High Taxes: Legal Marijuana and Black Market Response

Laura Grigolon, Andrés Plúas-López, Kevin Remmy and Michelle Sovinsky*

(Preliminary draft - Do not cite or circulate)

Abstract

Many countries have legalized or are planning to legalize consumption of recreational marijuana. One of the arguments for legalization is that it will reduce the influence of the black market, which support weapons trade and involves other transactions that are costly to police. However, illegal dealers may react to legal competitors by changing their product line - i.e. the amount of high-per-purchase a person gets - to carve out a potentially non-negligible niche. Furthermore, legal dispensaries tend to sell higher quality marijuana, which also comes at a higher price point. This leaves open the possibility for illegal dealers to tap the market for lower quality marijuana in particular among more cash-constrained consumers. We estimate a structural model of demand and supply, where consumers care about prices, the high (THC level), engaging in illegal behavior, as well as other product characteristics. Suppliers offer products that vary by THC-level, legality, price and, in the case of dispensaries, other product characteristics. We estimate the model using unique data that links consumers to the products they purchased at dispensaries as well as at illegal dealers in Canada. The results will allow us to provide answers to many questions of importance to policy makers such as: How do illicit product markets respond to legalization? How can policymakers shape legal markets to reduce illegal activity? Can a form of tax plus subsidy (i.e. a feebate) be useful in curbing the influence of the black market?

[0] *All authors are at the University of Mannheim, Department of Economics; Grigolon and Sovinsky are affiliated with CEPR. Sovinsky acknowledges support from the European Research Council Grant #725081 FORENSICS. All authors gratefully acknowledge support from the German Research Foundation (DFG) through CRC TR 224 (Project A02).

1 Introduction

Several countries have moved towards the legalization of recreational marijuana, expanding the range of available products. This includes options beyond traditional leaf-based marijuana, such as edibles, vaping products, and even cannabis-infused beverages.

One key argument for legalization is the expectation that it will weaken the black market, which has been associated with various illegal activities, including weapons trade, that are challenging to regulate. However, it's essential to recognize that legalization might not completely eliminate the illegal market. In response to legal competition, illicit dealers might alter their product offerings, especially concerning the potency of marijuana (measured by THC content). In practice, the illegal market could adjust prices and THC content to maintain a significant presence. Additionally, legal dispensaries often focus on selling higher-quality, high-THC marijuana, typically at a premium price. This creates room for illegal dealers to cater to consumers seeking lower-quality, more affordable options, particularly those with budget constraints.

In this study, we develop and estimate a structural model that accounts for consumer preferences related to price, THC levels, the legal status of the product, engagement in illegal behavior, and other product attributes. Suppliers, both legal and illegal, offer products with variations in THC content, legality, price, and additional characteristics (in the case of dispensaries). We estimate this model using unique data that connects consumers with the specific products they've purchased from both legal dispensaries and illegal dealers in Canada.

The outcomes of our analysis will provide insights into critical questions of interest to policymakers. These include understanding how illegal markets adapt to legalization, strategies to shape legal markets and minimize illicit activity, and the potential effectiveness of policies like a tax-subsidy mechanism (e.g., a feebate) in reducing the influence of the black market.

This paper proceeds as follows. Section 2 describes the related literature; Section 3 explains the institution background; Section 4 describes the data; Section 5 shows the model; and Section 6 briefly explains the potential counterfactuals.

2 Related literature

In recent years, extensive research on marijuana use has surged alongside ongoing discussions about the legalization of recreational marijuana. This paper aligns with three distinct economic literature strands related to marijuana: (i) examining the legal marijuana market, and (ii) exploring the connection between crime and marijuana legalization.

First, recent research has predominantly concentrated on the legal marijuana market, disregarding the existence of a parallel black market. Hollenbeck and Uetake (2021) contends that the legal marijuana market is not excessively taxed, with most of the tax burden falling on consumers. Furthermore, Miller and Seo (2021) provides evidence that legal marijuana can siphon demand away from other legally regulated substances, while Hansen et al. (2020) examines the effects of a tax structure based on potency. Thomas (2019) investigates the inefficiencies of license quota systems in Washington's recreational marijuana market. Using data from Washington, Hansen et al. (2017) explores the effects of taxation on various aspects of the supply and consumption chain. Finally, Perrault (2022) suggests that marijuana quality can be a tool for directing demand toward the legal market. Nonetheless, there is no evidence regarding how drug dealers react to legalization to keep a significant presence in the market.

