



IMPACT Center
WASHINGTON STATE UNIVERSITY

2020 Contributions of the Washington Cannabis Sector

A report by Washington State University's IMPACT Center



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1. Introduction and Study Overview

In November of 2012 Washington citizens passed Initiative-502 legalizing, but greatly controlling, the marijuana sector within the state. Legal possession for individuals over the age of 21 went into effect in December of 2012. Additional legislation setting up and regulating the market, producers, processors, and retailers, went into effect by the end of 2013. Licenses began being issued in July of 2014 and tax collection methods were set at a single 37% retail rate in 2015. This is when most data collection on the cannabis market began.

This study aims to establish a baseline understanding of the role of cannabis in Washington State's economy and to determine a baseline expectation of the fiscal role it will play moving forward. A second, but equally important objective is to determine how legalization of home-grown cannabis might contribute to, or detract from, the estimated fiscal base. While medical exemptions exist for home-grown cannabis, recreational growing remains illegal under state law. The extent to which legalization of recreational home-grown cannabis will affect current market structures is a matter of debate. As such, estimates are made and a sensitivity analysis around those estimates is provided. Expected upper and lower-bound fiscal effects resulting from legalization of home-grown cannabis are then produced.

Data for the analysis came from extensive literature reviews focused on Canada, Colorado, California, and Oregon. A large review of academic literature regarding demand estimation of illicit drugs was conducted, as well as a review of the home-grown operations in Colorado and Oregon relative to their commercial operations. Data specific to Washington was obtained from the Washington State Liquor and Cannabis Board, the Cannabis Alliance, Hawthorn Gardening Co. and Scott's Miracle-Gro, and various members of the cannabis sector including growers and retailers.

Major Study Findings:

1. In 2020 the Washington cannabis sector contributed \$1.85 billion to gross state product.
2. The sector directly and indirectly supported nearly 18,700 full time equivalent jobs.
3. Retail cannabis sales grew 21% between 2019 and 2020 and grew 605% between 2015 and 2020.
4. Marijuana Excise taxes are the fastest growing component of the state's General & Selective Sales Taxes revenues.
5. State tax revenues from direct cannabis retail sales were \$468.81 million in 2020, while excise revenues from liquor and alcohol sales only totaled \$415.28 million and cigarette, tabaco, vapor product excise revenues only totaled \$383.55 million.
6. Total tax revenues in 2020 stemming from the cannabis sector, including property taxes, sales & excise taxes, and corporate and other taxes amounted to \$883.38 million.
7. 2020 per capita sales were highest in Asotin County¹ at \$564.52 and lowest in Franklin and

¹ Asotin county has a low population density and borders Idaho, which likely contributes to the high value.

Garfield Counties where no cannabis retail licenses have been issued.

- 8.** Washington has had the lower growth rates in retail cannabis sales than both Colorado and Oregon, since 2017.
- 9.** 2021 excise tax revenues are expected to be \$538.78 million resulting in total tax collection of \$1.02 billion.
- 10.** 2021 excise taxes could range from a low of \$520.04 million to a high of \$585.63 million, were recreational home production legalized.

2. Sector Overview and Market Structure

Sector Overview

The Cannabis sector is composed primarily of the three operations outlined in I-502: Production, processing, and retail sales. Indirect elements of the sector’s supply chain include growing medium and soil amendments, lighting and HVAC systems, electricity, building maintenance, lab testing services, packaging and labeling equipment, display containers, etc., not to mention the other products purchased in processing edibles. Labor costs, depreciation, returns to ownership, and taxes are not a small part of the operational expenses either. The effect the cannabis sector has had on the supply chain is discussed later in the report, but it is through the sectors revenues and expenditures that the economy is affected.

It is only a result of consumer demand that the sector continues to operate and grow. Measured demand has risen sharply since legalization within the state. Table 2.1 outlines measured and estimated sales volumes internal to the sector. Beginning in 2018 producer/processor sales were no longer captured by the WSLCB. Retail sales continue to be captured and reported and imputed sales, highlighted in red, were estimated and included to understand the backward links internal to the sector.

