



Research paper

"Should I Buy or Should I Grow?" How drug policy institutions and drug market transaction costs shape the decision to self-supply with cannabis in the Netherlands and the Czech Republic



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ABSTRACT

Background: This paper uses the framework of institutional economics to assess the impact of formal and informal institutions that influence the transaction costs on the cannabis market, and users' decisions to self-supply in the Czech Republic and the Netherlands, two countries with seemingly identical policies towards cannabis cultivation.

Methods: A comparative analysis was conducted using secondary qualitative and quantitative data in four areas that were identified as relevant to the decision to cultivate cannabis: (i) the rules of the game – cannabis cultivation policy; (ii) "playing the game" – implementation of cannabis cultivation policy, (iii) informal institutions – cannabis cultivation culture, and (iv) the transaction costs of the cannabis market – availability, quality, and relative cannabis prices adjusted by purchasing power parity.

Results: Although the two policies are similar, their implementation differs substantially. In the Czech Republic, law enforcement has focused almost exclusively on large-scale cultivation. This has resulted in a competitive small-scale cultivation market, built upon a history of cannabis self-supply, which is pushing cannabis prices down. In the Netherlands, the costs of establishing one's own self-supply have historically outweighed the costs associated with buying in coffee shops. Additionally, law enforcement has recently pushed small-scale growers away from the market, and a large-scale cannabis supply, partly controlled by organised criminal groups, has been established that is driving prices up. The Czech cannabis prices have become relatively lower than the Dutch prices only recently, and the decision to buy on the market or to self-supply will be further shaped by the transaction costs on both markets, by policy implementation and by the local culture.

Conclusions: The ability to learn from the impacts of cannabis cultivation policies conducted within the framework of UN drug treaties is particularly important at a time when increasing numbers of countries are seeking more radical reforms of their cannabis policy.

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Introduction

Several studies suggest that drug policies have little effect on any type of prevalence (lifetime, current, etc.) of drug use, but influence the behaviour of people who use drugs (PUD) in ways that militate or mitigate the potential for harm of drug use (Grund,

Stern, Kaplan, Adriaans, & Drucker, 1992; Huigen, 2013a, 2013b; MacCoun & Reuter, 2001; Reinerman, Cohen, & Kaal, 2004). However, it remains unexplored how particular drug policies shape the decision to purchase or self-supply illicit drugs in cases where it is possible – typically, with cannabis, and, to a somewhat lesser extent, with other psychoactive substances.

This paper aims to analyse the relevant factors in the decision to cultivate cannabis under two cannabis cultivation policies that at first sight seem very similar and that "allow" the cultivation of up to five cannabis plants. In the Czech Republic, 'home-grown' is a rather common source of cannabis, whereas in the Netherlands, cannabis cultivation for personal use is much less widespread. This paper

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compares cannabis policies and their everyday implementation, the cultures of cannabis cultivation, the market prices of cannabis, and other factors that may shape the decision “to buy or to grow” of cannabis users in the two countries. In this paper, we apply the theoretical framework of institutional economics, which explains the choices of individuals who participate in markets as an outcome of legal constraints, cultural boundaries, and, most importantly, the so-called “transaction costs”.

Our paper contributes to the recent debate on the impact of emerging regulated markets (Uruguay and two states of the USA, with more countries and US states debating similar measures) by scrutinising whether cannabis cultivation for personal use is a deliberate choice or, and to what extent, it is shaped by policy, culture, or other market factors.

Transaction costs and institutions on the illegal market

Institutional economics is an area of economics that centres around so-called “*transaction costs*”, a concept that is considered of primary influence in modern economic theory (Coase, 1937; Williamson, 2000). Transaction costs are the costs of finding an agreeable and reliable market counterpart, of the negotiations between these parties, and of reducing the uncertainty as to whether the parties to a contract will comply with their commitments. This is the case especially in the formally unregulated market transactions that are typical of illicit markets. For instance, an entrepreneur going into business has to contract suppliers, staff, and facilities. Each time, the price and contractual conditions have to be settled so that both contractual parties are *maximising utility* from the transaction, as the basic principles of the market have been defined since Adam Smith (Mankiw, 2007; Smith, 1776a, 1776b). The magnitude of the transaction costs is understood to predict the organisation of a particular market.

In order to minimise the transaction costs on the market, societies create *formal and informal institutions*, such as contractual laws or the enforcement of property rights. In this context, an “institution” is understood as any common principle that regulates how market participants behave (Commons, 1931). According to Williamson, there are four types of institutions that influence the decision making of individuals in a market: (i) informal institutions, customs, and culture; (ii) formal “rules of the game,” such as laws and legislation, which commonly evolve out of the former type; (iii) “playing the game,” especially contract enforcement, and (iv) resource allocation on the level of a firm.

On the illicit drug market, no formal institutions in the form of laws, legislation, or enforceable bi-partisan contracts exist that could regulate market behaviour, since the transactions themselves are prohibited. The transaction costs on these markets are remarkably high. In fact, all formal prohibitive laws that target the drug market aim to increase the transaction costs and discourage interested parties from participation in the market. Among those costs we can count the risk of arrest and of seizure of the product, or the risk of low product quality and lack of choice, as well as the risks of violence, which, in illegal markets, substitutes for the legal enforcement of property rights (Andrade, Sifaneck, & Neagius, 1999; Decorte, 2008; Reuter & Kleiman, 1986; Sifaneck, 2005). Although the term “transaction costs” has not been commonly used in analyses of these illicit market risks, it has been acknowledged that they increase substantially with each transaction or encounter between vendor and customer, in particular in rushed transactions between parties in the market who are unknown to one another.

As a result, illicit market players create *informal norms* aimed at reducing the transaction costs imposed on the market participants by the formal embargos. Wilkins and Casswell (2003) and Wilkins (2001) have shown that transaction costs in an illicit market can be reduced by establishing trusted relations among market

players. These can involve rules encouraging “*friends supplying friends*” (Belackova & Vaccaro, 2013; Coomber & Turnbull, 2007; Grund, Kaplan, Adriaans, & Blanken, 1991) or encouraging market participants to act in a “friendly” manner (Belackova & Vaccaro, 2013). These behavioural patterns can be referred to as “cannabis culture” (we define the term later) and act as institutions that reduce the transaction costs in the illegal market.

In the economic theory, another option for reducing transaction costs is leaving the market by establishing “*the firm*” instead (Coase, 1937; Crook, Combs, Ketchen, & Aguinis, 2013; Williamson, 1989). Within the firm, the transaction costs of bi-partial market contracts are obviated or diminished by long-term arrangements. For instance, instead of contracting with different supply chains, the entrepreneur uses management, administration, and governance instruments in order to produce marketable goods. If the transaction costs in a particular market are high, it pays off to bear the full costs of production – even when the associated costs would be lower had the product been outsourced as a result of *economies of scale* achieved by a specialised market counterpart.

This paper focuses on the role of formal and informal institutions in shaping users’ decision to “leave the market” and establish a firm – (small-scale) cannabis cultivation for personal use. It demonstrates how institutions outlined in economic theory (in particular, the *rules of the game* in the form of cannabis policies, *playing the game* in terms of law enforcement, and cannabis (cultivation) *culture* and *transaction costs*, such as availability, quality, and relative market price) influence the choice to cultivate cannabis.

Cannabis cultivation in the Czech Republic and the Netherlands

Domestic (indoor) cannabis cultivation has largely replaced imported cannabis products in developed countries in recent decades. In most Western European markets, much of the imported hashish has been overtaken by a wide variety of cannabis hybrids, referred to by Potter (2008) as the “green avalanche”. In other countries, domestically produced high-grade indoor cannabis has taken the place of the established outdoor cannabis production and imported indoor cannabis (Belackova & Zabransky, 2014b; Duffy, Schaefer, Coomber, O’Connell, & Turnbull, 2008; Hough et al., 2003). Domestic cannabis production is widely (but not exclusively) practised by small-scale cannabis cultivators, who mostly produce the herb for personal consumption (Decorte, 2008, 2010a, 2010b; Hakkarainen & Perala, 2011).

The two countries subjected to our analysis, the Czech Republic and the Netherlands, have notably different levels of small-scale cultivation for personal use. In the Czech Republic, about 9% of the last-year cannabis users recruited within a representative population sample claimed to have cultivated the cannabis they used the last time (Belackova, Nechaska, Chomynova, & Horakova, 2012), and so did 14% of the Czech cannabis users that participated in an EU online survey focusing on drug markets (Trautmann, Kilmer, & Turnbull, 2013).¹ The role of these small-scale growers in the Czech cannabis market is complemented by the relatively large proportion of the Czech cannabis users in this survey (44%) who declared they had received cannabis for free. This is much higher than in any of the other EU countries that participated in the survey – and more than twice the Dutch figure of 21%. Indeed, the Dutch respondents buy their cannabis at twice the rate of their Czech counterparts, 75% as opposed to 37%. Only 2% of the Dutch respondents using cannabis claimed to have grown their own – which was the lowest figure for all the survey participating countries. In the 2014 Global

¹ Non-probability sample of self-nominated respondents, recruited from a large cannabis cultivation discussion board.

Drug Survey,² the figure was not much higher: only 5.1% of the 1290 Dutch cannabis-using respondents (out of 2807 Dutch participants) who had used cannabis in the last year grew their own cannabis. The vast majority (76.7%) of the Dutch cannabis consumers in GDS2014 purchased their cannabis in coffee shops. A sizable minority, 21.6%, indicated that they bought their cannabis from a dealer (Winstock, 2014).

Previous studies described people's motivations for cultivating their own cannabis as the desire to compensate for the lack of a quality product on the market, distrust of non-organic production techniques, or the unavailability of particular strains and the desired potency, the low availability of cannabis in general, and discomfort with "supporting" criminal organisations (Hakkainen & Perala, 2011; Potter, 2006). These motives can be understood as avoidance of the transaction costs of the illegal market. At the same time, the reasons for cultivating one's own cannabis include more general trends, such as the "do-it-yourself" (DIY) phenomenon – individuals brewing beer or crafting furniture or devices for a variety of motivations, including lack of product quality and availability (Wolf & McQuitty, 2013). While such DIY activities are increasingly popular in Western countries, in post-communist countries their popularity is to a great extent shaped by the recent history of scarcity of many consumer goods that were taken for granted in the West. In the communist countries, more than elsewhere, strong alcohol was distilled in sheds and basements, while drug users later on copied this practice by cooking up powerful injectable drugs from poppies or over-the-counter medicaments (Grund, Zabransky, Irvin, & Heimer, 2009; Zabransky et al., 2012).

In this paper, we analyse what factors might contribute to the notable difference between the Czech Republic and the Netherlands in terms of the proportion of people who grow their own cannabis.

Methods

We conducted a secondary analysis of various data sources focusing on the three major areas that have an impact on the decision of people who use cannabis to leave the market and cultivate their own supply. We conceptualised these as institutions that influence the transaction costs of the market: the *rules of the game*, *playing the game*, the informal *culture* that emerges on the cannabis market, and the *transaction costs*. An overview of the data sources used in our analysis is presented in Table 1.

The first part of the analysis is focused on (i) *cannabis policy* and (ii) *its implementation*. We first discuss the available legislation on cannabis cultivation. In line with previous studies (MacCoun & Reuter, 1998; Meier, 1992), we operationalise 'cannabis policy implementation' as the enforcement of cannabis laws reflected in official police statistics. We analyse cannabis plant seizures (the number of annual seizures, total number of plants seized annually, and average number of plants per seizure recounted from the former two indicators) from the online databases of the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), supplemented by the national sources for the Netherlands. To assess the relative extent of cannabis seizures in the country, we relate them to the number of last-12-months cannabis users from the latest data available in the EMCDDA online statistical databases.

