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Economic Impacts of Marijuana Taxation

A White Paper Summarizing Contemporary
Research and Related Factors

City of Ontario, Oregon
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Executive Summary

Findings

The research shows that Oregon’s tax policy on marijuana is very generous compared to other legalized states nearby. The research shows that there is room to capture additional revenues without impacting the illicit sales market.

The research shows that marijuana is very inelastic at this point in the market. Price changes do not significantly impact the quantity demanded by customers and will therefore not decrease the number of sales or revenue.

Eighty percent (80%) of marijuana sold is used by daily users. An effective tax policy similar to cigarette taxation should eventually make up the majority of the cost of marijuana.

Legalization has shown to increase consumption. Consumers are willing to pay more to consume marijuana legally.

Most experts calculate price elasticity of demand, a measurement of how sensitive purchasing is to price, at -0.3 . To put that in perspective, the price elasticity of demand for cigarettes is generally expected to be at -0.4 .

The Washington case study shows that in reducing a 25% excise tax on each of the 3 phases in the supply chain to a flat sales tax on dispensaries, that growers, producers, and retailers pocketed much of the reduction in taxation (i.e. it was not passed on to consumers). This makes a case that there is additional room for taxation in Oregon’s market.

The real question of whether Ontario’s taxation capacity is higher than currently constituted is a question about location. The Treasure Valley of Eastern Idaho has a population of over 700,000 people who do not have access to legalized marijuana. A considerable amount of current sales 30 miles from the border in Huntington, Oregon comes from Idaho buyers. Given the convenience of being directly on Interstate 84 and being right on the border, it is expected that most of that traffic will stop in Ontario to purchase marijuana. Additional users will also come with the closer proximity.

Societies have a way of accepting things they once objected to. Normalization and acceptance can reasonably be expected over time. Consequently, Ontario will not enjoy this market capture permanently. At some point, it can be reasonably assumed that all states will legalize

marijuana at which point, Ontario, will see a significant loss to their revenue. Tax policies will have to be flexible to adapt. Ontario should use the revenue it receives not to add new programs, but to improve the community before this advantage is lost.

Black Markets should not be looked at as a dichotomous choice. In other words, we should not be talking about the choice between whether a black market thrives or whether we keep prices down to eliminate the black market. The city should tax marijuana at a level that mitigates externalities, internalities, and improves the tax base and black markets should be shut down by law enforcement.

Recommendations

1. Ontario has a limited amount of time in which we will receive a significant boon of revenues. We must wisely invest this in our community to better ourselves for the future when acceptance is the norm across states and Ontario loses its current advantage.
2. After review of the economic studies, we recommend that the council approve a resolution requesting the State Legislature to allow a local option tax on marijuana up to 18% for the City of Ontario.
3. Approve Proposal 3 – The City Manager recommends proposal 3 which represents a combination of ideas and concessions from members of the city council.
4. Law enforcement should continue to focus on the elimination of black market sales of marijuana.

Purpose:

The purpose of this white paper is to summarize contemporary research of the economic impacts of taxation policy on the marijuana industry. The City of Ontario is debating tax policy on marijuana and would like to know the economic impact of such policy alternatives.

None of the City of Ontario staff, including law enforcement, have had personal experience working in a community where an illegal drug was made legal. Consequently, we cannot speak credibly from a point of experience on this matter. We found that much of the early literature on the subject was significantly biased coming from extreme positions on both sides of the issue. Since marijuana legalization and multiple taxation strategies have now been tried over a period of time, academic longitudinal studies are now available, which were not previously available. We intend to summarize the research of neutral writers, calculate the elasticity of demand, and identify other contributing factors to this complex question.

The proposal being considered by Ontario is to request special legislation to increase a local option tax above the current state restricted limit of 3% to as much as 18%.

Contemporary Research

For this study, we have relied heavily on research conducted by academic institutions and unbiased research parties including the National Institutes of Health. Notwithstanding, all of these research studies, our location along the state border, makes our situation unique.

Up until the most recent years, there has not been reliable longitudinal data available given the newness of the legalized marijuana market. Most early studies were heavily persuaded by proponents or opponents of marijuana.

Outline

I will review different taxation policies in states where cannabis is legalized. The varying taxation policies have impacted the industry based upon the tax incidence (which point of the supply chain is taxed). I will review the price elasticity of demand studies, which is the impact price (including taxation) effects on the purchase of product. Then I will discuss the unique factors of the Ontario market. I will go over several different proposals some of which have been recommended by the mayor and members of the Ontario City Council.

Taxation Policies in States with Legalized Marijuana

State Taxation Policies

City of Ontario, Oregon

An ad valorem (sales) tax is the current tax allowed in Oregon and in all other states where marijuana is legal. Oregon taxes marijuana at 17% with a 3% local option tax. Out of the 17% taxed by the State of Oregon, 10% is shared back with cities where marijuana is legal. Up until the November 2018 election, Ontario has not been eligible for this money. The distribution formula is made up of the population of your city and the number of dispensaries in your city. The State of Oregon's revenue sharing distribution formula is problematic for Ontario because we abut a state with a Metropolitan Statistical Area population of over 700,000 people where marijuana is not legal. Undoubtedly, that population will penetrate the Ontario market which is the closest legalized cannabis available. Consequently, the taxes paid to the state will not be proportional to the taxes paid back to the City of Ontario.

Let's review other states. California imposes marijuana taxation at 3 different occurrences. According to the California Department of Taxation, the first tax is a cultivation tax of \$2.75 per oz. on dried cannabis leaves or \$9.25 per ounce on dried cannabis flowers. Second is an excise tax of 15% assessed on all marijuana products purchase by the retailer. Third is an ad valorem (sales) tax on retail sales by both the state and local governments. The minimum state tax is 7.25% but the average is between 8-10%. Local government sales tax ranges from 5% to 15%. The effective rate of taxation in California is between 28% and 40%. (Taxation, 2018)

The State of Oregon's revenue sharing distribution formula is problematic for Ontario because we border a state with a Metropolitan Statistical Area population of over 700,000 people where marijuana is not legal.