Table 2.1: *Washington State Internal Cannabis Sector Sales*

Year	Producer	Processor	Retailer	Total
2015	\$5,123,788	\$74,767,452	\$179,631,082	\$259,522,322
2016	\$29,777,309	\$254,698,477	\$501,973,814	\$786,449,599
2017	\$67,767,203	\$453,092,827	\$850,935,821	\$1,371,795,851
2018	\$85,582,398	\$534,889,985	\$972,527,246	\$1,592,999,628
2019	\$92,161,353	\$576,008,455	\$1,047,288,100	\$1,715,457,908
2020	\$111,427,728	\$696,423,297	\$1,266,224,177	\$2,074,075,202

Source: WSLCB and author’s calculations

Sales by county differ markedly because of different population bases, local regulatory environments, and consumer demand. Table 2.2 provides total retail sales by county for the years 2015 and 2020. Franklin and Garfield County did not have any licensed retailers in 2020. It is not surprising that total sales are highest in King county as it is the most populous county in the state. To provide some sense of overall demand by county we included 2020 sales per capita in the final column of the table. The remarkably high sales per capita figure for Asotin County is likely a result of its close proximity to Nez Perce County Idaho. Economists would view Clarkston, WA and Lewiston, ID as a single retail market, often referred to as a functional economic area. Including the Nez Perce County population would bring the retail sales per capita Asotin down to \$201.70. This is still quite high, but more inline with what we are seeing in other parts of Washington.

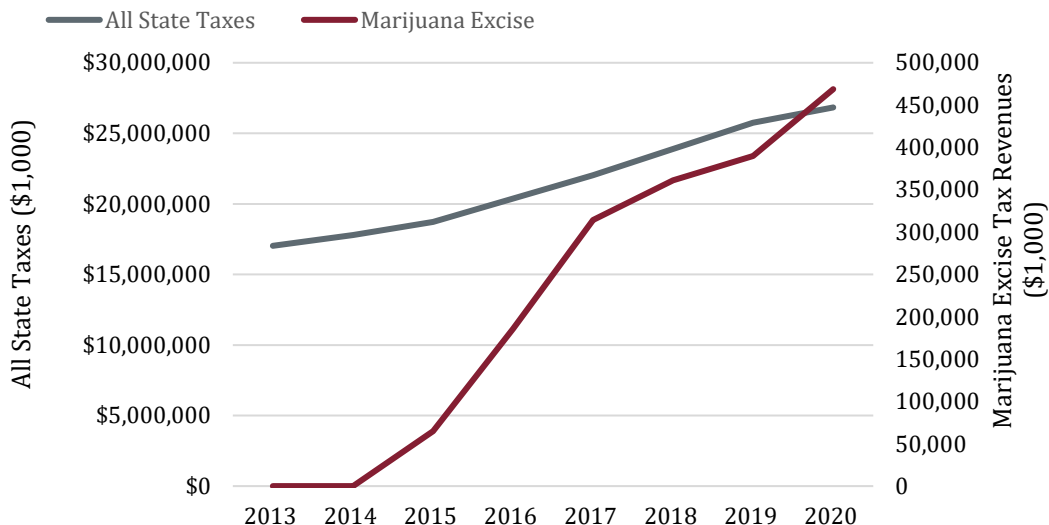
Table 2.2: Retail Cannabis Sales by County in Washington

Counties	2015	2020	2020 per capita sales
KING	\$48,166.44	\$340,530.21	\$149.54
PIERCE	\$16,424.91	\$159,543.36	\$174.14
SPOKANE	\$22,100.48	\$135,017.34	\$253.80
SNOHOMISH	\$17,451.82	\$134,134.49	\$161.39
CLARK	\$24,732.26	\$74,271.98	\$150.03
THURSTON	\$5,887.90	\$62,866.94	\$213.10
KITSAP	\$4,936.10	\$41,439.06	\$151.42
WHATCOM	\$8,005.49	\$40,387.90	\$173.12
BENTON	\$2,840.37	\$34,041.68	\$164.06
YAKIMA	\$2,808.90	\$28,803.35	\$114.67
SKAGIT	\$4,403.72	\$24,773.37	\$189.73
COWLITZ	\$4,583.66	\$19,807.22	\$176.17
GRAYS HARBOR	\$980.43	\$16,640.88	\$218.04
CLALLAM	\$1,400.40	\$14,929.60	\$191.13
GRANT	\$1,325.70	\$13,215.35	\$133.77
ASOTIN	\$78.39	\$12,728.75	\$564.52
ISLAND	\$1,185.03	\$12,101.60	\$140.63
WHITMAN	\$2,017.67	\$11,618.43	\$229.95
CHELAN	\$1,392.08	\$11,370.95	\$146.44
MASON	\$365.73	\$10,932.55	\$160.40
WALLA WALLA	\$0.00	\$9,411.43	\$154.53
KITTITAS	\$1,374.42	\$8,825.95	\$181.93
LEWIS	\$208.48	\$7,750.21	\$94.69
OKANOGAN	\$617.73	\$7,009.51	\$165.44
JEFFERSON	\$1,530.91	\$6,224.22	\$190.37
STEVENS	\$996.26	\$5,755.21	\$124.51
DOUGLAS	\$1,513.80	\$5,275.38	\$119.60
PACIFIC	\$348.06	\$3,945.57	\$172.54
SAN JUAN	\$251.11	\$3,061.66	\$169.72
KLICKITAT	\$1,351.24	\$2,659.60	\$117.09
ADAMS	\$0.00	\$1,977.02	\$97.73
SKAMANIA	\$351.59	\$1,226.58	\$100.15
FERRY	\$0.00	\$980.66	\$128.76
LINCOLN	\$0.00	\$925.40	\$82.98
COLUMBIA	\$0.00	\$825.91	\$210.10
WAHKIAKUM	\$0.00	\$735.71	\$161.30
PEND OREILLE	\$0.00	\$479.15	\$34.57
FRANKLIN	\$0.00	\$0.00	\$0.00
GARFIELD	\$0.00	\$0.00	\$0.00