The second part of the analysis is dedicated to what we term (iii) *the cannabis cultivation culture*. By this term we mean the socially transmitted information that generates behavioural

expectations around cannabis cultivation that are contingent on specific historical developments. This conceptualisation of culture aligns with the institutionalistic perspective of culture (Jütting, Drechsler, Bartsch, & de Soysa, 2007; North, 1990; Williamson, 2000), but differs from the concepts that are common among drug policy scholars. It is broader than the understanding of *cannabis culture* as the media outputs that incorporate cannabis cultivation as its core topic (Potter, Bouchard, & Decorte, 2010), than the sub-cultural rituals and symbols inherent to sociologically deviant groups (Grund, 1993; Hammersvik, Sandberg, & Pedersen, 2012; Micinski, 2014; Reinerman & Cohen, 2007) or the understanding of it as contrasting to profit-driven market behaviour (Potter, 2010). Our conceptualisation of "cannabis cultivation culture" acknowledges the co-existence of multiple cannabis market cultures in a given country (Sandberg, 2012), but instead of divorcing these from one another, it merges their varying expressions into a country-specific understanding of the habits, environments, rituals, and generally acknowledged rules among people involved in the phenomena in one way or another. Our definition of "culture" takes into account the development of public opinion towards cannabis use and cannabis cultivation.

To describe the specific cannabis cultivation culture of both countries, qualitative data from pre-existing studies was summarised. This data primarily came from interviews with cannabis users, sellers, and cultivators. Thus, we used the data collected from a recent comprehensive policy assessment of the Czech cannabis market and from several studies of the Dutch cannabis market to qualitatively capture the development of the cannabis cultivation scenes in both countries in the last four decades.

Finally, we looked at (iv) *the transaction costs of the cannabis market* that influence the decision to self-supply. In this part of the study, we analysed the availability of cannabis and cannabis market prices. While availability and quality represent the traditional understanding of the transaction costs that consumers face on the (black) market (see the background section), cannabis prices deserve further conceptualisation. We hypothesise that retail cannabis prices compensate for the transaction costs that are incurred at the wholesale and production levels, and that these are passed on to the consumer. High retail prices thus mean high risks of enforcement and compensate for losses (e.g. of stocks) at higher market levels (Caulkins, 1993; Caulkins & Reuter, 1998; Caulkins, Reuter, & Taylor, 2006).

We assessed the price levels of cannabis in the Czech Republic and in the Netherlands through a comparison of real cannabis prices in each country weighted by the purchasing power parities (PPPs) retrieved from Eurostat (2012). The cannabis price indicators used were the mean prices per gram at retail level. PPPs convert different currencies to a common currency and, in the process of conversion, equalise their purchasing power by eliminating the differences in the price levels between countries. In its simplest form, PPP analysis shows how the prices of cannabis compare to those of other comparable goods.

Results

The Czech Republic and the Netherlands are currently in the "liberal" segment of EU cannabis policies with Italy, Spain, Denmark, Portugal, and Luxemburg, reflected in the amount of cannabis allowed for personal possession and by the associated legal consequences (EMCDDA, 2013a). Until recently, this liberal approach towards consumption was also reflected in legislative and practical "tolerance" towards small-scale cannabis cultivation. Below, we present an outline of the national cannabis policies and their similarities and differences, followed by an analysis of their implementation.

² An online survey which targets active drug consumers (non-probability sampling).

Table 1

Data sources used in the analysis.

	The Netherlands	Years	The Czech Republic	Years
(i) Cannabis policy and its' implementation				
Cannabis-related criminal offences	Soft-drug "registered incidents" (Jongste et al., 2007; Kalidien and Lange, 2013)	1995–2004 2005–2012	Based on the statistics of the Ministry of Justice (MO, 2007–2011); police statistics retrieved from EMCDDA (EMCDDA, 2014) No. of seized cannabis plants, no. of seized cannabis plantations (EMCDDA, 2013c, 2013d), accounted for the prevalence of cannabis use (EMCDDA, 2013b)	2003–2011
Cannabis plant seizures	No. of seized cannabis plants, no. of seized cannabis plantations (EMCDDA, 2013c, 2013d), accounted for the prevalence of cannabis use (EMCDDA, 2013b)	1997–2011	No. of seized cannabis plants, no. of seized cannabis plantations (EMCDDA, 2013c, 2013d), accounted for the prevalence of cannabis use (EMCDDA, 2013b)	2003–2011
(ii) Cannabis cultivation culture				
Public opinion on cannabis	Yearly National Household Survey on opinions of Dutch citizens on society and culture (N = around 2000 respondents every year) (SCP, 1998) Public poll survey amongst 1894 Dutch citizens who regularly participate in public opinion surveys (Panelclix, 2009) Public opinion survey amongst at least 3000 Dutch citizens who regularly participate in public opinion surveys (Peil.nl/Maurice de Hond, December 2013)	1970–1996 2009 2013	National Household Survey on the Use of Psychotropic Substances and Attitudes Towards It (Belackova et al., 2012; Mravcik et al., 2013) Annual Report on the Drug Situation in the Czech Republic 2002	2011–2013 2002
Qualitative data from cannabis users and market players	Analysis of articles in a national newspaper (Parool 1950–1975) and interviews with 18 witnesses to the introduction of cannabis in the Netherlands between 1950 and 1970 (amongst them first-time users and cultivators, policemen, and journalists) recruited via judgement sampling (Maalsté, 1993) Interviews with 10 cultivators, 10 coffee shop visitors, 10 middlemen, 15 criminal investigators, 4 lawyers, and 6 researchers (Boekhoorn, van Dijk, Loef, Oosten, & Steinmetz, 1995) Ethnographic study in coffee shops (Jansen, 2002) Analysis of police documents, conversations with criminal investigators and other officials that are involved in cannabis prosecution and observations during 'dismantlings' (Bovenkerk, Hogewind, & Milani, 2002) Interviews with 45 entrepreneurs in the Dutch cannabis sector (cultivators, coffee shop and growshop visitors, middlemen) recruited via theoretical sampling; 35 of them had a history of cultivating cannabis for sale (with minimum of 10 plants and a maximum of 24,000 plants); aged 25–61 years; 1–40 years experience in the cannabis sector (Maalsté, 2008; Maalsté & Panhuysen, 2007) Interviews with 60 criminal investigators in 25 police regions and 20 coffee shop visitors, observations during 'dismantlings' and a survey amongst 119 criminal investigators (Korf, Benschop, & Wouters, 2007) Analysis of criminal investigations (Boerman et al., 2008) Interviews with 8 purchasers of cannabis products sold in coffee shops recruited via judgement sampling; experience in cannabis sector: 2 < 10 years, 2 10–20 years, 4 > 10 years) (Huigen, 2013a, 2013b)	1991–1992 1994–1995 1993–2002 2000 2003–2006 2006–2007 2008 2012	66 last-12-months cannabis market participants recruited via respondent-driven sampling for a policy assessment study in 2009; aged 18–61; 1/3 of them had a history of selling cannabis, 1/10 have been growing cannabis for their own use or for sale (Belackova & Zabransky, 2014a, 2014b)	1985–2009
(iii) Transaction costs of the cannabis market				
Mean retail level price of cannabis, adjusted for purchasing power parities (Eurostat, 2012)	Price of Nederwiet and hashish from a yearly monitor that analyses weed and has samples recruited from 50 random selected coffee shops (Niesink & Rigter, 2006, 2013)	1999–2011	Price of herbal cannabis and hashish from police statistics as reported by the National Focal Point (Mravcik et al., 2004, 2003; Zabransky et al., 2002) Police statistics as reported to the EMCDDA (EMCDDA, 2003e)	2001, 2002, 2003 CZ 2004–2011
Cannabis availability among 16 year olds	Availability of cannabis among 16 year olds according to the ESPAD survey (ESPAD, 2013, 2014)	1995–2011	Availability of cannabis among 16 year olds according to the ESPAD survey (ESPAD, 2013, 2014)	1995–2011
Cannabis availability in the adult population	Number of coffee shops in the Dutch municipalities (Maalsté et al., 2014)	1999–2014	Availability of cannabis according to general population surveys (Zabransky et al., 2002; Belackova et al., 2012)	2002–2008

Rules of the game – cannabis (cultivation) policies

In the Czech Republic, the cultivation of up to five cannabis plants for personal use is considered a misdemeanour or infraction, an administrative offence punishable with a fine of up to 15,000 CZK (approximately 600 EUR). This relatively tolerant situation emerged recently when a newly defined criminal offence under the Czech criminal law came into force in January 2010. Through the introduction of the criminal offence of "growing a greater than small number of psychoactive plants", the cultivation of (five or less) cannabis plants is no longer included in the criminal offence of "narcotics production", where it had belonged since 1937. Cultivating more than five plants can now result in up to six months' imprisonment, or up to five years when large numbers of plants or quantities of cannabis are involved.

The exact amount of "a small number of plants" is set by governmental decree, and it is seen as binding for police and courts. The rationale for criminalising only "greater than small" amounts of illicit drugs has been applied to the possession of illegal drugs in the Czech Republic since 1999. Until 2010, "greater than small" amounts were not universally defined by any norm in a bylaw or a court binding decision. Courts had to determine this amount on a case-by-case basis. In 2009, an ad hoc governmental commission proposed 15 grams as the lower limit for "greater than small" amounts of cannabis and this amount was subsequently adopted by the Government. Following the decision of the Constitutional Court on this specific part of the drug legislature ([Ústavní soud \[Constitutional Court\], 2013](#)), the Supreme Court set the "greater than small" amount at 10 grams of herbal cannabis, which is now seen as binding ([Nejvyšší Soud \[Supreme Court\], 2014](#)). A verdict of the constitutional court is expected on the arrangement over the 'five plants' is still awaited.

The cultivation of any number of cannabis plants is a criminal offence in the Netherlands, although in the last decade (since 2000) the cultivation of up to five cannabis plants by adults has normally not been prosecuted. Until 2012, this situation was treated in the same way as the possession of a small amount of cannabis for personal use (tolerance policy). The detection of up to five plants normally resulted in the police dismissing the case if the owner gave up the cannabis plants immediately. If, on the other hand, the owner refused to surrender the plants, he or she could still be criminally prosecuted. If the police detected more than five plants it was considered professional cultivation punishable by four years' imprisonment and/or a fine of up to €67,000.

In recent prosecution guidelines for the Opium Act (January 1, 2012), the policy of tolerance towards five cannabis plants was amended. Previously, only the number of plants was considered, but not the size of the plants or other factors. Since 2012, indicators of the level of "professionalism" have also mattered. The policy of tolerance towards five plants now only applies to amateurs who are obviously cultivating for personal use. To determine if a plantation is a professional setup, a number of instructions are included in the prosecutorial guidelines. If two or more reference points apply, the plantation is considered a professional setup, notwithstanding the number of plants. The reference points include the presence of ventilation, heating, artificial light, disease control, a centrally controlled irrigation system, the use of seedlings, and the use of CO₂ supplements. It is not yet clear how strictly the police will interpret and apply the new prosecution guidelines in practice, and this paper goes into the evidence provided by the available data. However, it is clear that five cannabis plants are no longer tolerated by definition.

Playing the game – cannabis (cultivation) law enforcement

Both the Czech Republic and the Netherlands have rather tolerant approaches to cannabis-type drugs. In both countries, the share of cannabis-related offences on all drug crimes is substantially lower than the European average (59.8% in 2011). Rather surprisingly, a lower share of cannabis-related crimes was reported for the Czech Republic (40.7% in 2012) than for the Netherlands (53.5% in 2011) ([EMCDDA, 2014](#)).

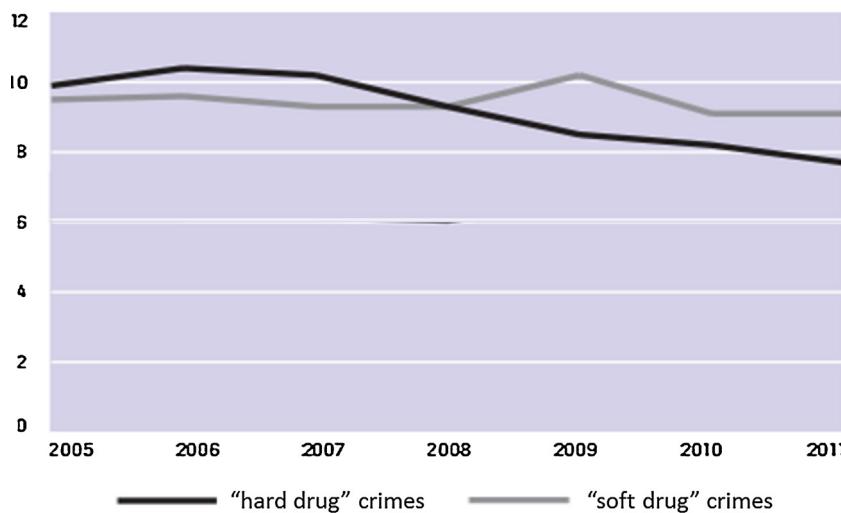
Neither the Dutch nor the Czech legal regulations criminalize small-scale cannabis cultivation, but the implementation of these laws seems to differ substantially in the two countries. In order to analyse these differences, data on cannabis seizures and arrests were assessed. In our analysis the law enforcement data is considered to reflect enforcement priorities and efforts to a large extent, rather than the underlying market characteristics.