Second, a burgeoning branch of the literature delves into the impact of marijuana legalization on crime resulting from the prohibition of this substance. This potential effect significantly motivates legalization efforts, particularly in regions where illicit drug production holds significance. Studies have documented decreases in various crime rates subsequent to legalization (Dragone et al., 2019; Brinkman and Mok-Lamme, 2019), though they seem to have minimal impact on youth crime rates (Dills et al., 2017). Similar effects have been observed in U.S. states that share borders with Mexico, where legalization or decriminalization of the marijuana supply chain weakened criminal organizations (Gavrilova et al., 2019). Furthermore, Hao and Cowan (2020) investigates an increase in marijuana possession-related arrests in neighboring states of Colorado and Washington, attributing it to a spillover effect following recreational legalization. However, none of these studies have explored the effect of legalization on the potency of marijuana in the black market.

While there is limited literature that takes into account the existence of a black market in a post-legalized marijuana market, the demand for such information is substantial among policymakers. They require robust evidence to develop effective tools and strategies to encourage illegal users to transition from illegal sources to legal ones.

3 Institutional background

Canada took a pioneering step in drug policy reform in 2018 by becoming one of the G7 nations to legalize recreational cannabis. This section delves into the institutional background and economic implications surrounding the legalization of recreational marijuana in Canada, offering insights relevant to the field of economics.

The journey towards legalizing recreational cannabis in Canada commenced with the implementation of the Cannabis Act, or Bill C-45, in October 2018. This landmark legislation provided a comprehensive framework for the governance of the production, distribution, and possession of recreational cannabis. Integral to this act was the establishment of significant institutions and regulatory bodies, including Health Canada, Provincial and Territorial Models, and Canadian Border Services Agency (CBSA).

Health Canada, was designed as the federal department responsible for overseeing the cannabis industry. It assumed a pivotal role in this sector, since its responsibilities encompassed licensing cannabis producers, setting and maintaining quality standards, and conducting routine inspections to ensure compliance with federal regulations.

Then, the Cannabis Act bestowed provincial and territorial governments with the autonomy to fashion their distinct systems for the distribution and retailing of cannabis. This empowerment led to a diverse array of approaches across the country, ranging from government-operated retail stores to privately managed establishments, thus creating a rich field of regional policy experimentation.

Lastly, the Canadian Border Services Agency (CBSA) regulates the cross-border movement of cannabis. While the Cannabis Act legitimized the possession and consumption of cannabis within Canada, it simultaneously imposed stringent restrictions on its interna-

tional transportation.

The legalization of recreational cannabis in Canada has introduced profound economic consequences, impacting areas such as tax revenue generation, employment dynamics within the cannabis industry, the evolution of drug-related crime rates, and public health outcomes. A cadre of research and monitoring agencies was established to meticulously evaluate these ramifications from an economic perspective, offering valuable insights for scholars in this field.

The institutional framework surrounding recreational cannabis in Canada has not been devoid of challenges. Issues ranging from the regulation of cannabis marketing and advertising to concerns about potential increased use among younger demographics (Watson and Erickson, 2019) and the imperative of addressing historical injustices related to cannabis prohibition have surfaced. Consequently, the Canadian government has been compelled to remain adaptable, continuously refining policies and regulations to address these challenges within an economic context.

4 Data

This section provides a brief overview of the data we need to carry out this project. We need detailed individual-level usage and purchase data that we can link to both demographics, the market environment, as well as the price and characteristics (especially the THC level) of the product purchased. Importantly, the data needs to incorporate both legal and illegal purchases.

We use three proprietary datasets provided by BDSA. This company is a leading center of knowledge and market research specializing in the legal cannabis market. This organization is dedicated to understanding the current state of the legal cannabis industry, its historical development, and its future trajectory. BDSA's core activities involve the collection, analysis, and presentation of critical data related to point-of-sale market share and consumer behavior through comprehensive surveys.