Source: WSLCB And World Population Review

Since its legalization, cannabis excise taxes have increased 623% from \$64.9 million in 2015 to \$468.5 million in 2020. Figure 2.1 shows the growth trajectory of total state tax revenues (primary vertical axis) and cannabis excise tax revenues (secondary vertical axis). Obviously, this figure does not capture the total effects on the state’s fiscal condition, as it does not capture drug enforcement expenditures.

Figure 2.1: *Total Taxes and Cannabis Tax Collection from 2013-2020 (\$1,000)*



Source: Department of Revenue Tax Statistics 2020 – Table 2

Figure 2.1 shows that cannabis excise taxes are increasing far more quickly than overall state tax collections. While still a small portion of the budget, the cannabis sector is growing in its importance to the state’s fiscal stability. From 2015 through 2020 the state’s total tax collections grew 43%, while cannabis excise tax revenues grew 623% over the same time period. Total alcohol excise taxes, by contrast, grew more slowly than the state’s budgets at only 26% from 2015 to 2020. Table 2.3 shows 2015 and 2020 nominal contributions to the state’s General and Selective Sales Taxes. The final column shows the percentage growth from 2015 to 2020.²

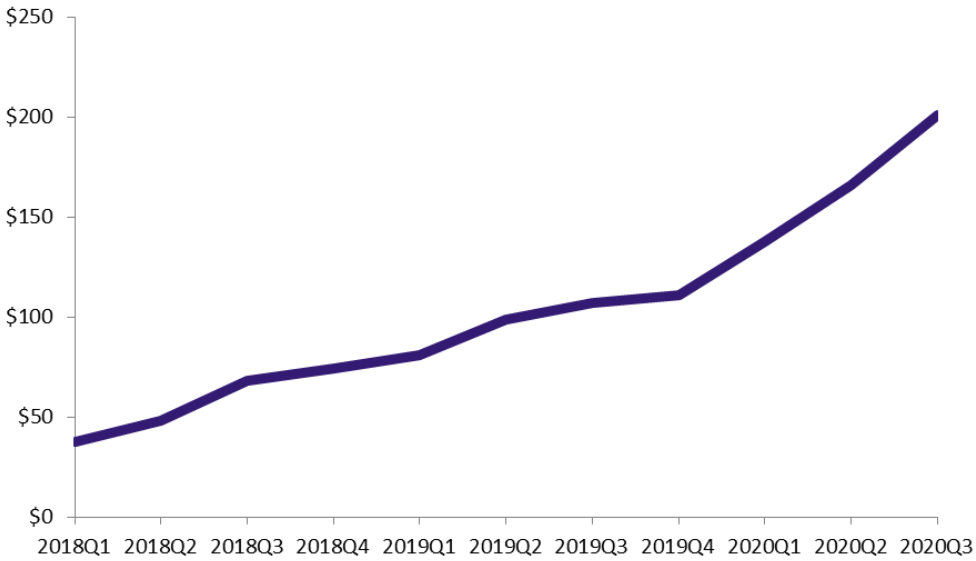
² Taxes included in state totals but not displayed in Table 1.1 include: Gross Receipts Taxes, Property and In-Lieu Excise Taxes, and Other State Taxes.