The Czech police used the recently established paragraph of the criminal code on the cultivation of more than five psychoactive plants 145 times in 2010, 168 times in 2011, and 193 times in 2012; statistics on cultivation-related administrative offences concerning less than five plants are not available ([Mravcik et al., 2013](#)).

Although one might expect a decrease in the number of charges for "illicit drug production" (the previous qualification of all cannabis cultivation-related offences), as a result of cultivation crimes being moved from "production" into the new paragraph of the criminal law (and those concerning five or less plants to administrative offences) after 2010, these actually increased from 2443 in 2009 to 2516 in 2010, and up to 3097 in 2011. The increases in cannabis cultivation crimes in the Czech Republic in 2010 and 2011 suggest that the *de jure* policy liberalisation has not translated into *de facto* changes in the policing of cannabis cultivation but, most likely, more people were arrested for cannabis cultivation after the legislative changes than before 2010. As a result of the clarification of the specific sanctions and the threshold number of plants for cannabis cultivation offences, not only cannabis users and cultivators but also police officials gained greater legal security in terms of what can be prosecuted under the criminal law.

Czech court statistics, on the other hand, show a decrease in the numbers of "illicit drug production" charges after 2010 (from 1820 court cases in 2009 to 1441 in 2010). This decrease is only partially compensated for by the increase in the number of new court cases involving the cultivation of more than five cannabis plants (170 cases in 2010). While from 2011 to 2012, the number of drug production-related court decisions increased again, the number of cannabis cultivation court cases dropped further, to 99. During a period of legislative changes, Czech judges are obliged to make decisions that are based on the legislation that is more beneficial for the offender. In 2010, a number of convictions for drug production from the previous period were probably dismissed as administrative offences involving cannabis cultivation. To summarise, although the number of arrests for cannabis cultivation increased in 2012, the number of court decisions in these cases dropped, suggesting that cannabis cultivation crimes are registered more often by the police, but are less likely to end up in court.

In the Netherlands, the prosecution of professional cultivators has intensified since the turn of the century, as the options for administrative enforcement have been extended with several additions to the Opium Act, including the *Victor Act* (2002). The latter regulates the cooperation between the police and several other stakeholders, such as energy companies, insurance companies, housing corporations, municipal organisations, and others ([Grund & Breeksema, 2013](#)). Further measures aimed at repressing cannabis cultivation include an anonymous tip line to which cannabis plantations can be reported and the distribution of "cannabis scent cards" with police appeals to report neighbours who are growing cannabis.

Fig. 1. Registered drug crimes in the Netherlands, $\times 1000$.

Source: van Rosmalen et al. (2012).

In 2012, the Dutch police recorded nearly 38,000 “incidents” concerning (alleged) drug offences (Kruize & Gruter, 2014). About 30% of those “incident records” were related to cannabis cultivation, indicating that over 10,000 cannabis-related offences were recorded in that year. The “incident records” can equally refer to cannabis plantations raided or to other types of incidents, such as a phone call from a local resident about a strange (hemp) smell (Kruize & Gruter, 2014). In 2011, the police recorded 17,000 drug crimes (see Fig. 1). The number of registered drug crimes gradually decreased after 2006, when they were 14% lower than in 2005. Both the number of recorded Schedule II crimes (“soft drugs” or cannabis) and Schedule I crimes (“hard drugs,” such as heroin, cocaine, amphetamines, or other synthetic drugs) decreased between 2005 and 2011, by 4% and 23% respectively (van Rosmalen, Kalidien, & de Heer-de Lange, 2012). More detailed Dutch police data concerning the number of recorded offences associated with cannabis cultivation, to be compared with the Czech figures, are not available. Dutch national police registrations do not specify the types of drug offences beyond schedule I and schedule II. Changes in registration practices and reorganisations of police structures interfere with valid distinctions between offence categories, such as production, trafficking, or dealing. Nor it is possible to distinguish offences related to personal consumption from supply-related offences (van Laar, Cruts, & van Gageldonk, 2014). Furthermore, registered offences under the Opium Act are usually the outcome of investigative police work and crime statistics may therefore partly reflect law enforcement and political priorities (van Rosmalen et al., 2012).

The change in the structure of the crimes investigated by the police towards “soft drugs” (i.e., cannabis-type drugs) may explain the decline in the number of cases brought to court which reflects the lower level of social danger posed by cannabis drugs, an aspect that courts are by definition more sensitive to than any other level of criminal proceedings (Table 2).

Another indicator of policy implementation is the number of seizures of cannabis plants. In 2011, the Netherlands had the second highest number among European countries after the United Kingdom of cannabis plantations seized, with 5435 plantations being seized. Yet 15 years ago, in 1996, the same indicator was 10 times lower for the Netherlands than for the UK, with only 342 plantations being seized. In the Czech Republic, 240 cannabis plantations were seized in 2011 – a number around the EU median. Nonetheless, this represents a fourfold increase in cannabis seizures in the Czech Republic since 2002 (EMCDDA, 2013d).

Across the EU, a median of 63 plants per 1000 cannabis users in each country are confiscated by the police annually (European Monitoring Centre for Drugs and Drug Addiction, 2013). Approximately 58 plants per 1000 cannabis users were seized in the Czech Republic – close to the 2011 EU median – at a relatively low number of plantation sites, witnessing the focus on large-scale sites. In the Netherlands, more than 1500 plants were seized per 1000 cannabis users, or 1.5 plants for each (last-12-months) Dutch cannabis user, the highest number in the EU. Fig. 2 shows a comparison of European countries in terms of the number of plantations seized and the average number of plants per 1000 users.

As depicted in Fig. 1, several countries, especially Belgium, followed by Finland, the UK, Ireland, and Greece, have seized a rather larger number of small-scale plantations per 1000 cannabis users. The Netherlands are an outlier in terms of seizing both a high number of plantations and a high number of plants. While this could suggest that large-scale plantations are being targeted, a more detailed analysis of the variation within the Dutch seizure data suggested that the median number of plants seized could be much lower than the average. In 2004, the average number of plants seized per Dutch plantation was 474, with a minimum of three, maximum of 5460, and a median of 150 plants (Jacobs, 2007, p. 14). This suggests that small-scale plantations in the Netherlands may be detected more frequently than large ones. For further analysis, we focus on the time trend of the number of plantations seized, and

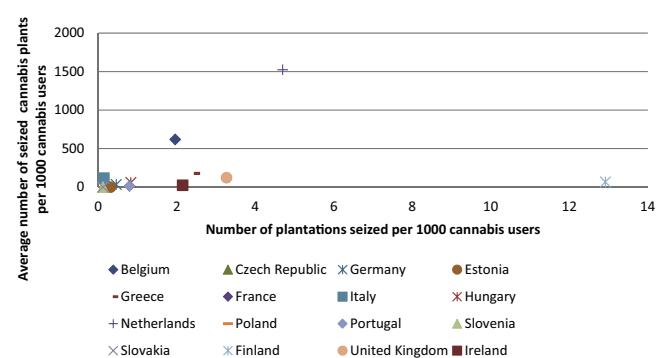


Fig. 2. Cannabis seizures and average number of plants per 1000 users in the EU as of 2011 (countries that reported on both indicators only).

Source: EMCDDA (2013b, 2013c, 2013d).

Table 2

Outcomes of court cases in the Netherlands involving Schedule II ("soft drugs") crimes, 2005–2012.

No. of persons	Year							
	2005	2006	2007	2008	2009	2010	2011	2012
(i) Declared guilty (at first verdict ^a)	2987	3131	2703	2762	2842	2575	2431	2451
(ii) Punished with a fine	892	857	707	807	805	686	544	510
(iii) Punished with community service	1649	1764	1538	1504	1538	1407	1351	1353
(iv) Punished with imprisonment	330	396	313	317	315	353	367	354

Source: Kalidien and Lange (2013 – (i) Table 6.5, p. 524; (ii) Table 6.9, p. 538; (iii) Table 6.11, p. 544; Table 6.13, p. 550).

^a Some of these convictions may be overturned at appeal.

the number of plants seized per operation, calculating the average number of plants seized per operation.

Between 1996 and 2011, the number of plantations seized in the Netherlands increased sixteen times. During the 1990s, the average size of the cannabis plantations dismantled by the Dutch police was above 1800 plants, with a total of 342 sites reported (van Laar et al., 2014). Since 2004, there has been a clear decrease in the average number of plants per site raided, dropping from 596 in 2003 to 130 in 2006 and 325 in 2012.

In the Czech Republic, the number of plants seized per plantation has been growing gradually, from an average of 56 plants in 2002 to 262 in 2011 (when a slight decrease occurred after a peak of 548 plants in 2008). The number of plantation sites dismantled grew steadily as well – from 58 in 2002 to 240 in 2011 and 218 in 2012. This suggests that law enforcement agencies in the Czech Republic focus their enforcement activities on detecting large-scale plantations. In contrast, the Dutch police seem to have increasingly targeted smaller cannabis entrepreneurs. These trends are depicted as relative changes compared to the baseline year in Fig. 3.

Informal institutions – cannabis cultivation culture

First, we analyse the role of cannabis cultivation in both countries and its acceptance by the public. We then discuss the specific cannabis cultivation cultures that emerged in the history of each country.

Both countries report rates of cannabis use above the EU average. In the Czech Republic, the lifetime prevalence of cannabis use for 16-year-olds was 42% in 2011, compared to 27% in the Netherlands and the European average of 20% (ESPAD, 2014). In the adult population, the average European prevalence of cannabis use during the last year is 5%, 7% in the Netherlands and 10% in the Czech Republic, which has the third highest last-year prevalence after Italy and Spain (EMCDDA, 2013b). Thus, concerning cannabis use, the Czech Republic and the Netherlands can be characterised

as high- and above-average-prevalence countries. This translates into the societal context and public attitudes towards cannabis.

Yet in 2002 (the earliest public opinion survey on cannabis policy questions in the Czech Republic), half of the Czech citizens (50%) agreed with the statement that "cannabis use should be prosecuted under the criminal law" (Mravcik et al., 2003). When the same question was asked 10 years later, the majority of the Czech citizens surveyed (56% in 2012) opposed the idea (Mravcik et al., 2013), suggesting a shift in attitudes to cannabis in the last decade. An even larger percentage of the respondents in the same 2012 survey disagreed with "criminalising cannabis cultivation for personal use", 73%, up from 43% in 2002. This strong rejection of criminalising small-scale growers may be associated with recent developments in medical cannabis legislation, explaining the sharp increase from the 43% level of support for the decriminalisation of cultivation in 2002. It seems that after the widely published beneficial effects on certain disease syndromes, small-scale cannabis cultivation is less stigmatised in contemporary Czech society than (recreational) cannabis use itself.

Dutch society has also gone through a transition in its opinions to cannabis. In 1975, 70% of the Dutch thought that smoking cannabis should be punished severely. This suggests that the 1976 legislative changes were initially only supported by a minority of the Dutch population. As Grund and Breeksema (2013) noted, the Dutch political process has historically aimed to include and protect minorities, even when public opinion or political majorities favour more repressive approaches. Likewise, the opportunity principle – a part of Dutch law since 1878 – allows a prosecutor to forego criminal proceedings when these would be harmful to the public good or lead to social unrest (Grund & Breeksema, 2013). Over the years, the Dutch started considering cannabis to be not unlike alcohol, and in 2009 public opinion survey they had clearly swung: about 77% of the Dutch thought cannabis should be decriminalised, regulated, or legalised (Sarosi, 2009).