Nevada and Colorado employ a similar taxation policy. Both have a 15% excise tax. Nevada has a 10% sales tax versus Colorado's 15% sales tax. Colorado also has another 8% sales tax and another 2.9% special sales tax. Local governments add on average another 4.6% on sales and another 3.5% excise tax (from processor to retailer). (Scarboro, 2017)

Colorado is the earliest adopter of marijuana taxation having passed in November of 2012. Oregon followed Colorado's legalization policy by allowing jurisdictions (cities and counties) to ban medical and/or recreational dispensaries.

California taxes all phases of the supply chain. A Cultivation Tax is charged at \$2.75 per ounce on dried cannabis leaves or \$9.25 per ounce on dried flowers. An excise tax is paid by the retailer from the processor of 15%. The state sales tax is a minimum of 7.25% but varies by area. Most areas average between 8-10%. Lastly, local governments can impose sales taxes between 5% and 15%. As far reaching as California's tax marijuana tax is, Washington is still higher. "All of these taxes lead to a lower effective rate than Washington's implying that if

Washington is on the left side of the Laffer curve, these other states likely are as well.” (Hansen, Nukker, & Weber, 2017)

Washington State has an ad valorem tax of 37%, but a transition from a 25% grower’s tax, 25% production tax, and 25% retail sales tax gives us a great insight into the impact of taxation policy. (Taxation, 2018) The State of Washington employed a unique tracking record for the entire supply chain. Washington’s marijuana tax policy change really provides good insight into the change of taxation on marijuana.

In a study conducted by the University of Oregon, they say that data from Washington gives them “the unique ability to observe the prices, quality, and variety of marijuana products in the marketplace.” (Hansen, Nukker, & Weber, 2017) Oregon still struggles to control production of marijuana, which makes black market sales ideal. In 2018 the state put a moratorium on some licensing because they recognized the over-production of cannabis in the state.

Washington’s change also had unique impacts on the supply chain. The previous tax policy encouraged integration of the supply chain. The new tax structure dis-integrated marijuana sold to retailers by 42%. (Hansen, Nukker, & Weber, 2017) Suppliers were incentivized to combine the growing and production to eliminate part of the taxation. Switching to a flat sales tax rate broke up the supply chain.

Washington’s tax policy change resulted in the production of lower quality products. (Hansen, Nukker, & Weber, 2017) The Caulkins study says that taxes based on weight encourage sales of high THC cannabis. Flowers in Washington State’s legal market average over 20% THC. Illegal cannabis confiscated by law enforcement did not rise above 5% until 2001. (Caulkins, 2017) “In Washington marijuana concentrates used for vaping, dabbing, or mixing into edibles now average over 60% THC. These concentrates should bear more tax than \$5 per gram.” (Caulkins, 2017)

Alaska has an entirely different taxation policy, but one that many researchers believe is going to be the most logical in the long run. The tax incidence is at the production part of the supply chain. Alaska marijuana taxes are as follows (State of Alaska, 2019):

1. Mature bud/flower taxed at \$50 per ounce
2. Trim taxed at \$15 per ounce
3. \$25 per ounce for immature or abnormal bud/flower
4. \$1 per Clone

Ideal Tax Policies

An ad valorem tax is not an ideal tax policy for the future as acceptance grows and prices fall. The current average price in Huntington is \$11.66 per gram. With a 20% tax, the total cost

would be \$13.99. The tax benefit is \$2.33. If prices fall, as they are expected to with wider acceptance, market consolidation, and reductions in production costs, the tax benefit will drop. As legalization spreads, prices will fall and revenue will decrease proportionally. This is why Alaska's tax per ounce at cultivation may work better than all other states that tax based on price.¹

Consumption

Breaking out consumption of marijuana is essential to figuring out the price elasticity of demand. Pacula et al suggest that there are multiple groups and the elasticity depends on the group. (Pacula & Lundberg, 2015) "While marijuana has tens of millions of happy occasional users, they account for a trivial share of industry sales. Consumption is concentrated among the smaller number of high-frequency users; half of marijuana is consumed by people with a medically diagnosable substance-use disorder, and these individuals are disproportionately poor and less educated. Policy – including tax policy – should be designed to protect these problem users from exploitation by industry and from their own bad choices, rather than cater to the convenience of occasional users." (Caulkins, 2017) Pacula and Lundberg state that "like alcohol, the casual user of marijuana represents a relatively large share of the proportion of people who report using any marijuana in the past year, but they represent a very small proportion of the total amount consumed." (Pacula & Lundberg, 2015)

"Eighty percent of marijuana is consumed by daily and near-daily users; 60% by people with a high-school education or less." (Caulkins, 2017) Caulkins proposes that "taxes will eventually account for most of the cost to consumers, as they already do for cigarettes in many European countries." Cigarette taxes in the United States vary from \$.50 to over \$4.00 per pack.

Pacula et al broke out users into four groups who all have varying price elasticities of demand. (Pacula & Lundberg, 2015)

1. Initiators and light users – new users who are experimenting with marijuana or consuming small doses on a very infrequent basis. Price Elasticity of Demand -.30
2. Regular Users – individuals who consume in relatively small and moderate doses on a more frequent basis. Price Elasticity of Demand -.33
3. Heavy Users – individuals who consume on a near daily basis or who meet Diagnostic and Statistical Manual of Mental Health (DSM-IV) criteria for dependence or abuse. Price Elasticity of Demand -.26 to -1.18 or -2.65 to -2.79

¹ Prices were taken directly from the retailers price as listed on Leafly.com

4. Quitters – individuals who are deciding to no longer use marijuana. There is very little data on this group, but it is price sensitive, but amongst this group, it had a greater impact on delaying initiation rather than enticing the user to quit.

