is better predicted by its proximity to Portugal, Belgium, France, Switzerland or the United Kingdom (r s ranging from -0.74 to -0.59) than by proximity to the Netherlands.

While it seems likely that the coffeeshop system has facilitated the development of a cannabis export industry, the nature and extent of that linkage is not entirely clear. The coffeeshop supply system certainly facilitates production and reduces suppliers' risks, but less so than one might expect in a true legal market, and the Netherlands might be a significant cannabis exporter even without a coffeeshop system. The Dutch are a leading horticultural exporter; they are near the geographic midpoint of western Europe; they have perhaps the busiest railway system in the EU and the busiest port (Rotterdam) in Europe, and the Netherlands is a prominent European exporter of other drugs that are fully prohibited by Dutch law and policy. It may be easier to infer the impact the coffeeshop model has had on other countries a few years after tourist sales have ended.

CONCLUSIONS

Whether the Dutch should go forward with some variant of this coffeeshop model in the future is uncertain, and

Dutch citizens may feel it is none of our business anyway. However, the Dutch experience is potentially informative for people in other countries who are debating whether to legalize cannabis sales.

The best available evidence paints a nuanced picture. Dutch citizens use cannabis at more modest rates than some of their neighbors, and they do not appear to be particularly likely to escalate their use relative to their counterparts in Europe and the United States. Moreover, there are indications that rather than increasing 'the gateway' to hard drug use, separating the soft and hard drug markets possibly reduced the gateway.

However, 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. 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, but what the Dutch have done is quite different, and far more nuanced, than the kind of full-scale legalization that is usually debated in other countries. 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.

Acknowledgements

I would like to thank Jon Caulkins, Peter Reuter, Beau Kilmer, Ben Vollaard, and several anonymous reviewers for very helpful comments and criticisms.

Declaration of interests

None.

References

1. MacCoun R., Reuter P. *Drug War Heresies: Learning from Other Vices, Times, and Places*. New York: Cambridge University Press; 2001.
2. Room R., Fischer B., Hall W., Lenton S., Reuter P. *Cannabis Policy: Moving Beyond Stalemate*. Oxford: Oxford University Press; 2010.
3. MacCoun R., Reuter P. The varieties of drug control at the dawn of the 21st century. *Ann Am Acad Pol Soc Sci* 2002; **582**: 7–19.
4. Bieleman B., Beelen A., Nijkamp R., de Bie E. *Coffeeshops in Nederland 2007*. Groningen: Intraval; 2009.

²Author's calculations using data from the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) 2009 (Tables SZR-4 [seizure data] and Eurostat-Statistics in Focus [2008; Table 2 (2007 population data)]).