Coffee shops per se, however, continue to carry stigma in the Dutch population. In 1998, 47% of Dutch adults (>19 years) thought that coffee shops should be allowed, while 43% thought they should not be (SCP, 1998). The 'Sociaal en Cultureel Planbureau' researchers explained the lower level of acceptance of coffee shops as a NIMBY³ response, "Society perceives coffee shops as 'trading enterprises'. People rather don't want to have them in their own neighbourhood." Dutch opinions on cultivation have not been explicitly queried. In December 2013, two-thirds of Dutch citizens agreed to legalisation to "conform to the example of Uruguay", which would transform the Dutch tolerance model towards the actual legalisation of cannabis cultivation for personal use and cultivation and wholesale supply (to coffee shops or perhaps other licensed retail outlets) by licensed companies (De Hond, 2013). Below we explore how these attitudes may interact with the developments in the cannabis cultivation culture in each country.

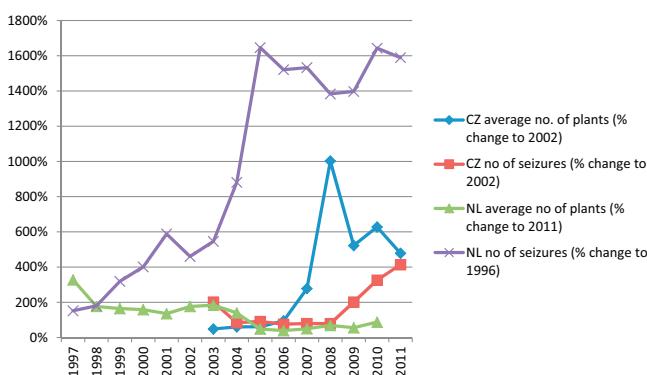


Fig. 3. Average number of cannabis plants seized per plantation and the number of seizures (% change from the baseline year).

Source: EMCDDA (2013c, 2013d).

³ "Not In My Back Yard".

In the Czech Republic (former Czechoslovakia), outdoor cannabis cultivation was already practised in the communist period. This herbal cannabis was distributed free of charge in the non-monetary or 'tit-for-tat' grey economy that represented the only market alternative during communism, when the country's borders were closed to international drug markets (Gabrhelik, Kubu, Miovsky, & Zabransky, 2008; Grund et al., 2009). Self-supply and the grey economy were in fact the primary source of many other consumer goods that were either unavailable in the centrally planned economy or supplied in low-quality versions only (e.g., sewing the household's own clothes, growing fruit and vegetables, and crafting furniture were common in many households). Since the 1989 Velvet Revolution, the cannabis market in the Czech Republic has evolved in two stages, the first being the development of commercial markets in imported indoor cannabis (1995–2005) and the second an increase in "large- and small-scale domestic indoor cannabis cultivation within a highly competitive market and resulting in price decreases (2005–present)" (Belackova & Zabransky, 2014b).

A substantial segment of current Czech cannabis users refer to their cultivation efforts as a hobby and the product is often distributed for free with pride. Another segment of Czech cannabis users – typically, those from rural areas – continue to prefer outdoor varieties because of their "natural character," and, in contrast to cannabis produced indoors, outdoor varieties are commonly smoked without tobacco (Belackova & Zabransky, 2014b).

However, outdoor cannabis cultivation entails significant risks in terms of theft of the crop and robbery. Indoor cannabis cultivation, on the other hand, is considered to involve greater risks to people living in rented housing or condominiums, since neighbours might complain to the property owners or the police. In addition to these *variable costs*, there are significantly higher *fixed costs* associated with indoor cannabis production than with outdoor production, where, for example, lighting and nutrients are provided by nature. To reach a cost comparable to market price, many indoor growers therefore also tend to supply cannabis users in their friendship networks, exposing themselves to substantial risks of criminal investigation. In turn, these activities have contributed to the cannabis market becoming increasingly competitive more recently, with many small-scale cannabis growers selling at low prices and at substantial discounts when selling "quantity". Vietnamese drug trafficking networks that produce cannabis on a large scale in the Czech Republic have also promoted this development since about 2005. Those networks produce primarily for export to neighbouring – higher-income – countries but a non-negligible part of their product is funnelled into the Czech cannabis market (Belackova & Zabransky, 2014b).

On the Dutch market, Morocco, Pakistan, and Lebanon were the most important source countries of the cannabis until 1990 (Jansen, 2002). The imported cannabis concerned mainly hashish, as the more bulky cannabis was harder to smuggle (Boekhooorn, 2002; Maalsté, 1993). Around the 1970s, Dutch cannabis enthusiasts pioneered outdoor cannabis cultivation. Initially, the Dutch cannabis was of low purity and few cannabis consumers were interested. The cannabis sold at coffee shops during the 1980s was mostly imported, e.g. from Jamaica or Thailand. In those days, indoor-grown cannabis could already be purchased in various coffee shops, although its quality, while increasing, was varied, with stronger strains still only on limited offer. As the consumption and demand for cannabis grew in the 1990s (in particular between 1997 and 2001 (Trimbos Institute, 2012)) and more coffee shops opened up, imported cannabis could no longer meet the growing demand. When indoor growing took off and various new cannabis strains were introduced, hobbies turned into small businesses and many home growers sold their product at the "back door" of the coffee shops.

Among the respondents of the 2014 Global Drug Survey, the most common types of cannabis used in the last 12 months were high-potency indoor cannabis (44.2%), herbal/grass (32.8%), hashish (21.6%), and edibles (1.3%) varieties. At 44.9%, high-potency indoor cannabis was also the type of cannabis most preferred by the majority of last-year users, followed by hashish (28.6%), (imported) outdoor (20.7%), and edible (4.9%) varieties (Winstock, 2014).

Jansen (2002) attributed the success of "Nederwiet" to innovations in the fields of genetics, fertilisers, lighting, air conditioning, pest control, and the prevention of unwanted attention (e.g. smell, noise). Agricultural production in greenhouses is core to the Dutch export economy and several universities and research companies are at the cutting edge of cross-breeding and biotechnology. This rich reservoir of agricultural knowledge soon became available to the pioneering cannabis growers (Jansen, 2002; Potter, 2008). Furthermore, breeding new cannabis strains was not against the Dutch Opium Act and is still legal. Within a decade, "over 80% of the internal demand for cannabis in the Netherlands was met through domestic production" (Jansen, 2002).

Although it did not take steps towards further regulation of the production of cannabis or the supply to the coffee shops, during the 1990s the Dutch government's position on home growing was rather sympathetic. The 1995 government policy paper, *Continuity and Change*, actually suggested that home growers might theoretically be able to supply all the coffee shops. As the government sought to reduce the influence of organised crime in the supply of the coffee shops as much as possible, it gave low enforcement priority to small-scale, non-professional home cultivation (Dutch Government, 1995a).

Far into the 1990s, law enforcement did not pay much attention to cannabis cultivators. In this atmosphere, the indoor cannabis cultivation culture developed at a rapid pace. In the late 1980s, the first "growshops" opened their doors, prompting a professionalisation of indoor cannabis cultivation in the Netherlands. The growshops opened up the cannabis market to new players without 'green fingers', providing them with access to advanced agricultural equipment and knowledge.

Several studies suggested that growshops became an important link between cultivators and coffee shops, selling seedlings (clones) and purchasing and distributing the harvest of various plantations. Some growshops supplied start-up cannabis farmers with the necessary equipment free of charge in exchange for (part of) their harvest (Boerman, Grapendaal, & Mooij, 2008; Wouters, Korf, & Kroeske, 2007). By 1990, there was no denying that the cannabis market had changed and had become dominated by indoor cannabis. While in 2014, hashish is still imported from Morocco or Afghanistan, around 90% of the cannabis sold in coffee shops concerns various strains of Nederwiet (cannabis from the Netherlands) (Maalsté, Huigen, & Lallush, 2014).

In the eighties, the emerging 'cannabisness' started attracting the attention of commercial entrepreneurs and individuals who were already involved in other illegal activities, and indoor cannabis cultivation became a relatively low-risk source of revenue. Soon, Nederwiet became an important export product and high-potency Dutch indoor Nederwiet (or "skunk") became increasingly available in cannabis markets across Europe (Jansen, 2002).

In the 1990s, there seemed to be a clear distinction between cultivators that were involved in so-called export weed and cultivators that supplied Dutch coffee shops. The cultivation of export weed was controlled by organised crime groups. The domestic production and supply to the coffee shops was dominated by smaller-scale individual and independent growing operations, each often producing less than 10 kilograms per year.

In 2002, Bovenkerk and his colleague Hogewind argued on the basis of interviews with police officers that almost all hemp cultivation had become a matter of organised crime, rather than of

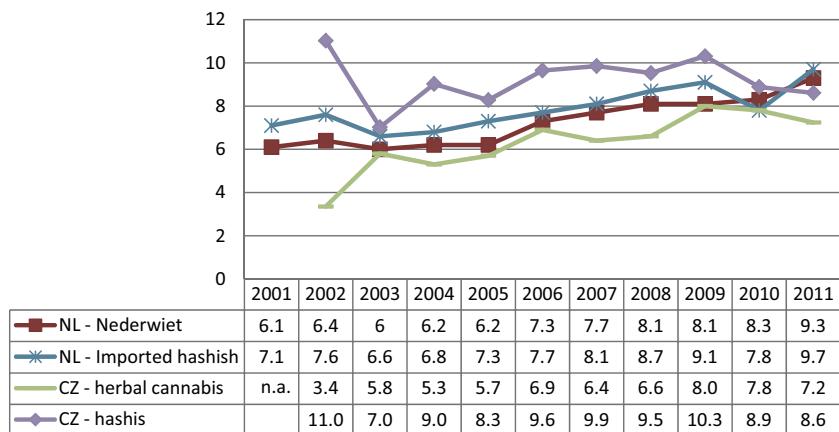


Fig. 4. Nominal cannabis prices in the Czech Republic and in the Netherlands (coffee shop prices) in €.

Source: EMCDDA (2003e), Mravcik et al. (2003, 2004), Niesink and Rigter (2013), Zabransky et al. (2002).

innocent gardening (Bovenkerk & Hogewind, 2002). The cannabis growers interviewed by Maalsté and Panhuysen (2007) also testified about the increasingly criminal character of the cannabis trade (threats of violence, weapon possession, rip-offs, and snitching) and linked these to increasingly repressive police tactics and the increasing dominance of commercial and criminal entrepreneurs in the cannabis sphere.

In terms of economic theory, these newcomers can be seen as “risk takers”. In contrast, earlier generations of “idealistic” and small-scale cultivators were less prone to taking risks when the chances of being caught increased. Thus, cannabis cultivation quickly lost its attraction for small-time home growers for whom these activities were not their primary source of income and who wished to avoid a criminal record or eviction from their home (Grund & Breeksema, 2013).

By 2014, the distinction between cannabis intended for export or local consumption seems to have disappeared. Because of the intensified repressive approach, direct contact between growers and coffee shop owners became a liability. Contacts between growers and retailers are increasingly facilitated by “brokers” that buy and sell the products and determine which product ends up in a coffee shop or abroad.

Over the years, cannabis culture has become ‘diluted’ in the Netherlands. Many coffee shops have become take-out-only outlets, no longer serving as a social meeting space, while a “joint” is no longer automatically shared, even when smoking with close friends.

Many current Dutch cannabis consumers grew up with coffee shops. For them, coffee shops and smoking cannabis are part of their normal daily life. One has to engage in a particular scene to know about cannabis or buy cannabis. In the larger Dutch cities, acquiring cannabis is little different from buying a packet of cigarettes. Identification with cannabis and/or with a “cannabis lifestyle” is much less common than in other countries. Most cannabis consumers do not consider themselves as being different because they smoke cannabis. It is merely one of the activities they do. Nor do they feel that they belong to a specific (deviant) community.

Transaction costs on the cannabis market – retail prices and availability

Cannabis prices can, to some extent, influence the decisions on whether to purchase cannabis or to grow one's own. At the same, they reflect the *transaction costs* that are incurred at the wholesale and production levels. We chose to compare cannabis prices in the Czech Republic and in the Netherlands, adjusted for purchasing

power parity. First, we adjusted the cannabis prices according to the purchasing power parity (PPP) in relation to alcohol, tobacco, and narcotics (further referred to as *the real cannabis price*). Secondly, we assessed the influence of the relative prices of cannabis adjusted to the prices of electricity, gas, and other fuels on the decision to buy or grow.