Table 2.3: Total State Tax Collections & Itemized General & Selective Sales Taxes

	2015	2020	Percent Change
ALL STATE TAXES	\$18,723,684	\$26,834,601	43%
General & Selective Sales Taxes	11,027,341	15,039,002	37%
Retail Sales	8,255,132	11,357,457	38%
Use	592,857	728,483	23%
Motor Fuels	1,230,139	1,565,036	27%
Liquor Sales	132,646	184,259	39%
Liquor Liter	142,137	174,505	23%
Beer Excise	30,717	30,058	-2%
Wine Excise	24,037	26,461	10%
Marijuana Excise	64,881	468,810	622.6%
Cigarette	398,823	324,855	-19%
Tobacco Products	46,517	53,061	14%
Vapor Products	0	5,635	
Solid Waste Collection	40,047	54,253	35%
Wood Stove Fee	205	220	7%
Brokered Natural Gas	28,076	23,116	-18%
Rental Car	29,218	31,663	8%
Shared Tribal Cigarette Taxes	8,078	6,495	-20%
Replacement Vehicle Tire Fee	3,713	4,232	14%
Studded Tire Fee	0	307	
Derelict Vessel Fee	118	97	-18%

The main finding from this data is that the more mature industries of alcohol and tobacco have plateaued where demand is growing more in line with population and demographic trends. The cannabis sector represents an “infant industry” that is still in a growth phase, which will continue until a relative equilibrium point is achieved. This is seen by its continued rapid rise in sales over and above population growth rates. A sign that the cannabis market has achieved a stable growth path will be when retail sales begin to trend with population and demographic growth patterns. It is unclear what the time frame on this leveling off is likely to be. California, Colorado, and Oregon (see Figures 2.2 through 2.4) are all reporting similar growth trajectories, none of which appear to be slowing down. Colorado and Washington, while still new to the market, have the longest track record with legal recreational markets and have nowhere within the United States to turn for gauging their growth patterns.

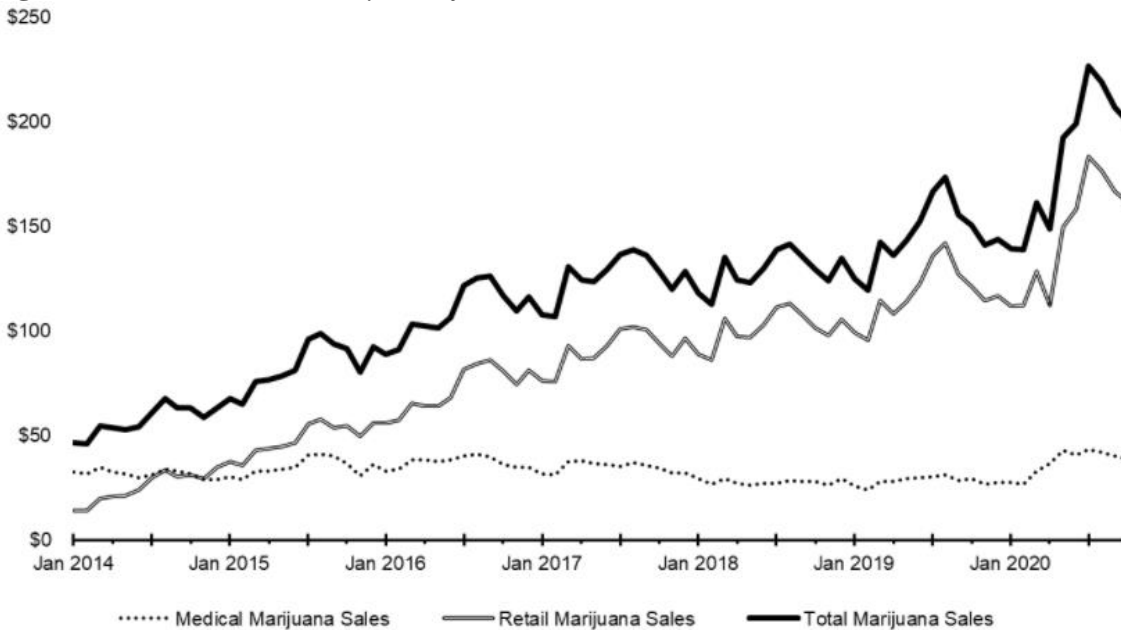
Figure 2.2: *California Quarterly Cannabis Tax Revenue (million)*