Legalization

One of the goals of legalization is to eliminate the black market for marijuana. This creates multiple impacts on use and price. “Legalization would bring more than just a potential reduction in the price of the substance; it will also bring a reduction in the legal risks of using the drug and the perceived harm, which we have demonstrated here have their own independent effects on demand.” (Pacula & Lundberg, 2015) Pacula et al postulate that new users will enter the market because of the reduction in legal risk and other users are willing to pay a higher price for eliminating the legal risk of going to a black market. The impact is surprising “A 10 percent decrease in the perceived harm of marijuana would generate a 28.7 percent increase in annual prevalence of marijuana use among youth.” (Pacula & Lundberg, 2015)

From a revenue-seeking perspective, “The marijuana industry is currently at a strategic disadvantage. Interested players want legalization more than they want low taxes.” That puts governments in a strong position. (Caulkins, 2017) Ontario witnessed this directly with the removal of the ban on marijuana dispensaries.

Elasticity of Demand

Definitions

Elasticity is a measure of, in this case, the quantity of marijuana legally sold and its sensitivity to change in price. In other words, if I raise the price of 1 gram of marijuana, what is the impact on how much marijuana I sell? When items are very elastic, it means that they are very price sensitive. If they are inelastic, they are not sensitive to price.

Tax Burden is used synonymously with tax incidence and is the term to describe the amount of tax levied on an individual or business. The attached chart shows how a change in price changes the quantity sold and also who bears the burden.

Tax burden is germane to the discussion of the economic impact of taxation policy because the elasticity is the greatest contributing factor that determines how much of the tax burden

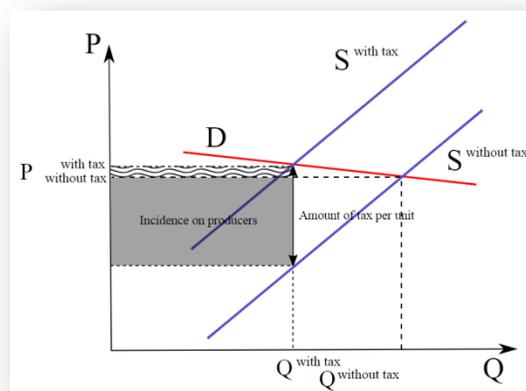


Figure 1 Elasticity and Tax Burden

falls on the buyer or seller. For instance, the study done by the University of Oregon, analyzing the Washington marijuana tax reform determined the buyer tax burden was 44% of the total tax burden. The other 66% would be borne by other entities in the supply chain. (Hansen, Nukker, & Weber, 2017)

Price Point

As more states legalize marijuana, there will be more opportunities for production. Because of the ease of growing marijuana, production costs will move to the states with low production costs. The low production costs will drive prices downward. Production costs will be driven more by regulation and taxes, than by fertilizer, land, or labor. (Caulkins, 2017)

With marijuana not legalized by the federal government and still many states, the production of marijuana is mostly in state the same state or within abutting states that are also legalized. All borders of Oregon, including California, Washington, and Nevada are legal with the exception of Idaho. Ontario sits on the Idaho border in a large, fast-growing metropolitan area where Idahoans have no legal access to marijuana. Although it is illegal to take it across state lines, it would be naïve to assert that this will not happen. Sales in Huntington, Oregon, more than 30 miles from the Idaho border already demonstrate the selling power of legal marijuana in Oregon. Even with the travel cost which some would argue would incentivize a black market, sales are extraordinarily high.

Now that marijuana is legal in Ontario, the City is responsible for wisely using the income boon until marijuana is legalized everywhere and revenue drops. “Propping up prices with excise taxes...would achieve the public-health goal of discouraging excessive marijuana use, while relieving the public of having to finance less-popular and more-counterproductive taxes.” (Caulkins, 2017) At the same time we want to be cautious about the effects of over-taxing marijuana and the perverse incentives that may create.

Current price levels for legal marijuana in the area range from \$6.00 per gram to over \$21.00 per gram. The average price per gram is around \$11.66. As production costs fall, the amount of taxes received by governments will drop with price.

Price Elasticity of Demand

The University of Oregon study determined that “Consumer marijuana demand is price-inelastic in the short run, but becomes price-elastic within a few week.” (Hansen, Nukker, & Weber, 2017) Following the taxation policy change in Washington, it was estimated that the price elasticity of demand was -1 and near the peak of the Laffer curve, which means that further tax increases may not increase revenue. (Hansen, Nukker, & Weber, 2017) We will show that there are many studies calculating price elasticity of demand; most come close together, and there are a few outliers.

Washington’s change in tax policy gives us a good glimpse at elasticity. When the state changed its taxation policy from 25% growing tax, 25% production tax, and 25% retail tax to a flat sales tax of 37%. “Processors took advantage of a unique opportunity to increase margins.” (Caulkins, 2017) The University of Oregon study on Washington found that list prices fell by 8%. At the same time, the after-tax price increased by 21%. Their study showed that the quantity of sales transactions, total weight of marijuana sold, and THC levels were unchanged. Because the after-tax price for processors increased dramatically following the tax change, it appears that the elimination of the 25% tax was a huge boon to processors, while it simultaneously decreased the marginal costs faced by retailers. (Hansen, Nukker, & Weber, 2017)

Figure 2 below shows the tax burden before and after the tax. While the tax yield went down, prices rose slightly and those in the supply chain took the profit.

Figure 10: The Average Price of One Gram of Marijuana and Tax Incidence across Markets



Figure 2 (Hansen, Nukker, & Weber, 2017)

The chart above shows that the retailers benefited by the tax policy change from paying \$6.63 to \$5.41 per gram of marijuana. Processors price dipped from \$4.10 to \$3.84 per gram. Even though the supply chain was getting more money, price to the consumer increased from \$13.18 to \$13.48 per gram. The total taxes collected before the change was \$4.51 and \$4.23 afterwards. This demonstrates that there is more room for taxation. “Our results suggest that significant state revenue may be left on the table in these other states” (states with smaller tax levies). (Hansen, Nukker, & Weber, 2017)

City of Ontario, Oregon

Another study conducted by California State University Northridge agrees, suggesting that legalizing and taxing recreational cannabis would be lucrative for governments. This study calculated the Price Elasticity of Demand at $-.418$. (Halcoussis, Lowenberg, & Roof, 2017)

Although Washington disallowed the integration from processor to retailer, they allowed integration from grower to processor. In Washington, vertical integration was incentivized between the grower and processor because the 25% excise tax could be avoided.