The data on cannabis prices for the Czech Republic was retrieved from the EMCDDA database and inconsistencies with national data as of 2011 were double-checked and corrected. The Dutch data concerns prices in coffee shops as reported by the Trimbos Institute (Niesink & Rigter, 2006, 2013). Given that in the Czech Republic, most of the price data would account for herbal cannabis and imported resin, we chose to compare it with Nederwiet and with hashish imported into the Netherlands. The *nominal prices* (the money paid for the goods at each transaction) of (mainly imported) hashish remain comparable or even higher in the Czech Republic (while the nominal Dutch average annual wage is more than double the Czech one (OECD, 2014)). The nominal Czech herbal cannabis prices remain, however, lower than those in the Netherlands (see Fig. 4).

As shown in Fig. 4, nominal cannabis prices in the Netherlands nearly doubled between 2001 and 2011, possibly as a result of increased law enforcement and pressure on cultivators. The Czech cannabis prices have been on the increase since these were first monitored in 2002, which is probably a reflection of the gradual increase in the quality of the cannabis and of the increasing mean and median nominal income in the country (according to the Czech Statistical Office, 2014, the average salary rose from 15,407 CZK in 2003 to 25,500 CZK in 2014).

However, after 2009, the Czech cannabis prices decreased when the market became increasingly competitive because of the growing number of small-scale cultivators and the establishment of large-scale Vietnamese growers/distributors. Qualitative research on the Czech cannabis market (Belackova & Zabransky, 2014b) suggests that the price fall was actually more profound and occurred already before the year suggested by the time series data from the police presented in Fig. 4, pointing at 2008 as the start point of decreases in the (purchase) price. Given the increase in the Dutch coffee shop prices and the recent homogenisation between the Czech cannabis and hashish prices, the price gap between the Czech and the Dutch prices seems to be closing.

When the prices are PPP adjusted to the prices of the closest substitutes (alcohol and energies), the picture changes slightly. After adjustment, cannabis products were almost twice as expensive in the Czech Republic as in the Netherlands (2003 data, see Fig. 5). Combined with the absence of “risk-free” venues for acquisition

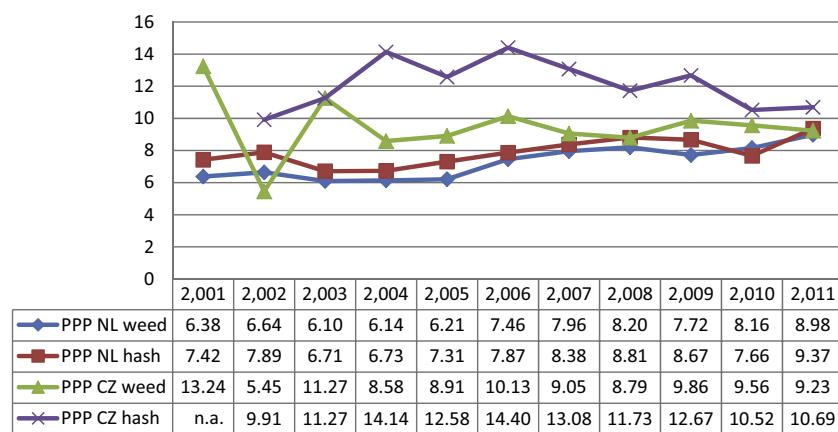


Fig. 5. Relative cannabis prices in the Czech Republic and in the Netherlands – re-counted with purchasing power parity for alcohol, tobacco, and narcotics (EU27) in €.

Source: EMCDDA (2003e), Eurostat (2012), Mravcik et al. (2003, 2004), Niesink and Rigter (2013), Zabransky et al. (2002).

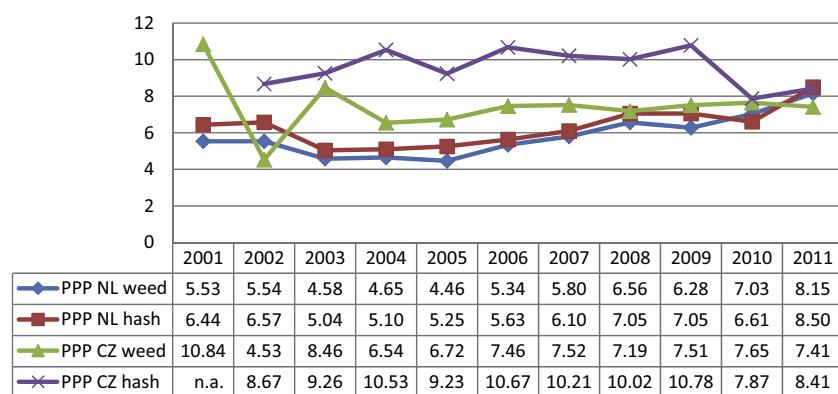


Fig. 6. Real cannabis prices in the Czech Republic and in the Netherlands – re-counted with purchasing power parity for electricity, gas, and other fuels (Eurostat, EU27) in €.

Source: EMCDDA (2003e), Eurostat (2012), Mravcik et al. (2003, 2004), Niesink and Rigter (2013), Zabransky et al. (2002).

(such as the officially tolerated coffee shops), this in turn provided relatively strong incentives for Czech cannabis users to avoid the market and cultivate “free-of-charge” outdoor cannabis. Only since 2010–2011 does this difference seem to have been disappearing, which seems to be a logical stage of the development of the market. Purchasing cannabis on the market was also relatively more expensive in the Czech Republic in the early 2000s when the costs of energy or equipment to cultivate one's own indoor cannabis are taken into account (see Fig. 6). In 2010, the Czech market prices probably reached the point at which it paid off to purchase cannabis on the market rather than to cover the cost of energy and other necessities for cultivating one's own.

The transaction costs of cannabis acquisitions are also determined by its availability, in particular that of good-quality strains. In the ESPAD 1995–2011 surveys, the proportion of EU respondents that perceived cannabis as “fairly easy” or “very easy” to obtain was between 24% and 34%. In both the Czech Republic and the Netherlands, perceived access to cannabis for 16-year-old students has been above average for the entire period (except for the Netherlands in 1995). In the Czech Republic this statistic peaked in 2007 at 66% and in the Netherlands in 2011 with 59% (ESPAD, 2013).

Likewise, between 1994 and 2000, 19% and 23% respectively of Czech citizens aged 15–64 had been offered an illegal drug in their lifetime (Zabransky et al., 2002). In 2001 this increased to 27% of the respondents, almost doubled to 50% in 2004 and then stabilised at 49% in 2008 (Belackova et al., 2012).

Whether one is offered cannabis is perhaps a less relevant indicator of availability for the Netherlands, as every adult can simply purchase the drug in coffee shops. Fig. 7 depicts the number of coffee shops, the number of municipalities, and the number of municipalities with coffee shops in the Netherlands from 1999 to 2012.

According to the latest available figures, there are 608 coffee shops in the Netherlands as of 2014, a decrease from 846 in 1999 (Maalsté et al., 2014). In 1995, the Dutch government estimated the number of coffee shops at 1500 (Dutch Government, 1995b). The number of municipalities where coffee shops are available has remained rather stable – 105 in 1999 and 103 in 2014. About half of those are in cities with over 200,000 residents. The Dutch coffee shops are concentrated in the “Randstad” (the urbanised area between Amsterdam, Rotterdam, and Utrecht) and in medium-sized cities in the provinces. More than half (52%) of all the Dutch coffee shops are located in the six major cities with more than 200,000 residents, with 286 coffee shops (46%) located in Amsterdam, Rotterdam, or The Hague, which are the only municipalities with over 20 coffee shops. 10% of the coffee shops are located in municipalities with fewer than 50,000 inhabitants. Very few municipalities with under 20,000 residents have coffee shops (van Ooijen-Houben, Bieleman, & Korf, 2014).

Discussion

Our paper contributes to the recent debate on the impact of emerging regulated markets (Uruguay, two states of the USA, and

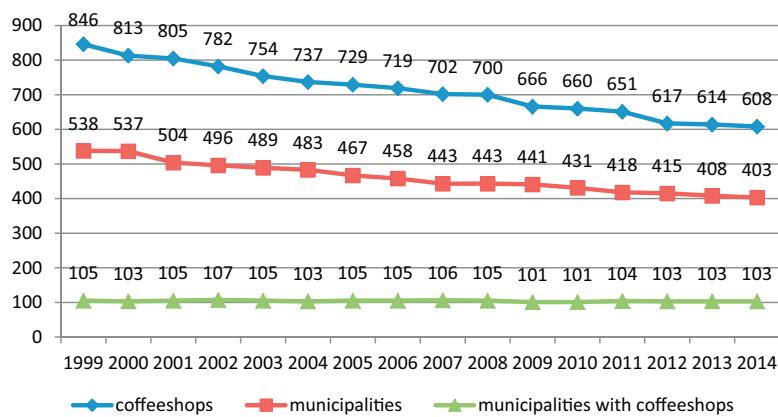


Fig. 7. Number of coffee shops, number of municipalities, and number of municipalities with coffeeshops 1999–2014.

Source: Maalst  et al. (2014).

Spain) by scrutinising whether cannabis cultivation for personal use is a deliberate user's choice and to what extent it is shaped by policy, culture, or other market factors. To cast some light on these important yet difficult questions, we studied two, at first glance, very similar policy models of partial decriminalisation. However, they show quite different emphases in terms of what is tolerated and what is enforced.

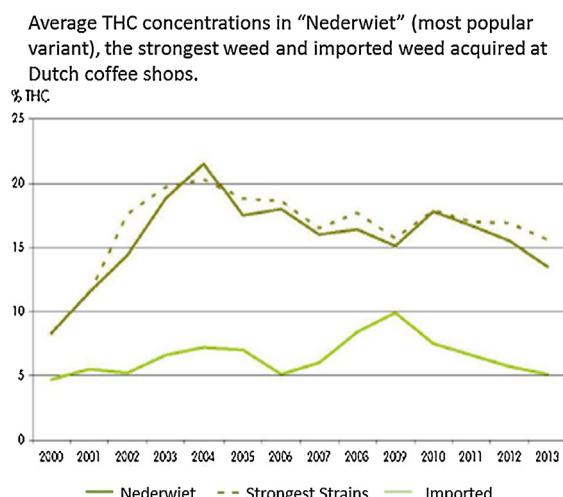
The severity of the punishment for small-scale cannabis cultivation of up to five plants is comparable for the two countries but, when the five plants limit is exceeded, the Dutch laws appear to have more serious consequences. The Czech regulations only consider the scale of the cannabis plantation when deciding whether it is exempt from criminal proceedings or not. The Dutch prosecution guidelines have recently introduced a rather arbitrary qualitative indicator of "professionalism" (the technology used in cultivation) that discourages small-scale cultivation for personal use, as many of these technologies – ventilation, heating, artificial light, irrigation, or disease control are used by just about all indoor cannabis growers – amateurs and professionals alike.

Clearly, *playing the game* – the practical implementation of policies on cannabis cultivation in both countries – differs substantially between the two countries. Five to six thousand dismantled plantations in the 16 million population-sized Netherlands contrasts strongly with about 150 dismantled plantations in the 10 million population-sized Czech Republic. In 2013, the Dutch police

estimated the total number of illegal cannabis plantations at 30,000, estimating the risk of police detection to any grower at 16–20% (RIEC, 2013).

The individual cultivator can avoid the risk of low or unknown product quality by securing his/her own. By self-supplying with cannabis, s/he also avoids interaction with illegal market players, which significantly reduces the risks of police intervention and the resulting seizure of the cannabis and/or prosecution. This could be despite the costs related to the small-scale technology of production. It will be important for his/her decision on whether (not) to grow whether or not s/he can produce at a price competitive with the market price, inclusive of its transaction costs.

Our findings clearly show that the Dutch law enforcement practice has deterred small-scale home cultivators in particular (increased their risk/costs, while the cost of "commercial" cannabis in coffee shops was relatively low), leaving the market to competitors with less of a commitment to conventional society and with more resources to avoid detection (Grund & Breeksema, 2013; Solinge, 2010). Thus, while home cultivation in the Netherlands declined, criminal organisations rapidly took over the market, and since 2008, non-professional plantations have only seldom been found. There is no doubt that the situation with the dominance of organised criminal groups is less desirable for the public than the one with small-scale growers, supplying mostly themselves and, possibly, the coffee shops (Fig. 8).



Average THC concentrations in "Nederwiet" (most popular variant), the strongest weed and imported weed acquired at Dutch coffee shops.