The first dataset, Cannabis Consumer Insights (CCI), includes individual-level infor-

mation on consumer behaviors, attitudes, product preferences, sources of marijuana, consumption patterns, and the key drivers influencing cannabis purchases. The second dataset, Canada Retail Tracking by Province, offers retail monthly-level sales data, including information on the producer, brand, classification, product size, THC potency, CBD potency, amount paid, and quantity. Lastly, the third dataset provides monthly-level wholesale prices by product.

Regarding the first dataset, the CCI, we observe 9 cross-sections that were performed between Fall 2018 and Spring 2022. As shown in Table 2 our total sample is 29,294 individuals. In each Wave (season-year), we observe around 3.5 thousand individuals, except for the first one.

	2018	2019	2020	2021	2022	Total
Spring	1,136	3,463	3,631	3,435	3,547	15,212
Fall	3,575	3,440	3,486	3,581	-	14,082
Total	4,711	6,903	7,117	7,016	3,547	29,294

Table 1: Sample size in CCI

Table 2 presents the socio-demographic data for the sample. Among these individuals, 44 percent are male, 55 percent have completed a college education, and 21 percent have some college experience. Moreover, 79 percent of the sample identifies as white, while 3 percent self-identify as black. The average age of the sample is 46, with ages ranging from a minimum of 16 to a maximum of 95. Finally, 10 percent of the respondents reported that they are unemployed.

Furthermore, Table 3 provides an overview of the geographic distribution of the sample, which closely mirrors the population distribution in Canada. Ontario is the most common province of residence for 31 percent of the surveyed individuals. Quebec, Alberta, and British Columbia each account for 15 percent of the respondents. In terms of urbanization, 47 percent of the individuals reported living in a city, while 29 percent resided in suburbs. Additionally, 12 percent stated they lived in a rural area, with the remaining 12 percent residing in a small town.

Table 4 presents the reported marijuana usage within the past 6 months among the

	Mean	Min	Max	Sum
Male	0.44	0	1	12,968
High School graduates	0.20	0	1	5,857
Trade grad / Some coll.	0.21	0	1	6,034
College graduates	0.55	0	1	16,186
White	0.79	0	1	23,042
Black	0.03	0	1	805
Age	46.32	16	95	
Unemployed	0.10	0	1	2,809
Observations	29,294			

Table 2: Socio-demographics in CCI

	Freq.	Perc.
Alberta	4,502	15.37
British Columbia	4,371	14.92
Manitoba	1,771	6.05
New Brunswick	1,168	3.99
Nova Scotia	1,316	4.49
Ontario	9,123	31.14
Quebec	4,709	16.07
Saskatchewan	1,284	4.38
City	13,860	47.31
Rural	3,404	11.62
Small town	3,473	11.86
Suburb of city	8,442	28.82
Observations	29,294	

Table 3: Geographic distribution in CCI

surveyed individuals. Within the sample, 48 percent reported using marijuana, and this data also allows us to examine further the forms in which they consumed this substance. Inhalable marijuana was the most common method, with 35 percent of the sample using this form. Additionally, 35 percent of the individuals opted for edibles, while a smaller

fraction of 11 percent used marijuana topicals. As shown in Appendix A, when using marijuana, most of the inhalable users prefer loose leaves, flowers, or buds.

Past 6-month use	Mean
Marijuana user	0.48
Inhalable user	0.35
Edible user	0.27
Topical user	0.11
Observations	29,294

Table 4: Geographic distribution in CCI

An essential piece of information for our paper pertains to the preferred THC potency among marijuana users. Table 5 reveals that within the entire sample, the majority of users reported a preference for marijuana with a THC potency of up to 40%, while a smaller fraction expressed a preference for higher THC potency. Interestingly, there is an observed trend regarding THC potency preferences. Over the years, marijuana users have shifted away from preferring potencies between 0% and 20%, and there is a growing preference for higher potencies.