Location

Price elasticity of demand is the very test used to determine the sensitivity to price. It is not a test of whether someone will purchase marijuana or not, it is a test of whether someone will seek other options too, including location. Huntington, Oregon is now the closest place to purchase marijuana and presumably will still have a taxation rate of 3%. Huntington, Oregon is 29.5 miles from Ontario and the border of Idaho. An argument could be made that buyers will pass Ontario to go to Huntington and purchase marijuana.

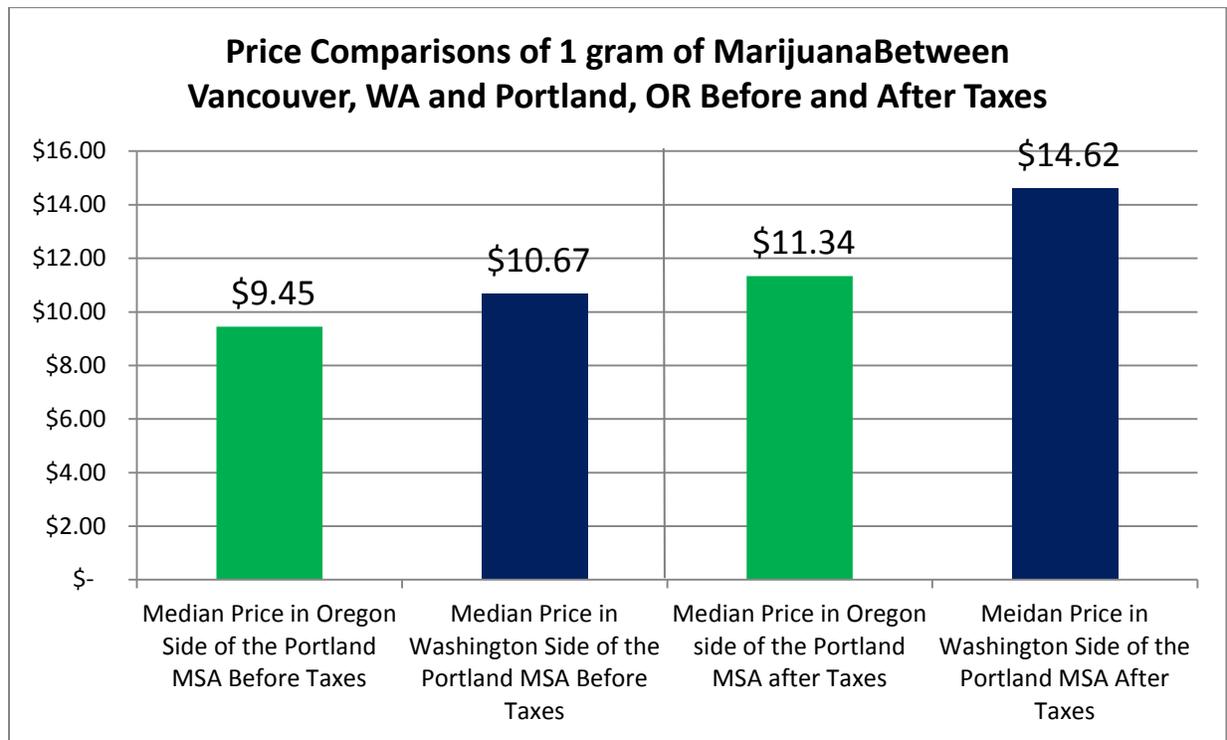
To prove the point about elasticity and its sensitivity to price regardless of distance, we performed a study using Portland Oregon and Vancouver, Washington. We used a statistical test of means known as a t-test to measure the difference in product between Portland, Oregon and Vancouver, WA. Both cities have legalized marijuana, however Washington taxes marijuana at the retail level at a rate of 37% while Oregon taxes marijuana at a rate of 20% as mentioned earlier in the report.

We took a random sample of stores on the Oregon side of the Columbia River. The number of stores sampled in Oregon is 11. Vancouver had 8 stores but one owner held three of the stores. So, the sample size in Vancouver is 5, which is nearly a census of all the stores on the Washington side of the river.

The metropolitan statistical area (MSA) includes both cities and adjoining communities. There are 1,789,580 million people on the Oregon side of the MSA and 434,429 on the Washington side of the MSA. Given the tax difference between Washington and Oregon, one might expect the price to be less on the Washington side of the river versus the Oregon side of the river.