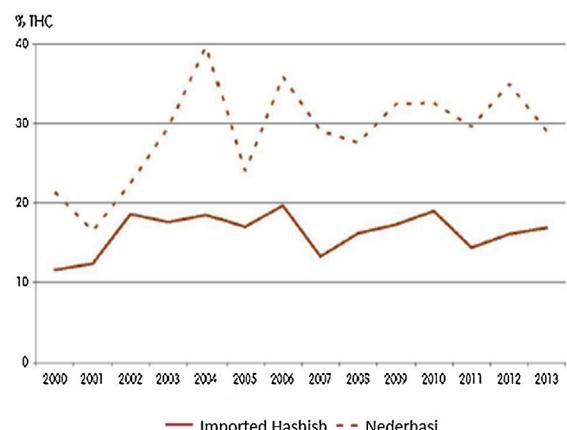


Fig. 8. Average concentrations of THC in cannabis and hashish in Netherlands, 2000–2013.

Source: Maalst  et al. (2014), Niesink and Rijter (2013).

The Dutch are justifiably considered to be the most liberal nation in Europe when it comes to commercial consumer-level transactions, but they flinched from regulating cultivation and the supply to the coffee shops (the so-called “back door problem”). Policing cannabis cultivation and supply to the coffee shops was not a policing priority for a quarter of a century after the 1976 drug policy reform. After 2000, the changing Dutch political landscape shifted the attention of politics and law enforcement to cannabis. While there was rather broad support for the coffee shops in general, the increasing association of cannabis cultivation and wholesaling with organised crime resulted in increasing financial investments in policing these two essential components of any supply chain. However, Dutch drug policy scholars contend that the government's stricter approach after 2000 triggered the scale-up and criminalisation of the cannabis supply side (Solinge, 2010; Maalsté, 2008). This development represents a very impressive example of numerous unintended consequences of restrictive drug policies in a country where few from the outside would expect it.

Quite the reverse, the Czech police continue to dismantle growing sites run by organised crime, as well as to prosecute any known operation of cannabis sales. Nonetheless, the implementation of the policy on cultivation is substantially more liberal than in the Netherlands, resulting in a vibrant self-supply cannabis cultivation culture that extends into a “friends providing to friends” system that is large enough to compete with (internationally operating) criminal entrepreneurs.

The Czech cannabis cultivation culture emerged in response to the strict prohibition under the communist regime, when drug users started to produce their own drugs, including cannabis and injectable drugs (Grund et al., 2009; Zabransky, 2007), to compensate for the lack of imports caused by the “iron curtain”, which minimised the movement of people and goods across borders. These efforts were driven by scarcity, an important determinant of drug cultures (Agar, 1977; Grund, 1993). After the Velvet Revolution, the emerging liberal drug policy opened up the space for the further development of small-scale amateur cultivation. In the Netherlands, on the other hand, the amateur cultivators always remained a small minority. Trautmann et al. (2013) and the Global Drug Survey data suggest that only between 2 and 5% of cannabis consumers grow cannabis for their own use. Although idealistic growers and connoisseurs continue to contribute to the Dutch cannabis market, in terms of market behaviour, the players that currently dominate cannabis cultivation and the wholesale market in the Netherlands can be characterised as risk-taking individuals that thrive in the unregulated production and wholesale parts of the cannabis supply chain, using the latitude provided by the overall liberal drug policy setting.

In terms of *cannabis cultivation culture*, a concept established for the purpose of this paper, we understood it as an interplay between the drug policy, its incentives and the general culture. This is in contrast to Sandberg's definition of cannabis culture, who presents cultural aspects of three cannabis markets – private, semi-private, and public markets, each of them possessing its own specific culture. He stipulates that in the course of the sellers' careers, the culture preceded their market behaviour, and from this he assumes the superiority of the culture over the market behaviour. To us, however, the cannabis cultivation culture has been constructed by the specific features of historical market and policy developments. For instance, competitive market operations offer significant economies of scale. This has characterised the Dutch cannabis prices in the recent decades. Easy access to affordable cannabis in a safe and regulated environment (coffee shops) and relatively high risks when growing one or two plants above the norm have significantly reduced the incentive to grow your own. “Why bother?” would be the answer of most Dutch cannabis users.

In economic terms, the coffee shop system has protected cannabis users from the *transaction costs* of the illegal market. In contrast to the Czech situation, the costs of establishing one's own self-supply (<5 plants) firm in the Netherlands greatly outweigh the costs associated with participating in the coffee shop market.

In the Czech Republic, on the other hand, prohibition and high prices have pushed cannabis consumers towards growing their own. Cannabis prices have only recently decreased, when competition among market players evolved. In 2010, the Czech cannabis market prices reached the point where it paid off to purchase cannabis on the market rather than to cover the costs associated with cultivating one's own – a development that transpired rather rapidly with the rise of the coffee shops in the Netherlands several decades earlier. In the Czech Republic, outdoor cannabis cultivation remains a viable option. In the densely populated Netherlands, the options for outdoor cannabis cultivation are limited, while the new enforcement guidelines on distinguishing small-scale self-supply from professional plantations may deter minor indoor growing.

PPP-corrected Dutch cannabis prices have equalled those in the Czech Republic recently. Nevertheless, within the current policy framework Dutch cannabis consumers are exempt from the transaction costs of the illegal market. Prices would probably have to rise drastically before Dutch cannabis consumers step out of the familiar and safe coffee shop market to establish their own firms.

Although successful in many ways, over the years the Dutch model has become more susceptible to the fallout from its “*blind spot*,” the omission of regulating the “back door” of the coffee shops – cannabis production and the supply to the shops. The Czech experience with more tolerant policies is of more recent provenance and has spawned quite a different cannabis market and culture. However, in essence both the Czech and Dutch legislation and policies are impartial solutions, offering ample opportunities to black market entrepreneurs.

Self-suppliers meet an important part of the Czech demand for cannabis; the estimate gained from metaanalysis of relevant surveys is that 60% of Czech cannabis consumers either use cannabis grown by themselves or receive it for free, eventually from the grower (Mravcik et al., 2013), and yet, the self-supply and small-scale growing have not completely replaced commercial cultivation and wholesale and retail transactions. As a result, the Vietnamese dominate the international and purely commercial cannabis business in the Czech Republic now (Národní protidrogová centrála Policie ČR [National Drug Squad of the Czech Police], 2014).

In theory, formal institutions grow out of informal ones – this means that laws are generally product of the culture (Bardhan, 1989). Cannabis policies, however, are not “pragmatic” or “natural” in most countries around the world, as they are driven by global drug prohibition. The cultures emerging around substance use can, in fact, be a product of the rather artificially established drug policies. The Czech “friends providing to friends” tradition (or the Spanish and Belgian cannabis social clubs) are perhaps not devoid of commercial interests and incentives, but in most cases these are driven by a mixture of economic, hedonistic, policy and security motives, centring around the reduction of *transaction costs*, developing new, high-quality, and pleasant cannabis strains, protection against outside threats (from both noxious market players and drug enforcement bodies), and building communities of like-minded people, similar to beer-brewing or wine-tasting clubs. As those communities have developed quite a strict moral codex (no sharing with the under-aged, no profit above maintenance costs, etc.), the financial stimuli that are supportive of the higher prevalence of high-risk and high-frequency use of cannabis (because everyday frequent drug users, albeit small in number, representing 5–25% in the EU countries, are those responsible for

around 70% of the cannabis consumption ([Trimbos Institute, RAND Europe, & ICPR, 2013](#)) are somehow suppressed.

Although the very idea seems naïvely idealistic, the removal of high profits as a commercial motor of high cannabis consumption is at the heart of the current legalisation and regulation of both medical and recreational cannabis in Uruguay (personal communication of TZ with Julio Calzada Mazzei). We will have an opportunity to observe how viable this concept is and what its impacts will be when compared to, e.g., the one in Colorado, which is purely commercial (personal communication of TZ with Robert Booth).

Data limitations

Methodologically, this paper clearly demonstrates the irreplaceability of qualitative methods in drug policy research, both for better interpretation of the quantitative data and avoiding the “epidemiological fallacy” and for the very understanding of the everyday “living drug policies” by those targeted by them. As a synthesis of qualitative studies is by its very nature complex and vulnerable to different sorts of bias ([Barnett-Page & Thomas, 2009](#)), the mixed methods approach – a combination of quantitative and qualitative metaanalysis – is probably the best way to make sense of data from different sources.

For the Czech Republic, the EMCDDA quantitative data was used (congruent with the data presented by the Czech Annual Report on the national drug situation). Data on drug seizures and drug-related offences in the Netherlands are collected by the National Police Intelligence Service (IPOL) of the National Police Services Agency (KLPD). The KLPD/IPOL reports are not published regularly and therefore for some of the comparisons we used secondary sources that refer to these reports. These data may be distorted by several factors, including variations in registration practice and changes in the organisation of the police. The KLPD was established on January 1, 2013, merging 25 regional police forces. Before 2013, cannabis cultivation-related offences and seizure data were not consistently registered by the regional police forces. For example, in 2004, only 18 of the 25 police forces gathered data about cannabis seizures. Whether such variations in registration practice (e.g. between the larger cities and rural municipalities) are present in the Czech data is not known. Additionally, the law enforcement data, derived from seizures and arrests, are inevitably biased; not only do they represent a rather small sample compared to the number of people involved in drug-related activities and to the amount of drugs that is consumed (e.g., according to [Mravcik et al. \(2014\)](#), the annual consumption of cannabis is estimated at 21,400 kg in the Czech Republic, and the overall seizures were 735 kg, i.e. 3.3% of what was consumed), but it is also highly probable that the “police samples” differ from the entirety in terms of both people and commodities, simply because the work of the police is not random. Therefore, the comparisons that include police data should be interpreted with extreme caution and supplemented by other sources – both qualitative and quantitative – as much as possible.

Although both the Netherlands and the Czech Republic are relatively well developed in their parts of the EU when it comes to drug research, studies of drug markets are relatively rare and the data on them must be supplemented by different proxy indicators and studies where, again, the representativeness of the sample being studied is not guaranteed (such as with the online studies used extensively in this paper).

Nonetheless, we believe that our analysis adds to the understanding about the evolution of cannabis markets and the economic factors involved therein and that it allows some useful conclusions to be drawn.

Conclusion

Having much in common in their priorities of drug policies and *de jure* policies on small-scale cannabis cultivation, the Netherlands and the Czech Republic can learn from each other as the implementation guidelines in both countries differ, as does their enforcement.

Of course, the experiences of one country cannot always simply be applied to another. In our opinion, key criteria in applying foreign experiences ought to be their ‘fit’ with local practices and culture, and their potential to contribute to ousting criminal enterprise from the cannabis market and overall reductions in drug-related harms, including those associated with cannabis policies (such as criminal records and relatively severe punishments for relatively small and non-violent infractions without victims).

On the basis of our findings above, a few major conclusions and recommendations can be proposed for each of the countries within the current control regime as framed by the UN Drug Conventions ([United Nations, 1961, 1971, 1988](#)):

- the Dutch should design/implement measures that stimulate and regulate home growing in an orderly fashion; in other words, we believe that it is in the best interest of the Netherlands (and in accordance with its tradition of protecting public health and public order) to abandon the current measures that aim to suppress such growing and – most probably unintendedly, but effectively – “clean” the market for organised criminal groups, with all the negative consequences such cartels bring along with them;
- the Czechs should further maintain and deepen their policy supporting small-scale growing and avoid police excesses such as increased policying despite of liberalized legislation; in the current system, the only possible way would be better coordination of police activity so that it would, as much as possible, be in accord with the broader goals of Czech drug policy; in other word, the police should reflect the national drug policy strategically in their priorities in the drugs field, not to create their own policy based on partial and short-term interests;
- any country that is willing to implement pragmatic cannabis policies that minimise the harms to public health and safety shall keep in mind the importance of policies targeting cannabis cultivation; tolerance to small-scale cannabis cultivation has a potential to reduce the role of organized crime in the country and reduce the size of commercial market in its scope as well as size; the individual decisions to self-supply with cannabis, however, are dependent on the cultural context as well as past policy approaches, and on the *transaction costs* of the commercial market;
- in the mid-term, careful social and governmental support for “hedonistic connoisseur” cannabis-growing communities should be analysed legally with regard to the UN Treaties with the clear aim being to make them another experimental approach within the current space for manoeuvring. The authors of this paper deem them far more desirable than those entirely aimed at profit maximisation – whether within the law or outside it.