5. Bieleman B., Goeree P., Naayer H. *Coffeeshops in Nederland 2004: Aantallen Coffeeshops En Gemeentelijk Beleid 1999–2004*. Groningen: Intraval; 2005.
6. van Dijk J. J. M. The narrow margins of the Dutch drug policy: a cost–benefit analysis. *Eur J Crim Policy Res* 1998; 6: 369–93.
7. van der Steen P. European court weighs cannabis ban for foreigners. *NRC Handelsbad*, 3 May 2010. Available at: http://www.nrc.nl/international/article2537302.ece/European_court_weighs_cannabis_ban_for_foreigners (accessed 1 August 2011; archived by Webcite at <http://www.webcitation.org/60cOcatkg>).
8. Amsterdam Tourist Information. Are Amsterdam's coffee-shops about to disappear? 26 May 2007. Available at <http://www.dutchamsterdam.nl/183-are-amsterdams-coffeeshops-about-to-disappear> (accessed 1 August 2011; Archived by Webcite at <http://www.webcitation.org/60cYUF8vE>).
9. Openbaar Ministrie. Frequently asked questions about the Dutch drugs policy. 2010. Available at: http://www.om.nl/vast_menu_blok/english/frequently_asked/ (accessed 1 June 2010; archived by Webcite at <http://www.webcitation.org/60cPaUJPC>).
10. Kucharz C. Holland cannabis trade at all-time high. *ABC NEWS*, 6 November 2008. Available at: <http://abcnews.go.com/International/story?id=6196371&page=1> (accessed 1 August 2011; archived at <http://www.webcitation.org/60cPgVI3x>).
11. Daley S. A Dutch city seeks to end drug tourism. *New York Times*, 18 August 2010, A1. Available at: <http://www.nytimes.com/2010/08/18/world/europe/18dutch.html> (accessed 1 August 2011; archived by Webcite at <http://www.webcitation.org/60cPniQK2>).
12. Stinson J. Tobacco ban wafts into Amsterdam pot shops. *USA Today*, 26 June 2008. Available at: http://www.usatoday.com/news/world/2008-06-26-amsterdam-tobacco_N.htm (accessed 27 May 2010; archived by Webcite at <http://www.webcitation.org/60cPznj4D>).
13. Clements J. Dutch cities to grow their own cannabis. *The Daily Telegraph*, 25 November 2008. Available at: <http://www.telegraph.co.uk/news/worldnews/europe/netherlands/3520768/Dutch-cities-to-grow-their-own-cannabis.html> (accessed 21 October 2010; archived by Webcite at <http://www.webcitation.org/60cQ5ED20>).
14. EU judges back Dutch fight against drug tourism. *EurActiv/Reuters*, 17 December 2010. Available at: <http://www.euractiv.com/en/justice/eu-judges-back-dutch-fight-against-drug-tourism-news-500720> (accessed 1 August 2011; archived by Webcite at <http://www.webcitation.org/60cQAymba>).
15. Ministry of Security and Justice. Coffeeshop to be a private club for the local market. Press release, 27 May 2011. Available at: <http://english.justitie.nl/currenttopics/pressreleases/archives-2011/110527the-dutch-cabinet-coffeeshop-to-be-a-private-club-for-the-local-market.aspx?cp=35&cs=1578> (accessed 1 August 2011; archived by Webcite at <http://www.webcitation.org/60cQHDFt>).
16. The Lisbon Treaty. 13 December 2007. Available at: <http://www.lisbon-treaty.org/wcm/the-lisbon-treaty.html> (accessed 1 August 2011; archived by Webcite at <http://www.webcitation.org/60cQR8DOX>).
17. MacCoun R., Reuter P. Interpreting Dutch cannabis policy: reasoning by analogy in the legalization debate. *Science* 1997; 278: 47–52.
18. European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). *Stat Bull* 2009; Available at: <http://www.emcdda.europa.eu/stats09> (accessed 1 August 2011; archived by Webcite at <http://www.webcitation.org/60cQYIPPY>).
19. European School Survey Project on Alcohol and Other Drugs (ESPAD). *The 2007 ESPAD Report*. Available at http://www.espad.org/documents/Espad/ESPAD_reports/2007/The_2007_ESPAD_Report-FULL_091006.pdf (accessed 1 August 2011; archived by Webcite at <http://www.webcitation.org/60cQwFaQL>).
20. Johnston L. D., O'Malley P. M., Bachman J. G., Schulenberg J. E. Monitoring the Future (MTF). Various years. Available at: <http://www.monitoringthefuture.org> (accessed 1 August 2011).
21. Reinerman C., Cohen P. D. A., Kaal H. L. The limited relevance of drug policy: cannabis in Amsterdam and in San Francisco. *Am J Public Health* 2004; 94: 836–42.
22. Abraham M. D., Kaal H. L., Cohen P. D. A. *Licit and Illicit Drug Use in the Netherlands 2001*. Amsterdam: CEDRO/Mets en Schilt; 2002.
23. Rodenburg G., Spijkerman R., van den Eijnden R., van den Mheen D. *Nationaal Prevalentie Onderzoek Middelengebruik [National Prevalence Study on Substance Use]*. Rotterdam: IVO (Addiction Research Institute); 2007.
24. MacCoun R. In what sense (if any) is marijuana a gateway drug? *Drug Policy Anal Bull* 1998; 4: 5–8.
25. Lynskey M. T., Vink J. M., Boomsma D. I. Early onset cannabis use and progression to other drug use in a sample of Dutch twins. *Behav Genet* 2006; 36: 195–200.
26. van Ours J. C. Is cannabis a stepping-stone for cocaine? *J Health Econ* 2003; 22: 539–54.
27. MacCoun R., Reuter P. Evaluating alternative cannabis regimes. *Br J Psychiatry* 2001; 178: 123–8.
28. Jansen A. C. M. *Cannabis in Amsterdam: A Geography of Hashish and Marijuana*. Muiderberg, The Netherlands: Coutinho; 1991.
29. Abraham M. D., Cohen P. D. A., Buekenhorst D. J. Comparative cannabis use data. *Br J Psychiatry* 2001; 179: 175–7.
30. de Zwart W., van Laar M. Cannabis regimes. *Br J Psychiatry* 2001; 178: 574–5.
31. Korf D. J. Dutch coffee shops and trends in cannabis use. *Addict Behav* 2002; 27: 851–66.
32. MacCoun R. J. American distortion of Dutch drug statistics. *Society* 2001; 38: 23–6.
33. MacCoun R., Reuter P. Author's reply. *Br J Psychiatry* 2001; 179: 177.
34. MacCoun R., Reuter P. Cannabis regimes—a response. *Br J Psychiatry* 2001; 179: 369–70.
35. Monshouwer K., van Laar M., Vollebergh W. A. Buying cannabis in 'coffee shops'. *Drug Alcohol Rev* 2011; 30: 148–56.
36. Monshouwer K., Smit F., de Graaf R., van Os J., Vollebergh W. First cannabis use: does onset shift to younger ages? Findings from 1988 to 2003 from the Dutch National School Survey on Substance Use. *Addiction* 2005; 100: 963–70.
37. Reuter P. What drug policies cost: estimating government drug policy expenditures. *Addiction* 2006; 101: 315–22.
38. Substance Abuse and Mental Health Services Administration, Office of Applied Studies. *Treatment Episode Data Set (TEDS). Highlights—2005. National Admissions to Substance Abuse Treatment Services*, DASIS Series: S-36, DHHS Publication No. (SMA) 07-4229, Rockville, MD; 2006.