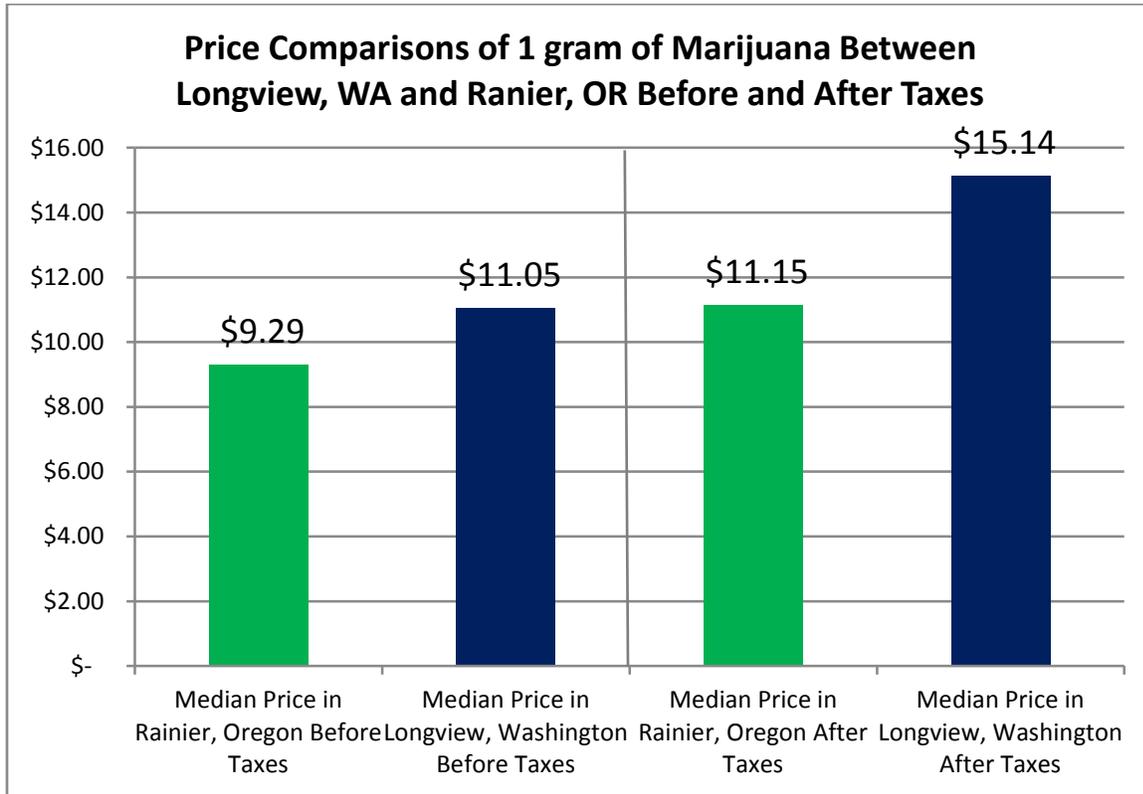
The data showed that the median offering at each store in Washington was \$10.67 before taxes while it was \$9.45 in Oregon. There was a 13% difference in cost between Oregon marijuana offerings and Washington marijuana offerings. After taxes the price is \$14.62 in Washington versus \$11.34 in Portland, a difference of \$3.28 per gram. The distance between these stores was within a 7.5 mile radius. We performed a t-test that showed there was not a statistically significant difference between the median prices in Washington and Oregon before or after taxes at the .05 or .01 levels.



Transporting marijuana across state lines is a federal offense, which makes comparing brands and strains across state lines difficult. We found many product names that were the same, but there was little overlap in brand most likely because producers are formed under separate limited liability corporations, (LLC's) or because the producer market has historically "been dominated by small, local players." (Cowee, 2019) Only recently has the industry started to merge and acquire across state boundaries, and some have even gone public on the Canadian Stock Exchange.

To verify our findings in the Vancouver and Portland Market, we looked at another border town with legalized dispensaries on both sides of the river. The bordering towns of Rainier, Oregon and Longview, Washington both have dispensaries with the same tax burden as Vancouver and Portland, 37% and 20% respectively. In compiling the data the average cost per gram of marijuana before taxes was still higher in Washington than in Oregon. Longview is the larger of the towns with 36,648 residents and 9 dispensaries. There was only one

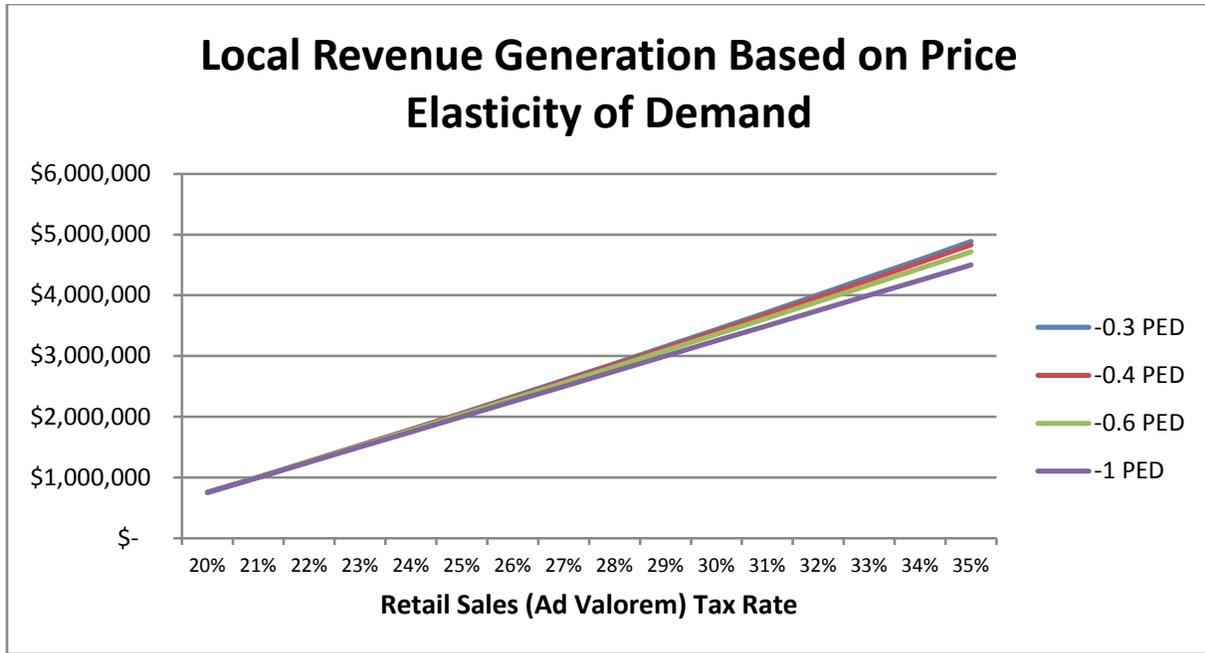
dispensary in Rainier which has a population of 1,195 residents. A theory that says marijuana is elastic, meaning very sensitive to price, might suggest that there would be more dispensaries on the Oregon side of the river because of the smaller taxation. The retail price per gram in Rainier was 19% cheaper before taxes and 36% cheaper after taxes. Yet, there is only one dispensary in Rainier and prices do not show responsiveness to taxation.