The ability to learn from each other's successes and failures is more important than ever – not only for the Netherlands and the Czech Republic – on the eve of the 2016 United Nations General Assembly Special Session on the drug problem (UNGASS, 2016). Uruguay and the US states of Colorado and Washington have recently legalised cannabis for any purpose/use, regulating the entire supply chain. Another three US states decided to do so in ballots held in November 2014 (Alaska, Oregon, and Washington, DC) and at least another five US states⁴ will hold similar ballot

⁴ Arizona, California, Maine, Massachusetts, and Nevada.

initiatives in 2016. Political discussions at the highest level on thorough regulation reforms related to cannabis – and other drugs – are topical in many countries of Latin America and elsewhere, and are increasingly being brought onto the UN stage (Haase & Youngers, 2013).

Importantly, these ongoing and future resolute legal reforms – while differing in their details – should be built on the foundation of the (early) experiences with (less radical) cannabis reform in Europe. By doing so, the pioneers have taken the lead in the debate on cannabis reform and drug policy in general. Probably the most important lesson they have to take to heart is that legal reform of the cannabis situation should be comprehensive, regulating sales to consumers, wholesale supply, and cultivation so that the results of novel cannabis policies are accountable against clearly stated aims and goals – a desirable state of the art which the cannabis policies analysed in this paper still largely fail to achieve.

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References

- Agar, M. (1977). *Into that whole ritual thing: Ritualistic drug use among urban American heroin addicts*. In B. Du Troit (Ed.), *Drugs, rituals and altered states of consciousness*. Rotterdam: A.A. Balkema.
- Andrade, X., Sifaneck, S. J., & Neagis, A. (1999). Dope sniffers in New York City: An ethnography of heroin markets and patterns of use. *Journal of Drug Issues*, 29(2), 271–298.
- Barnett-Page, E., & Thomas, J. (2009). *Methods for the synthesis of qualitative research: A critical review*. NCRM Working Paper Series (Vol. 01/09) London: ESRC National Centre for Research Methods.
- Belackova, V., Nechanska, B., Chomynova, P., & Horakova, M. (2012). *Celopopulační studie užívání návykových látek a postoju k němu v České republice v roce 2008* (Vol. 6) Prague: Úřad vlády České republiky.
- Belackova, V., & Vaccaro, C. A. (2013). "A Friend With Weed Is a Friend Indeed": Understanding the relationship between friendship identity and market relations among marijuana users. *Journal of Drug Issues*, 43(3), 289–313.
- Belackova, V., & Zabransky, T. (2014a). Assessing the users' risks of shift towards indoor cannabis cultivation – The case of the Czech Republic. *Adiktologie*, 14(4) (in print).
- Belackova, V., & Zabransky, T. (2014b). Transformation of the marijuana market in the Czech Republic – From free-of-charge outdoor cannabis to a competitive market in indoor products. *Adiktologie*, 14(3) (in print).
- Boekhoorn, F. (2002). *Softdrugs in Nederland. Consumptie en handel*. Amsterdam: Van Dijk, Van Soomenen en partners.
- Boekhoorn, P. A. G., van Dijk, C. J., Loef, R. N. J., Oosten, v. R. N. J., & Steinmetz, C. H. D. (1995). *Softdrugs in Nederland; consumptie en handel*. Amsterdam: Steinmetz Advies en Opleiding.
- Boerman, F., Grapendaal, M., & Mooij, A. (2008). *Nationaal Dreigingsbeeld 2008. Georganiseerde criminaliteit*. Zoetermeer: KLPD Dienst IPOL.
- Bovenkerk, F., Hogewind, W. I., & Milani, N. C. (2002). *Hennepeelt in Nederland: Het probleem van de criminaliteit en haar bestrijding*. Willem Pompe Instituut voor Strafrechtswetenschappen.
- Bovenkerk, F., & Hogewind, W. I. M. (2002). *Hennepeelt in Nederland. Het probleem van de criminaliteit en haar bestrijding*. Utrecht/Apeldoorn: Willem Pompe Instituut voor Strafrechtswetenschappen/Politie en Wetenschap.
- Bardhan, P. (1989). The new institutional economics and development theory: A brief critical assessment. *World Development*, 17(9), 1389–1395.
- Caulkins, J. P. (1993). Local drug markets' response to focused police enforcement. *Operations Research*, 41(5), 848–863.
- Caulkins, J. P., & Reuter, P. (1998). What price data tell us about drug markets. *Journal of Drug Issues*, 28(3), 593–612.
- Caulkins, J. P., Reuter, P., & Taylor, L. J. (2006). Can supply restrictions lower price? Violence, drug dealing and positional advantage. *B.E. Journals in Economic Analysis and Policy: Contributions to Economic Analysis and Policy*, 5(1), 1–18.
- Coase, R. H. (1937). The nature of the firm. *Economica*, 4(16), 386–405.
- Commons, J. R. (1931). Institutional economics. *American Economic Review*, 21(4), 648–657.
- Coomber, R., & Turnbull, P. (2007). Arenas of drug transaction: Adolescent cannabis transactions in England – Social supply. *Journal of Drug Issues*, 37(4), 845–865.
- Crook, R. T., Combs, J. G., Ketchen, D. J., & Aguinis, H. (2013). Organizing around transaction costs: What have we learned and where do we go from here? *Academy of Management Perspectives*, 27(1), 63–79.
- Czech Statistical Office. (2014). (*Average salaries*) Průměrné mzdy. Available from. <http://www.czso.cz/csu/csu.nsf/informace/cpmz090514.docx>
- De Hond, M. (2013). Situatie 'zoals in Uruguay' vindt 65% een goed idee. Available from. <http://politiek.thepostonline.nl/2013/12/15/opiniepeiling-meerderheid-nederlanders-voor-legaliseren-marihuana/>
- Decorte, T. (2008). Domestic cannabis cultivation in Belgium: The (un)intended effects of the national drug policy on the cannabis market. *Cannabis in Europe: Dynamics in Perception, Policy and Markets*, 69–86.
- Decorte, T. (2010a). The case for small-scale domestic cannabis cultivation. *International Journal of Drug Policy*, 21(4), 271–275.
- Decorte, T. (2010b). Small scale domestic cannabis cultivation: An anonymous Web survey among 659 cannabis cultivators in Belgium. *Contemporary Drug Problems*, 37, 341–370.
- Duffy, M., Schaefer, N., Coomber, R., O'Connell, L., & Turnbull, P. J. (2008). *Cannabis supply and young people – 'It's a social thing'*. York: Joseph Rowntree Foundation.
- Dutch Government. (1995a). *The drug policy of the Netherlands: continuity and change*. The Hague: Ministry of Health, Welfare and Sports, Ministry of Justice.
- Dutch Government. (1995b). *(The drug policy of the Netherlands: continuity and change) TK 24 077, no. 3, 1995. Nota 'Het Nederlandse drugeleid: continuïteit en verandering'*. The Hague: Dutch Government.
- EMCDDA. (2013a). Possession of cannabis for personal use. Available from. <http://www.emcdda.europa.eu/legal-topic-overviews/cannabis-possession-for-personal-use#countries>
- EMCDDA. (2013b). Table GPS-2. Last 12 months prevalence of drug use by age and country, most recent national general population survey available since 2000. Available from. <http://www.emcdda.europa.eu/stats11/eyetab23b>
- EMCDDA. (2013c). Table SZR-3. Number of cannabis plants seized, 1995 to 2010. From European Monitoring Centre for Drugs and Drug Addiction.
- EMCDDA. (2013d). Table SZR-5. Number of seizures of cannabis plants, 1995 to 2010. From European Monitoring Centre for Drugs and Drug Addiction.
- EMCDDA. (2003). Table PPP-1. Price of cannabis products at retail level. From European Monitoring Centre for Drugs and Drug Addiction.
- ESPAD. (2013). Reports and Documents. Available from. <http://www.espad.org/en/Reports-Documents/ESPAD-Documents/>
- EMCDDA. (2014). Table DLO-6. Cannabis-related offences, 2003 to 2011. From European Monitoring Centre for Drugs and Drug Addiction.
- ESPAD. (2014). Lifetime use of cannabis in EU countries and areas participating in ESPAD 2011 – Keyresult Generator. Available from. <http://www.espad.org/en/Keyresult-Generator/?css=https%3a%2f%2fwww.espad.org%2fTemplates%2fStyles%2fgraphgenerator.css&SavedQueryId=fcfbd25a-4e57-46a4-9576-a2f6ddf1515b>
- European Monitoring Centre for Drugs and Drug Addiction. (2013). Data: Statistical Bulletin 2013. Available from. <http://www.emcdda.europa.eu/stats13>
- Eurostat. (2012). *Eurostat–OECD Methodological Manual on Purchasing Power Parities*.
- Gabrhelik, R., Kubo, P., Miovsy, M., & Zabransky, T. (2008). *Vzorce užívání konopných drog a parafernálie*. In M. Miovsy (Ed.), *Konopi a konopné drogy (Cannabis and cannabis type drugs)* (pp. 132–135). Prague: Grada.
- Grund, J. P., Kaplan, C. D., Adriants, N. F., & Blanken, P. (1991). Drug sharing and HIV transmission risks: The practice of frontloading in the Dutch injecting drug user population. *Journal of Psychoactive Drugs*, 23(1), 1–10. <http://dx.doi.org/10.1080/02791072.1991.10472569>
- Grund, J.-P., & Breeksema, J. (2013). *Coffee shops and compromise: Separated illicit drug markets in the Netherlands*. New York: Global Drug Policy Program, Open Society Foundations., ISBN 978-1-936133-89-5.
- Grund, J.-P., Stern, L. S., Kaplan, E. H., Adriants, N. F. P., & Drucker, E. (1992). Drug use contexts and HIV consequences: The effect of drug policy on patterns of everyday drug use in Rotterdam and the Bronx. *British Journal of Addiction*, 87, 381–392.
- Grund, J.-P. C. (1993). *Drug use as a social ritual: Functionality, symbolism and determinants of self-regulation*. Erasmus, MC: University Medical Centre Rotterdam.
- Grund, J.-P. C., Zabransky, T., Irvin, K., & Heimer, R. (2009). Stimulant use in Central & Eastern Europe: How recent social history shaped current drug consumption patterns. In R. Pates, & D. Riley (Eds.), *Interventions for amphetamine misuse* (pp. 173–202). Oxford: Wiley Blackwell.
- Haase, H. Y., & Youngers, C. A. (2013). Latin American leaders bring drug policy debate to the United Nations – Drug law reform in Latin America. *Drug Law Reform in Latin America*, Available from. <http://www.druglawreform.info/en/weblog/item/4998-latin-american-leaders-bring-drug-policy-debate-to-the-united-nations>
- Hakkainen, P., & Perala, J. (2011). *With a little help from my friends: Justifications of small-scale cannabis growers*. In T. Decorte, G. Potter, & M. Bouchard (Eds.), *World wide weed: Global trends in cannabis cultivation and its control* (p. 75). Burlington: Ashgate Publishing.
- Hammersvik, E., Sandberg, S., & Pedersen, W. (2012). Why small-scale cannabis growers stay small: Five mechanisms that prevent small-scale growers from going large-scale. *International Journal of Drug Policy*, 23, 458–464.
- Hough, M., Warburton, H., Few, B., May, T., Man, L.-H., Witton, J., et al. (2003). *A growing market: The domestic cultivation of cannabis* (1st ed.). York: Joseph Rowntree Foundation.