39. Ouwehand A. W., Mol A., Kuipers W. G. T., Boonzaker Flaes S. *Key Figures, Addiction Care 2005. National Alcohol and Drugs Information System*. Houten: Stichting Informatie Voorziening Zorg (IVZ); 2006.
40. Kilmer B., Caulkins J. P., Pacula R. L., MacCoun R. J., Reuter P. H. *Altered State? Assessing How Marijuana Legalization in California Could Influence Marijuana Consumption and Public Budgets*. Santa Monica, CA: RAND; 2010.
41. United Nations Office on Drugs and Crime (UNODC). *World Drug Report 2009*. Vienna: United Nations Office on Drugs and Crime; 2009. Available at: <http://www.unodc.org/unodc/en/data-and-analysis/WDR-2009.html> (accessed 1 August 2011; archived by Webcite at <http://www.webcitation.org/60cSxwre>).
42. Pijlman F. T. A., Rigter S. M., Hoek J., Goldschmidt H. M. J., Niesink R. J. M. Strong increase in total delta-THC in cannabis preparations sold in Dutch coffee shops. *Addict Biol* 2005; **10**: 171–80.
43. Hazekamp A. An evaluation of the quality of medicinal grade cannabis in the Netherlands. *Cannabinoids* 2006; **1**: 1–9.
44. Gettman J. Lost taxes and other costs of marijuana laws. *Drug Science*. 2007. Available at: <http://www.drugscience.org/Archive/bcr4/4Price.html> (accessed 20 October 2010).
45. Caulkins J. P., Lumibao L. M. The average price of marijuana. Working draft, Heinz School, Carnegie Mellon University, 2010.
46. Kilmer B., Pacula R. L. Estimating the size of the global drug market: a demand-side approach. In: Reuter P., Trautmann F., editors. *A Report on Global Illicit Drug Markets 1998–2007*. Utrecht: Trimbos Institute; 2009, p. 61–3.
47. National Drug Intelligence Center. *National Drug Threat Assessment 2007*. October 2006. Available at: <http://www.justice.gov/ndic/pubs21/21137/index.htm> (accessed 1 August 2011; archived by Webcite at <http://www.webcitation.org/60cS3skvi>).
48. Reuter P., Kleiman M. A. R. Risks and prices: an economic analysis of drug enforcement. *Crime Justice: An Annual Review* 1986; **7**: 289–40.
49. van Ooyen-Houben M. M. J., Meijer R. E. *National Drug Monitor: Drug-Related Crime 1999–2004. Fact Sheet 2006–200a*. Den Hague, the Netherlands: Research and Documentation Centre (WODC), Ministry of Justice; 2006.

Supporting information

Additional Supporting Information may be found in the online version of this article:

Appendix S1 What is the Dutch cannabis market worth?

Please note: Wiley-Blackwell are not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.