Applying the Elasticity of Demand

Most studies reviewed showed elasticity between -0.3 to -0.6 . The outlier was -1 . If the marijuana price elasticity of demand were -0.3 , what this means it that a 10% increase in price would lead to a 3% reduction in the level of demand. If marijuana tax increases by 15% a reduction of 4.5% in quantity demanded could be expected.

Any elasticity under 1 is considered not price sensitive, which means an increase in price will not change the amount purchased significantly. Once you go above 1, there is a point at which revenues will be maximized. By using the range of price elasticity of demands (price sensitivity) we can generate revenue models based on the proposed tax policy of increasing the local tax option to a maximum of 18%. The model below starts at the current taxation rate of 17% for the state and 3% for the City of Ontario. The amount above 20% represents the proposed local option tax of up to 15 more percentage points.



As can be observed by the chart, the difference between a low elasticity rate of -.3 to a rate that is most likely higher than expected at -1, the difference in revenue is just under \$500,000. We expect Ontario to get \$750,000 in local tax at the 3% rate. If price had no impact on sales, we could expect a total of \$5,000,000 if the city was granted permission to tax at 18%. Price does have an impact on sales though, so the following table shows the change in revenue by each percentage point up to 35%.

Table 1: Revenues at 4 Price Elasticity of Demand Levels

| | -0.3 | -0.4 | -0.6 | -1.0 |
|-----|--------------|--------------|--------------|--------------|
| 20% | \$ 750,000 | \$ 750,000 | \$ 750,000 | \$ 750,000 |
| 21% | \$ 1,005,819 | \$ 1,004,983 | \$ 1,003,317 | \$ 1,000,000 |
| 22% | \$ 1,264,529 | \$ 1,262,438 | \$ 1,258,271 | \$ 1,250,000 |
| 23% | \$ 1,526,120 | \$ 1,522,352 | \$ 1,514,852 | \$ 1,500,000 |
| 24% | \$ 1,790,581 | \$ 1,784,713 | \$ 1,773,047 | \$ 1,750,000 |
| 25% | \$ 2,057,903 | \$ 2,049,509 | \$ 2,032,844 | \$ 2,000,000 |
| 26% | \$ 2,328,075 | \$ 2,316,730 | \$ 2,294,233 | \$ 2,250,000 |
| 27% | \$ 2,601,086 | \$ 2,586,363 | \$ 2,557,202 | \$ 2,500,000 |
| 28% | \$ 2,876,928 | \$ 2,858,398 | \$ 2,821,740 | \$ 2,750,000 |
| 29% | \$ 3,155,590 | \$ 3,132,824 | \$ 3,087,837 | \$ 3,000,000 |
| 30% | \$ 3,437,064 | \$ 3,409,630 | \$ 3,355,481 | \$ 3,250,000 |
| 31% | \$ 3,721,338 | \$ 3,688,804 | \$ 3,624,663 | \$ 3,500,000 |
| 32% | \$ 4,008,405 | \$ 3,970,337 | \$ 3,895,371 | \$ 3,750,000 |
| 33% | \$ 4,298,254 | \$ 4,254,218 | \$ 4,167,597 | \$ 4,000,000 |
| 34% | \$ 4,590,877 | \$ 4,540,437 | \$ 4,441,330 | \$ 4,250,000 |
| 35% | \$ 4,886,265 | \$ 4,828,984 | \$ 4,716,559 | \$ 4,500,000 |

Even at the highest elasticity, the revenue would be around \$4.5 million. As with other budget strategies, we recommend being conservative and using the higher elasticity. Seeing the inelastic nature of retail marijuana and looking at Washington's experience changing the tax incidence and burden, the University of Oregon's study suggests "that significant state revenue may be left on the table." (Hansen, Nukker, & Weber, 2017)

Unique Factors

Idaho

Forbes Magazine identified the Boise, Idaho Metropolitan Statistical Area (MSA) as America's fastest growing city. (Sharf, 2019) According to the US Census, the 2017 estimate for the Boise City-Nampa Idaho MSA was 709,845. The closest access up until now for the Boise MSA population for legal cannabis is 30 miles from the Idaho Border. Whitney Economics did a study of the impact of sales in Washington before and after Oregon legalized in border towns. They show how prices in Washington border cities reacted significantly to the difference in taxation rates. In most cases, it was 37% in Washington and 20% in Oregon. (Whitney, 2017) He calculated a much higher rate of elasticity at -10 that I could find no other studies to substantiate. No other research from the volumes of studies I read, calculated a price elasticity of demand much higher than 1. Most were between -.3 and -.6.

Normalization and Acceptance

Caulkins theorizes that once people can easily obtain marijuana next door, more states will legalize. (Caulkins, 2017) There are many examples of how populations learn to accept things over time that were once not accepted. If that is true, Ontario has a limited amount of time in which we will receive a significant boon of revenues. We must wisely invest this in our community to better ourselves for the future when acceptance is the norm across states.

We have no way to estimate the amount of time in which our border state will legalize marijuana. It may be 5 years or it may be 10 years. We must realize though that we will lose a significant portion of that revenue at the time it is legalized. Our spending choices must be wise.

Complex Systems

We stated before the difference in marijuana users and how the price elasticity of demand may change based on those users. "...Many who draw on this [discussion of the price elasticity of demand for marijuana] literature to substantiate a particular position regarding legalization do so naively, unaware that the responsiveness of consumption to price can depend on where in the distribution of marijuana users the sample is drawn." (Pacula & Lundberg, 2015) The following table breaks out users by age and looks at the impact of

elasticity based on complex factors including price, decriminalization, penalties, and enforcement.