- Huigen, M. (2013). *Exploring buyer-supplier relationships: The case of the Dutch coffee shop*. Tilburg: Tilburg School of Economics and Management.
- Huigen, M. C. (2013). *Exploring buyer-supplier relationships: The case of the Dutch coffeeshops*. Tilburg: Tilburg School of Economics and Management.
- Jacobs, M. J. G. (2007). *Opiumwetdelicten nader bekeken: analyseverslag van een empirisch onderzoek naar Opiumwetdelicten ten behoeve van het Justitieonderdeel van de Nationale Drugmonitor, jaarrbericht 2006*. IVA Beleidsonderzoek en advies.
- Jansen, A. C. M. (2002). *The economics of cannabis cultivation in Europe*. Paper presented at the 2nd European conference on drug trafficking and law enforcement, Paris. <http://www.cedro-uva.org/lib/jansen.economics.html>
- Jongste, W. M. d., Huys, H. W. J. M., Laan, A. M. v., Bogaerts, S., Lange, N. E. d., Kalidien, S. N., et al. (2007). *Criminaliteit en Rechts handhaving 2006*. In W. v. d. Heide, & A. T. J. Eggen (Eds.), *Criminaliteit en rechtshandhaving 2006: ontwikkelingen en samenhangen*. The Hague: WODC.
- Jütting, J., Drechsler, D., Bartsch, S., & de Soysa, I. (2007). *Informal institutions and development: How they matter and what makes them change. Informal Institutions: How Social Norms Help or Hinder Development* (Vol. 29) Danvers, USA: OECD, Development Centre Studies.
- Kalidien, S. N., & Lange, H.-d. (2013). *Criminaliteit en Rechts handhaving 2012. Ontwikkelingen en samenhangen het CBS en de Raad voor de rechtspraak*. The Hague: WODC.
- Korf, D., Benschop, A., & Wouters, M. (2007). Differential responses to cannabis potency: A typology of users based on self-reported consumption behaviour. *International Journal of Drug Policy*, 18(3), 168–176.
- Kruize, P., & Gruter, P. (2014). *Drugsdelicten beschouwd. Over aard & omvang van Opiumwetfeiten in 2012 geregistreerd bij politie en Koninklijke Marechaussee*. Amsterdam: Ateno.
- Maalsté, N. (1993). *Het kruid, de krant en de kroongetuigen. De geschiedenis van hennep 1950–1970*. Utrecht: WGU.
- Maalsté, N. (2008). *Op jacht naar respondenten in verborgen segmenten van de cannabissector*. *Tijdschrift voor Criminologie*, 50(4), 393–399.
- Maalsté, N., Huigen, M. C., & Lallush, S. (2014). *Verplicht nummer Onderzoek naar de lokale handhaving van het coffeeshopbeleid*. The Hague: Acces Interdit.
- Maalsté, N., & Panhuysen, M. (2007). *Polderwiet: een veelzijdig en onthullend beeld van de wietteelt in Nederland*. Utrecht: De Fontein.
- MacCoun, R., & Reuter, P. (1998). Drug control. In M. Tonry (Ed.), *The handbook of crime and punishment* (p. 819). Oxford: Oxford University Press.
- MacCoun, R. J., & Reuter, P. (2001). *Drug war heresies learning from other vices, times, and places*. Cambridge, UK/New York: Cambridge University Press.
- Mankiw, N. G. (2007). *Principles of economics*. Harvard: Harvard University., ISBN 9781285165875.
- Meier, J. K. (1992). Politics of drug abuse: Laws, implementation, and consequences. *Western Political Quarterly*, 45(1), 41–69.
- Micinski, N. (2014). *Simulated sessions: Cannabis (sub)culture, the subcultural repository, and networked mediation* (Graduate College). Bowling Green, OH: Bowling Green State University.
- MOJ. (2007–2011). *Statistická ročenka kriminality 2007–2011 [Statistic reports of criminality 2007–2011]*. Prague: Ministry of Justice of the Czech Republic.
- Mravcik, V., Chomynova, P., Grohmannova, K., Necas, V., Grolmusova, L., Kissova, L., et al. (2013). *Výroční zpráva o stavu ve věcech drog v České republice v roce 2012* (Vol. 11) Prague: Úřad vlády ČR [Office of the Czech Government].
- Mravcik, V., Chomynova, P., Grohmannova, K., Necas, V., Grolmusova, L., Kissova, L., et al. (2014). *Výroční zpráva o stavu ve věcech drog v České republice v roce 2013* (Vol. 12) Prague: Úřad vlády ČR [Office of the Czech Government].
- Mravcik, V., Korciso, B., Lejcková, P., Miovska, L., Skrdlantova, E., Petros, O., et al. (2004). *Annual Report: The Czech Republic – 2003 Drug Situation*. Prague: Office of the Government of the Czech Republic.
- Mravcik, V., Zabransky, T., Korciso, B., Lejckova, P., Skrdlantova, E., Stastna, L., et al. (2003). In V. Mravcik (Ed.), *Výroční zpráva o stavu ve věcech drog v České republice v roce 2002* (The Czech Republic – Drug Situation 2002). Prague: Úřad vlády ČR [Office of the Czech Government].
- Národní protidrogová centrála, Policie ČR [National Drug Squad of the Czech Police]. (2014). *(2013 Annual Report) Výroční zpráva 2013*. Prague: Policie ČR [Czech Police].
- Nejvyšší Soud [Supreme Court]. (2014). *(Stance of the Criminal Law Collegium of the Czech Supreme Court on the Interpretation of the Term "Amount Bigger than Small" of Narcotic and Psychotropic Substances and Poisons) Stanovisko trestního kolegia Nejvyššího soudu k výkladu pojmu, množství větší než malé "u oramných a psychotropních látek a přípravků je obsahujících a jedu.*, sp. zn. Tpjn 301/2013 C.F.R. (2014).
- Niesink, R., & Riger, S. (2006). *THC-concentraten in wiet, nederwiet en hasj in Nederlandse coffeeshops (2005–2006)*. Utrecht: Trimbos-instituut.
- Niesink, R., & Riger, S. (2013). *THC-concentraten in wiet, nederwiet en hasj in Nederlandse coffeeshops (2011–2012)*. Utrecht: Trimbos-instituut.
- North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge: Cambridge University Press.
- OECD. (2014). *Average annual wages*. OECD.
- Potter, G. (2006). *Weed, need and greed: Domestic marijuana production and the UK cannabis market*. Sheffield: University of Sheffield.
- Potter, G. (2008). *The growth of cannabis cultivation: Explanations for import substitution in the UK Cannabis in Europe: Dynamics in perception, policy and markets*. ISSDP.
- Potter, G., Bouchard, M., & Decorte, T. (2010). *The globalization of cannabis cultivation*. In T. Decorte, G. Potter, & M. Bouchard (Eds.), *World wide weed: Global trends in cannabis cultivation and its control*. London: Ashgate Publishing.
- Potter, G. R. (2010). *Weed, need and greed: A study of domestic cannabis cultivation*. London: Free Association Books.
- Reinarman, C., & Cohen, P. (2007). Lineaments of cannabis culture: Rules regulating use in Amsterdam and San Francisco. *Contemporary Justice Review: Issues in Criminal, Social and Restorative Justice*, 10(4), 393–410.
- Reinarman, C., Cohen, P. D. A., & Kaal, H. L. (2004). The limited relevance of drug policy: *Cannabis in Amsterdam and in San Francisco*. *American Journal of Public Health*, 94(5), 836–842.
- Reuter, P., & Kleiman, M. A. R. (1986). Risks and prices: An economic analysis of drug enforcement. *Crime and Justice*, 7, 289–340.
- RIEC. (2013). *Integraal Appèl*. Tilburg: Universiteit van Tilburg, Regionaal Informatie en Expertise Centrum (RIEC) Zuid-West Nederland en Oost-Brabant en het Integraal Afpteam Brabant.
- Sandberg, S. (2012). The importance of culture for cannabis markets: Towards an economic sociology of illegal drug markets. *British Journal of Criminology*, 52, 1133–1151.
- Sarosi, P. (2009). *Public Poll Survey on Drug Policy Attitudes in 6 EU Member States*. Available from. <http://drogriporter.hu/files/drogriporter/imce/pollreported.pdf>
- SCP. (1998). *Sociaal en cultuurrapport 1998*. Rijswijk: Social Cultureel Planbureau.
- Sifaneck, S. (2005). *High-quality designer Marijuana in New York City's retail markets*. Paper presented at the American Society of Criminology conference, Annual Meeting, Toronto, 16th May, 2005.
- Smith, A. (1776a). *An inquiry into the nature and causes of the wealth of nations*. London: W. Strahan and T. Cadell.
- Smith, A. (1776b). *The nature and causes of the wealth of nations*. Indianapolis: Liberty Classics.
- Solinge, B. v. (2010). *Het Nederlandse drugsbeleid en de wet van de remmende voorsprong*. *Nederlandse Juristenblad*, 85, 2579–2636.
- Trautmann, F., Kilmer, B., & Turnbull, P. (Eds.). (2013). *Further insights into aspects of the illicit EU drugs market*. Luxembourg: European Commission – Directorate General for Justice.
- Trimbos Institute. (2012). *Nationale Drug Monitor*. Jaarbericht 2011. Utrecht: Trimbos-instituut.
- Trimbos Institute, RAND Europe, & ICPR. (2013). *Further insights into aspects of the EU illicit drugs market*. Luxembourg: Office for the Official Publications of the European Union.
- United Nations. (1961). *Single convention on narcotic drugs*. New York: United Nations.
- United Nations. (1971). *Convention on psychotropic substances, 1971*. New York: United Nations.
- United Nations. (1988). *United Nations convention against illicit traffic in narcotic drugs and psychotropic substances adopted by the conference at its 6th plenary meeting, on 19 December 1988*. Vienna: Economic and Social Council, United Nations.
- Ústavní soud [Constitutional Court]. (2013, 31 July). *(The constitutional court abolished parts of the Criminal Code authorising the government to specify what is "amount greater than small")* Ústavní soud zrušil ustanovení trestního zákoníku zmcňující vládu ke konkretizaci pojmu množství větší než malé. Available from. [http://www.usoud.cz/aktualne/?tx_ttnews\[tt_news\]=1979](http://www.usoud.cz/aktualne/?tx_ttnews[tt_news]=1979)
- van Laar, M., Cruts, G., & van Gageldonk, A. (2014). *The Netherland Drug Situation 2013 – Report to the EMCDDA by the Reitox National Focal Point*. Utrecht: Trimbos-instituut.
- van Ooijen-Houben, M., Bieleman, B., & Korf, D. J. (2014). *Coffeeshops, toeristen en lokale markt* (Cahier ed., pp. 231). The Hague: Intravaal.
- van Rosmalen, M. M., Kalidien, S. N., & de Heer-de Lange, N. E. (2012). *Criminaliteit en rechtshandhaving 2011. Ontwikkelingen en samenhangen*. Justitie in statistiek serie The Hague: CBS, WODC, Raad voor de rechtspraak.
- Williamson, O. E. (2000). The new institutional economics: Taking stock, looking ahead. *Journal of Economic Literature*, XXXVIII, 595–613.
- Williamson, O. E. (1989). Transaction cost economics. In R. Schmalensee, & R. D. Willig (Eds.), *Handbook of industrial organization* (Vol. I) (pp. 132–186). Elsevier.
- Wilkins, C. (2001). A "new institutional economics" approach to the reliability of street-level transactions. *Contemporary Drug Problems*, 28(Winter 2011), 679–684.
- Wilkins, C., & Casswell, S. (2003). Organized crime in cannabis cultivation in New Zealand: An economic analysis. *Contemporary Drug Problems*, 30(4), 757–777.
- Winstock, A. (2014). *Early results of the headline findings from GDS 2014: The Netherlands*. Press kit at Dutch Media release in April 2014. Available from. http://static.ow.ly/docs/GDS2014.THE%20NETHERLANDS%20PRESS%20EDIT_24Pi.pdf
- Wolf, M., & McQuitty, S. (2013). Circumventing traditional markets: An empirical study of the marketplace motivations and outcomes of consumers' do-it-yourself behaviors. *Journal of Marketing Theory and Practice*, 21(2), 195–210.
- Wouters, M., Korf, D. J., & Kroeske, B. (2007). *Harde aanpak, hete zomer: een onderzoek naar de ontmanteling van hennepkwekerijen in Nederland*. Amsterdam: Rozenberg Publishers.
- Zabransky, T. (2007). *Methamphetamine in the Czech Republic*. *Journal of drug issues*, 37(1), 155–180.
- Zabransky, T., Grund, J. P., Latypov, A., Otiashvili, D., Stuikyte, R., Scutelniciuc, O., et al. (2012). *Harm reduction in Central and Eastern Europe*. In R. Pates, & D. Riley (Eds.), *Harm reduction in substance use and high-risk behaviour* (pp. 301–321). Southern Gate, Chichester: John Wiley & Sons.
- Zabransky, T., Radimecky, J., Mravcik, V., Gajdosikova, H., Petros, O., Korciso, B., et al. (2002). *(Czech Republic – Drug Situation 2001) Výroční zpráva o stavu ve věcech drog 2001*. Prague & Lisbon: National Focal Point Czech Republic & EMCDDA.