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Estimating the demand for cannabis



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Estimating the demand for cannabis

1. Introduction

On June 21, 2018 Parliament approved legislation (the *Cannabis Act*, Bill C-45) permitting the purchase and consumption of select cannabis products for non-medical purposes by adults. (The products have been legal for medical purposes for many years.) Bill C-45 takes effect starting October 17, 2018. Production of cannabis is strictly regulated by Health Canada. As of late August there were 115 licensed producers who are permitted to sell cannabis to provincially-authorized wholesalers and retailers who, in turn, will sell to the general public. Each province is putting in place its own regulated retail regime, some restricting sales to government operated establishments and others allowing the private sector to enter this new retail market as well. The *Cannabis Act* also permits online purchases from authorized producers and retailers and personal cultivation of up to four plants depending on the province or territory.

It is a matter of some speculation what the demand for cannabis will be after the substance becomes available for non-medical use. Statistics Canada has released estimates of household consumption expenditure over the past several decades based largely self-reported use¹, but this demand is mostly for illegal cannabis used for non-medical purposes. To what extent will the new legal market displace the long-existing illegal market and how large will new demand be, coming from consumers who are not presently using illegal products?

Definitive answers to these questions will start to become known after legal cannabis retail outlets have been open for a few weeks. With some stores opening in October, Statistics Canada expects to begin releasing monthly retail sales statistics from these stores in January 2019.

In the meantime, it is possible to project how large these sales potentially might be and that is the purpose of this paper. Such information may be of value to producers, retailers and federal and provincial regulators as they prepare for the legal sale of cannabis for non-medical purposes to adults.

Some of the relevant issues can be addressed using statistics from the National Cannabis Survey (NCS). Results pertaining to the first quarter of 2018 were disseminated on April 18 and for the second quarter on August 9. The survey asks questions about spending by Canadians on cannabis products, whether legal or illegal, and also about the likely behaviour of Canadians once cannabis consumption is legalized in the fall of 2018. In the NCS Canadians who reported using cannabis in the previous three months were asked if they intend to switch to legal products after October 17. In addition, Canadians who reported not using cannabis in the previous three months were asked if they would begin. In this paper a simple model of cannabis demand is presented using data from the combined first and second quarter NCS results. The model is used to project potential cannabis demand in the fourth quarter of 2018.

2. A model of potential cannabis demand

The model used to estimate potential cannabis demand in the last three months of 2018 is the product of several factors.

The first of these factors is the total population old enough to purchase cannabis according to the federal and provincial legislation. In this paper the number is referred to as D1 (see Equation 1 and Table 1). The eligibility age varies by province. In Alberta and Quebec the minimum age is 18 and in the other provinces and territories it is 19. Based on demographic statistics released by Statistics Canada, the total eligible population on October 17, 2018 is projected to be $D1 = 29,892,021$ people.

The second factor in the calculation is the share of the population that is currently using cannabis, even though the substance is presently illegal for non-medical purposes. The NCS estimates this share to be $D2 = 0.148$ (that is 14.8% of the survey target population).

1. Roterhmann, Michelle and Ryan Macdonald, "*Analysis of trends in the prevalence of cannabis use in Canada, 1985 to 2015*", Statistics Canada, Health Reports, catalogue 82-003-X, February 2018, <https://www150.statcan.gc.ca/n1/pub/82-003-x/2018002/article/54908-eng.htm>.

The third factor is the share of the population that is currently using illegal cannabis that intends to switch to legal cannabis after October 17, 2018. The NCS estimates this share to be $D3 = 0.492$.

The fourth factor is the share of the population that is currently using illegal cannabis and has not yet decided whether it will switch to legal cannabis after October 17, 2018. The NCS estimates this share to be $D4 = 0.252$.

The fifth factor is the share of those currently using illegal cannabis and not yet having decided whether to switch to legal cannabis after October 17, 2018 that, in the end, will decide to switch. The value of this factor, $D5$, is unknown and assumed to be 0.500.