Findings from the Literature of the Effects of Price on Regular (Past Month) Use

| Policy | Summary Estimates | Studies | Age of sample |
|-------------------|--|---|---|
| Monetary price | -1.01 to -1.51 (full demand elasticity); -0.7 to -1.0 (30 day participation elasticity). | Nisbet and Vakil (1972) | College students – own sample |
| | -0.24 (30 day participation elasticity) | Williams et al (2004) | College students – Harvard College Alcohol Study (HCAS) |
| | -0.26 (30 day participation elasticity) | Williams et al (2006) | College students - HCAS |
| | -.40 (full demand elasticity) | Clements and Zhao (2009) | Full population |
| | -0.28 – 0.31 (30 day participation elasticity) | Gallet (2013) | Mixed populations |
| Decriminalization | No effect on prevalence or frequency of use | Thies & Register (1993) ; Pacula (1998) | NLSY79 Young adults (ages 19-30) |
| | Past month use participation elasticity: 0.07-0.09. | Saffer and Chaloupka (1999). | 1988, 1990, 1991 NHSDA (includes illicit drug prices) |
| Penalties | -0.008 effect of median fine on thirty day use. No effect on frequency of use | Farrelly et al (1999) *controls for enforcement too | 1991-1994, 1996 NSDUH (ages 21 to 30) |
| | Median fine insignificant | Williams et al (2004) | College students – HCAS |
| Enforcement | Crime per officer ratio positive and significant (elasticity not specified) | Pacula (1998) | NLSY79 (young adults ages 19-26) |
| | Past month participation elasticity for MJ arrests to users: -0.157 to -0.176 | Farrelly et al (1999) *Monetary price included | 1991-1994, 1996 NHSDA (ages 21 to 30) |

Figure 3 (Pacula & Lundberg, 2015)

Black Markets

The University of Oregon study made the point that “there is little evidence on how industry participants may respond to alternative policies – particularly given the available substitutes in the form of black-market goods and legal or quasi-legal medical marijuana. (Hansen, Nukker, & Weber, 2017)

One strategy for eliminating black markets is legalization. It is highly unlikely that a black market will be totally eliminated. Price will factor on the existence of a black market though. A survey conducted by the Rand Corporation said “that most wouldn’t pay more than a few dollars per gram over the black market price. People who said they would buy whatever was cheapest accounted for fully one-third of consumption.” (Caulkins, 2017)

As referred to earlier, one study done by Whitney Economics proposed a much stronger relationship between the price of cannabis in the legal market and in the illicit market. They propose that the Price Elasticity of Demand is as high as -10, which would be very price sensitive. (Whitney, 2017) I was not able to find any other studies, references, or data to back up these findings. The closest data to Whitney’s findings in the study done by the National

Institutes of Health where they broke out a segment of heavy users and projected that population PED could be as high as -2.79. (Pacula & Lundberg, 2015)

Even at an elasticity of -10, taxation would not be counterproductive until going above 32% although revenues would be significantly less and lost business would likely go to the illicit market. This study is not substantiated by any academic studies. For purposes of demonstrating the impact of higher elasticities we have shown the price elasticity of demand at -10 and -2.6 on the chart below.

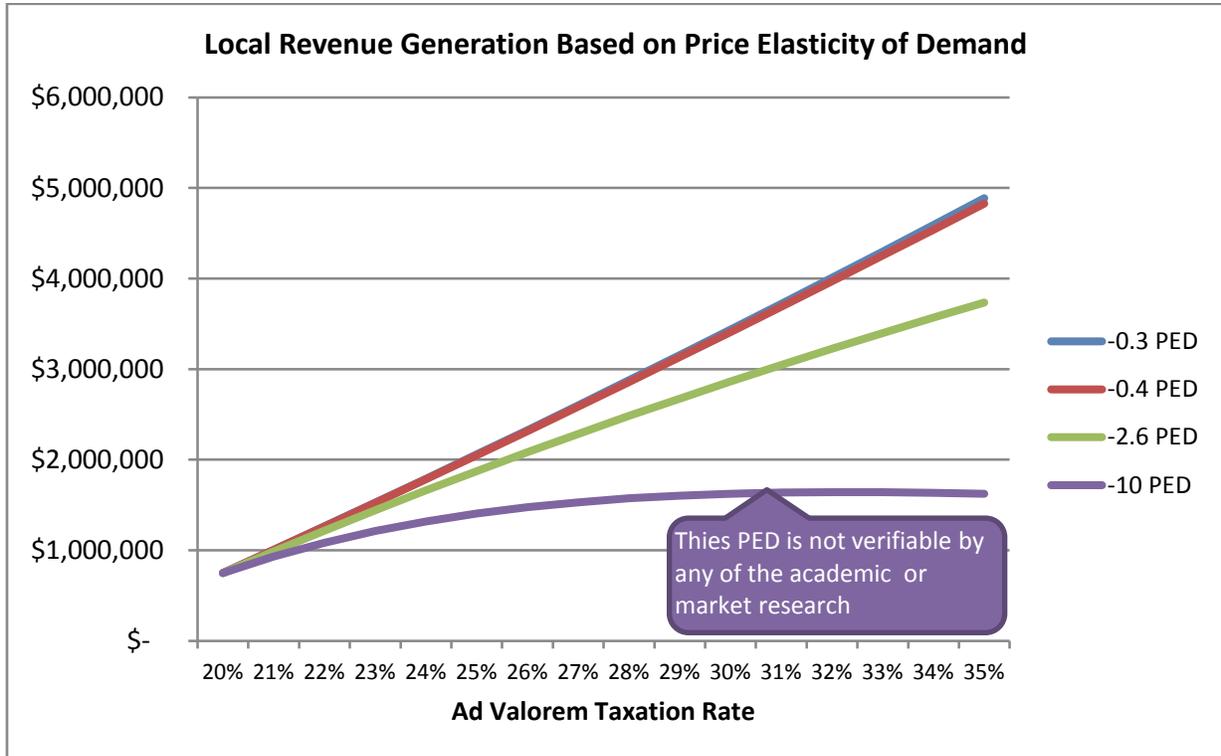


Figure 4 Calculation of PED at -10

Oregon has had problems with the production side of marijuana, that is to say, they have produced more than can be used within the state, and it is being illegally moved out of state. Washington's seed to sale tracking system seems to be the most practical way to account for the production of marijuana throughout the supply chain. Without a good tracking system and a known oversupply, a black market is very likely. Still, researchers on the subject say that we need to shut down black markets through law enforcement and keep prices on marijuana high enough to discourage abuse, and low enough to discourage black markets.