Preferred THC potency (inhalable users)	**Inhalable users** Perc.	**2019** Perc.	**2020** Perc.	**2021** Perc.	**2022** Perc.
0% - 20%	20.9	22.1	20.5	23.0	16.8
21% - 40%	32.9	26.9	32.6	34.8	39.6
41% - 60%	10.1	8.7	10.0	10.7	11.5
61% - 80%	3.9	3.0	4.2	3.7	4.4
81% +	5.1	4.0	5.0	5.3	7.2
Don't know / Not sure	27.0	35.3	27.8	22.3	20.4
Total	6,929	1,206	2,344	2,134	1,245

Table 5: Preferred THC potency (inhalable users) - CCI (W5-W10)

Furthermore, when it comes to edibles, we have data on the amount of THC (in milligrams) that is present in the edibles used by those who consume them. As shown in Table 6, the majority of edible users prefer products containing a THC potency of up to 20 milligrams. Notably, within this group, most users express a preference for edibles with a THC content ranging from 5 to 10 milligrams, followed by those preferring 10 to 20

milligrams. Over the years, we observe a trend where surveyed individuals tend to favor higher THC potencies in their edibles, particularly in the range of 10 to 20 milligrams.

Preferred THC potency (edible users)	**Edible users** Perc.	**2018** Perc.	**2019** Perc.	**2020** Perc.	**2021** Perc.	**2022** Perc.
Less than 2.5 mgs	11.2	9.5	12.7	11.9	10.9	10.0
2.5 to 5 mgs	18.0	11.7	17.5	19.7	20.2	18.9
More than 5 mgs to 10 mgs	15.6	11.3	13.9	16.2	16.5	20.5
More than 10 mgs to 20 mgs	12.5	11.9	10.4	12.4	13.1	15.7
More than 20 mgs to 50 mgs	8.4	8.1	7.4	8.6	9.2	8.5
More than 50 mgs to 100 mgs	4.4	5.5	3.7	4.6	4.6	3.7
More than 100 mgs to 200 mgs	2.8	3.5	3.4	2.8	2.1	2.0
More than 200 mgs	3.2	3.9	3.4	2.4	3.4	3.5
Don't know	23.6	33.4	27.6	21.5	20.1	17.1
Only use sublinguals	0.2	1.3				
Total	7,928	1,172	1,740	1,931	1,960	1,125

Table 6: Preferred THC potency (edible users) - CCI (W5-W10)

Additionally, we have data on the amounts paid by marijuana users in any single purchase and on a monthly basis. Figure 1 provides an overview of the distribution of these payment reports, and Table 7 offers key statistics related to these amounts. The histograms illustrate that the majority of payments fall below the 100 Canadian dollar (CAD) mark. Specifically, the average and standard deviation for payments in any single purchase are 82 CAD and 73 CAD, respectively. In contrast, the average and standard deviation for monthly payments are 105 CAD and 134 CAD, respectively.

Money typically spent:	Mean	SD	Min	Max	p1	p5	p50	p95	p99	N
At any one purchase	82.13	72.63	0	999	1	20	60	200	340	7,389
Each month	104.67	134.35	0	3,000	0	0	60	350	600	6,712

Table 7: Amounts paid for marijuana - CCI

Lastly, another pivotal aspect for our paper pertains to the sources employed by marijuana users. Table 8 presents the sources reported by these individuals. It's important to note that respondents were asked to indicate if they had used one of these sources at least once. The survey provided a list of legal sources. Then, if an individual did not use any of