The sixth factor in the calculation is the share of the population that is not currently using illegal cannabis, based on use during the previous 3 month period. The NCS estimates this share to be $D6 = 0.852$. This equals 1 minus $D2$.

The seventh factor is the share of the population that reported not having used cannabis in the previous 3 month period and who intend to try using cannabis after October 17, 2018. The NCS estimates this share to be $D7 = 0.059$.

The eighth factor is the share of the population that reported not having used cannabis during the previous 3 month period and who have not yet decided whether they will start using after October 17, 2018. The NCS estimates this share to be $D8 = 0.094$.

The ninth factor is the share of those not currently using illegal cannabis and not yet having decided whether to start using cannabis after October 17, 2018 that, in the end, will decide to try cannabis. The value of this factor, $D9$, is unknown and assumed to be 0.500.

The tenth factor in the calculation is the average amount spent by cannabis users on the substance during the past three months. The NCS asked those currently using cannabis how much they spent during the previous three months and categorized the answers in five groups: \$0, \$1 to \$50, \$51 to \$100, \$101 to \$250, and more than \$250. The first category represents those who used cannabis and obtained their supplies from someone else without purchasing the product themselves or they grew it.

The survey did not produce estimates of how much, on average, was spent in each of the categories, although it did compile estimates of the proportions of cannabis users in each of the categories. For the purposes of the present analysis the average amounts spent are assumed to be at the mid-points of the ranges: \$0, \$25.50, \$75.50, \$175.50. For the last category, more than \$250, where there is no upper limit, three alternative average amounts spent are considered: \$600, \$700 and \$800². This category has only about a fifth of all cannabis users, but those users consume cannabis frequently and spend substantial amounts in a typical quarter. Bringing the five categories together in a weighted average, the alternative estimates of the average amount spent by a Canadian cannabis user in the three-month period are $D10 = \$177$, or \$199, or \$221 (Cases 1, 2 and 3 in Table 1).

Finally, the demand estimates in this paper are for the fourth quarter of 2018. Since cannabis sales become legal on October 17, 2018, rather than October 1, this represents less than a normal three-month period. The eleventh factor is therefore $D11 = 0.848$, which is the number of days between October 17 and December 31 divided by the number of days between October 1 and December 31.

Putting these factors together, the model predicts the potential legal demand for cannabis in the period between October 17, 2018 and December 31, 2018 to be:

$$\text{Equation 1: Potential legal demand} = D1 \times \{D2 \times (D3 + D4 \times D5) + D6 \times (D7 + D8 \times D9)\} \times D10 \times D11$$

To assess total spending in the fourth quarter, including sales of illegal cannabis as well as legal cannabis, estimated expenditure in the illegal market must be added to these projections. Illegal cannabis spending is estimated as:

$$\text{Equation 2: Potential illegal demand} = D1 \times \{D2 \times (1 - D3 - D4 \times D5)\} \times D10 \times D11$$

Table 1 shows the results for the three alternative estimates of average three-month spending ($D10$), assuming half of those current users who say they may switch to legal cannabis actually do so ($D5$) and half of those current non-users who say they may try legal cannabis actually do so ($D9$). Estimated fourth quarter legal demand is between \$816 million and \$1,018 million. Expressed at annual rates, allowing for the fact that legalization occurs

2. In the third-quarter edition of the NCS additional spending categories will be added to better capture spending at the high end.

on October 17 rather than October 1 and ignoring seasonality (which cannot be assessed at this stage), legal spending in the fourth quarter is projected to be between \$3,849 million and \$4,801 million. Illegal cannabis expenditures in the quarter are estimated to be between \$254 million (\$1,198 million annualized) and \$317 million (\$1,495 million annualized). Accordingly, total cannabis demand in the fourth quarter is projected to be between \$1,069 million (\$5,047 million annualized) and \$1,335 million (\$6,297 million annualized).