We believe also, that it should not be looked at as a binomial question with one alternative to keep prices low to eliminate black markets or the second alternative to raise taxes and accept the presence of black markets. Black markets should be dealt with and taxes should be

collected to cover the externalities caused by the consumption of the manufactured goods, in this case marijuana.

Communal Impacts

Ontario has had marijuana in our community legally possessed when the state legislatively legalized the drug. We cannot point specifically to any observable impacts at the current level of presence in our community. With many new merchants, however, there is undoubtedly going to be, at the very least, increased traffic. There will be more people in our retail areas which brings more police and rescue calls.

There will be societal impacts for having cannabis in our community. "An early study after the adoption of decriminalization policies experienced a 56% to 64% increase in marijuana involved emergency department episodes compared to states who did not adopt these policies." Additionally, this study showed a decline in the number of episodes for other illicit drugs. (Pacula & Lundberg, 2015) Caulkins makes an argument about the internalities of excessive marijuana use, that is to say the impact on the user's lives. "Marijuana is a dependence-inducing intoxicant that leads many users to systematically make bad decisions that harm themselves as well as third parties." "The phrase 'drugs hijack the brain' is sensationalistic, but not altogether wrong." (Caulkins, 2017)

Conclusions

It is difficult to tell precisely what the impact on consumer purchase will be. Nearly all of the studies indicate a elasticity between -.3 and -.6. A conservative estimate across the board would be -1 in our view.

Tax policies will need to be changed as acceptance broadens. Right now, though, the research shows that there is an opportunity to increase taxes without a significant impact on sales. The research indicates that an effective tax rate under 40% is within the area that consumers will absorb. Proof of this comes from Washington where the reduction in tax was largely not passed on to the consumers.

We have a limited amount of time to enjoy this boon in revenue. Normalization and acceptance are expected over time. The city should avoid programs or ongoing expenses that cannot be sustained after legalization across state lines. We do not have an estimate of how much of the revenue will remain after acceptance across state lines.

Proposals for Revenue

Council has discussed several proposals for the tax revenue generated by additional taxes. They are outlined in a numbered list below for the purpose of this presentation.

1. Dedication of all marijuana tax revenue specifically by purpose and percentage.
2. Dedicate marijuana tax revenue beyond the approved 3% rate by purpose but not by percentage.
3. Dedicate marijuana tax revenue beyond the approved 3% rate specifically by purpose and only payments to the Public Employee Retirement System debt by minimum percentage.
4. No specific dedication of revenues in the enabling legislation. The budget committee, including the city council, will formulate the priorities together.

Proposal 1

The original idea and resolution proposed by Mayor Hill recommends that all revenue be dedicated by percentages. The associated revenue from a tax rate of 18% broken out by the proposed percentages would be as follows:

| Purpose | | \$ | 4,500,000 |
|---|-----|----|-----------|
| Roads, Water, Sewer, and Storm Drain | 10% | \$ | 450,000 |
| Homeless, Veteran Housing, and Community Kitchens | 10% | \$ | 450,000 |
| Detectives for the Ontario Police Department | 10% | \$ | 450,000 |
| Pay down PERS Obligation | 70% | \$ | 3,150,000 |

At this funding level, PERS could be paid off in less than 4 years.

Proposal 2

An amended resolution has been proposed by Councilors Crume, Capron, and Polomo proposes that revenue above and beyond the currently passed 3% be dedicated by purpose but not specifically by percentage.

Proposal 3

A proposal using multiple concepts from the city council could be to leave the first 3% unrestricted as it is now. The budget committee demonstrated its priority to pay down PERS in last year's budget cycle. A resolution suggested by council members would be to commit at least 50% of the additional revenue to pay down the City's PERS obligation. The additional 50% of the new revenue would be used for the priorities previously mentioned by the council. The budget committee will make recommendations for the use of the additional revenue.

| After first 3% Revenues of \$750,000 | Percentage | Total Revenue |
|---|-------------------|----------------------|
| Purpose | Breakdown | \$3,750,000 |
| Roads, Water, Sewer, Storm Drain, Homeless Services, Veteran Housing, Community Kitchens, Police Detectives, Code Enforcement and Marijuana Education for kids. | 50% | \$1,874,000 |
| Pay down PERS Obligation | >50% | \$1,876,000 |

The most recent PERS obligation for the city was valued at \$10.9 million. This estimation was done prior to the City setting up a side account, so we can expect the valuation to be just under \$10 million, assuming state investments recover from the weak beginning of the current year. As the council is well aware, from past budget discussions, being 100% funded with PERS would bring in an additional \$1 million to the general fund operating budget.

Proposal 4

Lastly, it has been discussed that it should be the role of the budget committee, which includes the City Council, to designate priorities through the normal budget process for the entire amount. The proposed percentages have not been vetted by the city council or budget committee. This fits with past practice of re-convening the budget committee to make decisions together on the priorities of the City. The disadvantage is that the bill must be submitted by next week to be considered in this state legislative session. It is entirely likely though that the bill will be reworded, reworked, and will look very different as it goes through the process. Comments on the bill can be considered throughout the legislative session. The budget committee will meet on January 29, 2019.

Recommendations

1. Ontario has a limited amount of time in which we will receive a significant boon of revenues. We must wisely invest this in our community to better ourselves for the future when acceptance is the norm across states.
2. After review of the economic studies, the City Manager recommends that the council approve a resolution requesting the State Legislature to allow a local option tax on marijuana up to 18%.
3. Approve Proposal 3 – The City Manager recommends proposal 3 which represents a combination of ideas and concessions from members of the city council.
4. Law enforcement should continue to focus on the elimination of black market sales of marijuana.

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