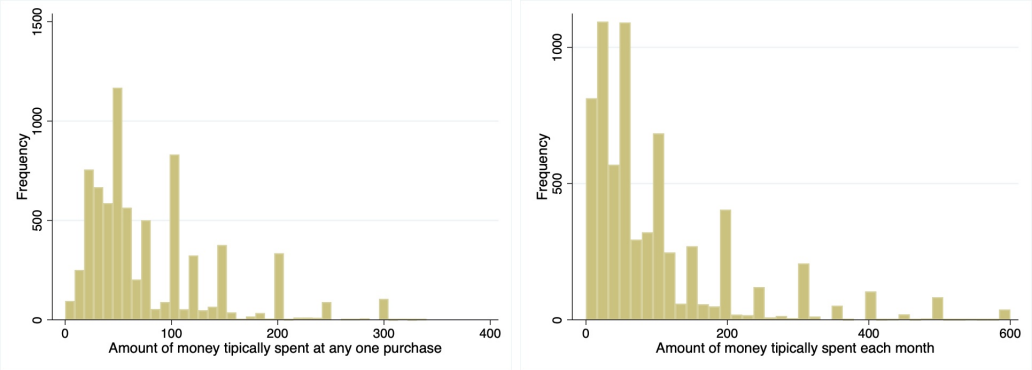

Figure 1: Distribution of amounts paid for marijuana - CCI

these legal sources and instead reported obtaining marijuana "from somewhere else", they must be illegal users. It is worth noting that 57 percent of the users obtained marijuana from a source that is not legal. Additionally, 36 percent acquired marijuana from friends and family, followed by mail order at 16 percent. A smaller fraction, 9 percent, reported purchasing marijuana directly from dispensaries or retailers.

Sources of marijuana	Mean	Min	Max	Sum
Caregiver	0.02	0	1	289
Delivery service	0.11	0	1	1,441
Friends or family member	0.36	0	1	4,862
Mail order	0.16	0	1	2,182
Dispensary or retailer	0.09	0	1	1,216
From somewhere else (illegal)	0.57	0	1	7,587

Table 8: Sources of marijuana - CCI

5 Model

5.1 Demand

The indirect utility that consumer i obtains from product j in market t is given by:

$$u_{ijt} = p_{jt}\alpha_i + T_{jt}\gamma_i + (X'_{jt}\beta + L'_{ijt}\varphi_i)I_{j\in\mathcal{J}_L} + \varepsilon_{ijt} \tag{1}$$

for $j = 1, ..., \mathcal{J}_L + 1$, where $j = 1, ..., \mathcal{J}_L$ are the products sold by legal dispensaries and the final product represents the illegal product. The $I_{j\in\mathcal{J}_L}$ is an indicator function for a product sold legally. We denote $\mathbf{J}_t$ as the set of all products legally and illegally sold. We assume idiosyncratic shocks (ε_{ijt}) are distributed iid EV. Note that we will interact (ideally all) selected variables with demographic characteristics (D_i) of the consumer in the final specification.

The variable T_{jt} denotes the THC level of product j. The THC level is an important quality factor and can be adjusted by producers either by using different strains of marijuana or by using different parts of the plant.

The consumer pays:

$$p_{jt} = \widetilde{p}_{jt} + f_{jt}I_{j\in\mathcal{J}_L}. \tag{2}$$

The government may tax products or provide a subsidy for a product, so f_{jt} represents the feebate structure. Note that this structure may depend on the THC level of the product. We have in mind that high THC products will be taxed, and low THC products will be subsidized.

Consumers may attach a premium to buying legal products, which we capture by φ_i.

Not all consumers have access to the illegal market, whether a consumer has access depends on her demographic characteristcs (D_i) as well as market characteristics (G_t). The probability a consumer has access is given by

$$\phi_{i,j+1,t} = \Pr(D_i'\lambda + G_t'\kappa + \eta_{i,j+1,t} > 0) \tag{3}$$

where we allow the shocks in utility and access to be correlated with $cov(\varepsilon, \eta) = \rho$.

The probability that individual i chooses to buy product j in market t depends upon the probability they know where to purchase illegal marijuana ($\phi_{i,j+1,t}$) and the probability they would use legal marijuana given availability. Let

$$R_{ijt} \equiv \{U_{ijt} \geq U_{irt}, \phi^*_{i,j+1,t}(\mathbf{D}_i, \mathbf{G}_{it}, \eta_{i,j+1,t}) > 0 \quad \forall r, j \in \mathbf{J}_t, r \neq j\}$$

define the set of variables that results in the purchase of j given the parameters of the model, where $\phi^*_{i,j+1,t} = D_i'\lambda + G_t'\kappa + \eta_{i,j+1,t}$. The probability and individual purchases product j is given by

$$s_{ijt} = \int_{R_{ijm}} dF_{\epsilon,\eta}(\epsilon, \eta) \tag{4}$$

where $F(\cdot)$ denotes distribution functions

The market share of product j in market t is given by

$$s_{jm} == \int_{R_{jm} j \in \mathbf{J}_t} s_{ijt} dF_{\epsilon,\eta}(\epsilon, \eta) \tag{5}$$