Table 1
Estimated cannabis spending in the fourth quarter 2018

	Case 1 (D10=\$177)	Alternative estimates	
		Case 2 (D10=\$199)	Case 3 (D10=\$221)
		number	
D1 - Eligible population on October 17, 2018	29,892,021	29,892,021	29,892,021
		percentage	
D2 - Currently using cannabis	14.8	14.8	14.8
D3 - Current users who will switch to legal	49.2	49.2	49.2
D4 - Current users who may switch to legal	25.2	25.2	25.2
D5 - Assumed: 'maybe' switchers who actually switch	50.0	50.0	50.0
D6 - Not currently using cannabis	85.2	85.2	85.2
D7 - Current non-users who will try	5.9	5.9	5.9
D8 - Current non-users who may try	9.4	9.4	9.4
D9 - Assumed: 'maybe' new users who actually try	50.0	50.0	50.0
D11 - Share of the fourth quarter 2018	84.8	84.8	84.8
		number	
Projected users of legal cannabis	5,433,652	5,433,652	5,433,652
Projected users of illegal cannabis	1,689,975	1,689,975	1,689,975
Projected total users of cannabis	7,123,627	7,123,627	7,123,627
		millions of dollars	
Projected legal spending	816	917	1,018
Annualized projected legal spending	3,849	4,325	4,801
Projected illegal spending	254	285	317
Annualized projected illegal spending	1,198	1,344	1,495
Total projected spending	1,069	1,202	1,335
Total annualized projected spending	5,047	5,670	6,297

Source: Statistics Canada calculations based on [Census of Population](http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3901) (<http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3901>) and [National Cannabis Survey](http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5262) (<http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5262>).

Table 1 also shows estimates of the likely number of cannabis consumers in the fourth quarter. The number of users of legal cannabis products is estimated at 5.4 million persons and the number of users of illegal cannabis at 1.7 million persons.

3. Other limitations of the model

The estimates of potential demand are presented in Section 2. There is no assessment here of whether the supply from licensed producers, coming from current production or inventories, will be fully adequate to meet this demand. Statistics Canada is presently studying this supply capacity question separately.

The estimates also assume consumers will be able to purchase, from authorized retailers, the quantities of cannabis they want to purchase. Based largely on information gleaned from media reports, all provinces and territories are expected to be ready to sell cannabis products online as of October 17, 2018. However, the provinces and territories vary considerably in the extent to which they will be ready to open authorized 'bricks and mortar' outlets for business in the fourth quarter of 2018. In Ontario, for example, no stores will be legally open until April 1, 2019 while in most other provinces there are expected to be some new cannabis stores ready to open by October 17, 2018. Statistics Canada is also studying this retail accessibility question separately.

The population estimate that drives the model assumes purchases are made only by persons of legal age, although it is likely that some underage persons will continue to buy cannabis from illegal sources. The NCS target population is people 15 years of age and older. In addition, there will be some demand from non-resident tourists and they are ignored in this calculation.

In addition, since the estimates presented here are derived from NCS data they are sample based, self-reported and subject to statistical uncertainty. For detailed information about the survey sources and methodology see: [National Cannabis Survey](http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5262) (<http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5262>).

4. Conclusion

This paper has presented a simple model of potential cannabis demand that is based on statistics from the NCS. There are some uncertainties in the model, the most important of which is concerned with the average quarterly purchases, in dollars, by the most intensive users of cannabis products. Three scenarios are presented in which these purchases are assumed alternatively to be \$600, \$700 and \$800 per quarter.

Using this information, it is estimated there will be 5.4 million persons wanting to purchase legal cannabis in the fourth quarter of 2018 and 1.7 million continuing to buy illegal cannabis. Expenditure on legal cannabis in the fourth quarter may be between \$816 million and \$1,018 million while purchases of illegal cannabis may be between \$254 million and \$317 million. The estimates imply illegal cannabis sales will account for about 24% of the total market.