Finally, demand for j is

$$\mathcal{M}_t s_{jt}$$

5.2 Supply

A legal firm selling marijuana (for now assume all legal products are sold by one firm) has the following profit function:

$$\Pi_L = \sum_{j \in \mathcal{J}_L} (\widetilde{p}_{jt} + f_{jt} - mc_{jt}) s_{jt} \mathcal{M}_t$$

and the profit function of an illegal dealer is

$$\Pi_{IL} = (p_{j+1,t} - mc_{j+1,t}) s_{j+1,t} \mathcal{M}_t$$

Marginal costs are given by $mc_{jt} = f(T_{jt}, X_{jt}, W_{jt})$, where W_{jt} are cost shifters such as the growth environment or the distance from the nearest port (aimed to capture transportation cost /increased risk premium).

Firms choose prices and quality to maximize profits. Note that the first order conditions for both firms will depend on the prices and THC levels sold in both markets as well as the access to the illegal market.

Let us first examine the first order conditions of the legal firm. For product j, we get the following equations:

$$\frac{\partial \Pi_L}{\partial p_{jt}} = s_{jt} + (\widetilde{p}_{jt} + f_{jt} - mc_{jt}) \frac{\partial s_{jt}}{\partial p_{jt}} + \sum_{k \neq j, k \in \mathcal{J}_L} (\widetilde{p}_{kt} + f_{kt} - mc_{kt}) \frac{\partial s_{kt}}{\partial p_{jt}} = 0$$

$$\frac{\partial \Pi_L}{\partial T_{jt}} = -s_{jt} \frac{\partial mc_{jt}}{\partial T_{jt}} + (\widetilde{p}_{jt} + f_{jt} - mc_{jt}) \frac{\partial s_{jt}}{\partial T_{jt}} + \sum_{k \neq j, k \in \mathcal{J}_L} (\widetilde{p}_{kt} + f_{kt} - mc_{kt}) \frac{\partial s_{kt}}{\partial T_{jt}} = 0$$

The FOC with respect to price describes the usual trade-off between collecting a lower markup on infra-marginal units, gaining a markup from additional units, and cannibalization of other products in the firm's portfolio. Note that the cannibalization effect acts like an increase in the marginal cost of producing the product and increases the price. This effect drives an additional wedge between legal and illegal products. On the other hands, collecting a high tax on the other own-firm products will reduce the cannibalization effect

We can write down the first order conditions of the illegal firm in a similar fashion. We get:

$$\frac{\partial \Pi_{IL}}{\partial p_{j+1,t}} = s_{j+1,t} + (p_{j+1,t} - mc_{j+1,t})\frac{\partial s_{j+1,t}}{\partial p_{j+1,t}} = 0$$
$$\frac{\partial \Pi_{IL}}{\partial T_{j+1,t}} = -s_{j+1,t}\frac{\partial mc_{j+1,t}}{\partial T_{j+1,t}} + (p_{j+1,t} - mc_{j+1,t})\frac{\partial s_{j+1,t}}{\partial T_{j+1,t}} = 0$$

There are two key differences between the system of first order conditions of the legal and that of the illegal firm. First, there is no feebate levied on the illegal product, simply because it is produced and sold outside of the government's reach. The absence of a feebate will affect both price and THC choices. Second, there is no cannibalization effect as the illegal market only provides leaf and no alternatives such as eatables, vaping products, or creams.

So far the model treats the illegal market in the same way as the legal market. However, it may be easier to gather information on the legal market (from the firm's perspective) than it is to gather information on the illegal market. In this sense, the firm's selling legal marijuana face an unobserved competitor - illegal dealers. We address this issue by including an unknown parameter (τ) to capture the extent to which the illegal market is known to a legal competitor. Specifically, we augment the term capturing a consumers willingness to purchase illegal marijuana by τ: $L'_{ijt}\varphi_i\tau$. Our motivation for including it in this manner, is that it is a proxy to capture potential mis-perceptions by the legal firm about how willing consumers are to go to the illegal market. The parameter can take values $\tau \in (0, 1)$, where if legal firms have correct perceptions then $\tau = 1$ if they think no consumers would consider breaking the law then $\tau = 0$. We do not estimate this term, as it would not be possible to separate it from φ_i without additional data, but rather we estimate the model under a variety of assumptions on the value of τ and use the test to determine the nature of firm conduct proposed in (Conlon, et al) to test which model best fits the data. Note for us, we can think about if we want to make τ a function of drug busts in the area and how long the dispensary has been selling, in this way we could actually estimate it's value, and still do the test.

6 Counterfactuals

Once estimated, the model allows us to study a rich set of counterfactuals in which we can analyze different policies aimed to reduce the scope of the illegal market. The first such counterfactual will be the introduction of a feebate scheme in which the government taxes high-THC products but subsidizes low-THC products in order for these (legal) low-THC products to eat into the sales of illegal dealers. When choosing such a feebate scheme, the policymaker faces a trade-off between squeezing the illegal market on the one hand and increasing consumption (implying negative health impacts) on the other hand. Other potential counterfactuals will investigate the impact of market structure and portfolio effects on price- and THC choices and, consequently, on the ability of the black market to carve out a niche for itself.

These counterfactuals are of great relevance to policymakers considering legalizing recreational marijuana consumption. They will shed light on how to design taxes and/or subsidies that should regulate usage on the one hand and prevent the illegal market from keeping a significant market share on the other hand.

References

Brinkman, J. and Mok-Lamme, D. (2019). Not in my backyard? not so fast. the effect of marijuana legalization on neighborhood crime. *Regional Science and Urban Economics*, 78:103460.

Dills, A. K., Goffard, S., and Miron, J. (2017). The effects of marijuana liberalizations: Evidence from monitoring the future. Technical report, National Bureau of Economic Research.

Dragone, D., Prarolo, G., Vanin, P., and Zanella, G. (2019). Crime and the legalization of recreational marijuana. *Journal of economic behavior & organization*, 159:488–501.

Gavrilova, E., Kamada, T., and Zoutman, F. (2019). Is legal pot crippling mexican drug trafficking organisations? the effect of medical marijuana laws on us crime. *The Economic Journal*, 129(617):375–407.

Hansen, B., Miller, K., Seo, B., and Weber, C. (2020). Taxing the potency of sin goods: Evidence from recreational cannabis and liquor markets. *National tax journal*, 73(2):511–544.

Hansen, B., Miller, K., and Weber, C. (2017). The taxation of recreational marijuana: Evidence from washington state. Technical report, National Bureau of Economic Research.

Hao, Z. and Cowan, B. W. (2020). The cross-border spillover effects of recreational marijuana legalization. *Economic inquiry*, 58(2):642–666.

Hollenbeck, B. and Uetake, K. (2021). Taxation and market power in the legal marijuana industry. *The RAND Journal of Economics*, 52(3):559–595.

Miller, K. and Seo, B. (2021). The effect of cannabis legalization on substance demand and tax revenues. *National Tax Journal*, 74(1):107–145.

Perrault, T. (2022). Flying high? legalization and the black market for cannabis.

Thomas, D. (2019). License quotas and the inefficient regulation of sin goods: Evidence from the washington recreational marijuana market. *Available at SSRN 3312960*.

Watson, T. M. and Erickson, P. G. (2019). Cannabis legalization in canada: how might 'strict'regulation impact youth?

A Inhalable products

Most preferred inhalable	Freq.	Perc.
Loose leaf, flower, or bud	6,417	61.99
Oil	512	4.95
Shatter	322	3.11
Wax or Budder	141	1.36
Resin	98	0.95
Hash	742	7.17
Rosin	75	0.72
Kief	141	1.36
Live resin	101	0.98
Another inhalable product	373	3.60
Distillate	138	1.33
Caviar	73	0.71
Vape (cartridge or disposable vape)	1,218	11.77
Total (Inhal. P6M users)	10,351	

Table 9: Inhalable products - CCI