Source: California Legislative Analyst’s Office <https://lao.ca.gov/LAOEconTax/Article/Detail/583>

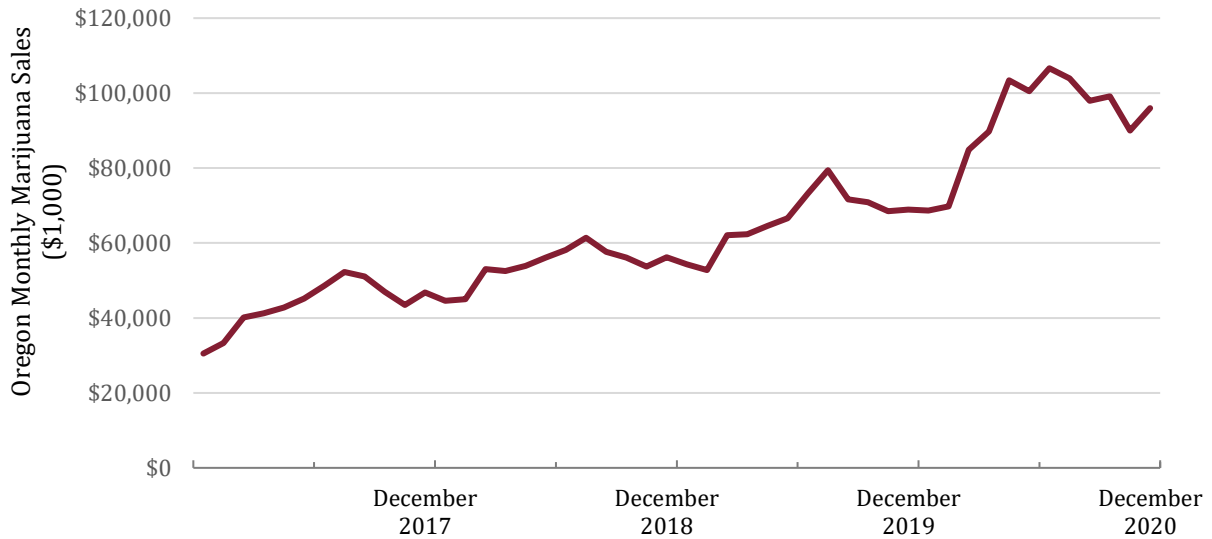
Colorado Reports data for medical and retail markets and shows that medical cannabis sales are flat while recreational sales continue to climb rapidly. Some of this growth may be due to COVID-19 as there has been significant growth in recreational sales across all four states in 2020. Figure 2.3 Shows the growth data for Colorado.

Figure 2.3: *Colorado Monthly Marijuana Sales (million)*



Source: Colorado State Sales Tax Returns and Retail Marijuana Sales Tax Returns

Figure 2.4: Oregon Monthly Marijuana Sales (\$1,000)



Source: Oregon Liquor Control Commission – Marijuana Market Data

Building the Cannabis Sector

To model the flow of cannabis sector dollars through the Washington economy, it is important that we build revenue and expenditure patterns for the sector that can be mapped to other industries within the state. This was done with data collected from growers, The Cannabis Alliance, and other members of the cannabis sector. Production and processing data was not comprehensive. However, since total retail sales and total expenses are equal in the input-output framework, and because total tax collections were available, expenditure patterns for the sector were able to be estimated. Once expenditure patterns were broadly defined, spending was mapped to specific industry accounts in the IMPLAN modeling system as per Willis and Holland (1995). Table 2.4 shows the distribution of cannabis sector spending by industry super sector and value-added components. Value added accounts for nearly 75% of the sector’s total spending. Because most of this spending is towards household income the sector will have much higher induced contributions, i.e., household-to-business contributions, than it will have indirect contributions through its supply chains and business-to-business purchases.

Table 2.4: Estimated Cannabis Sector Industrial Expenditure Patterns in 2020

North American Industrial Classification Sectors	Percent of Cannabis Spending
Sector 11: Agriculture, Forestry, Fishing and Hunting	1.4%
Sector 21: Mining, Quarrying, and Oil and Gas Extraction	0.0%
Sector 22: Utilities	0.5%
Sector 23: Construction	0.1%
Sector 31-33: Manufacturing	0.8%
Sector 42: Wholesale Trade	1.5%
Sector 44-45: Retail Trade	0.2%
Sector 48-49: Transportation and Warehousing	2.3%
Sector 51: Information	3.4%
Sector 52: Finance and Insurance	1.0%
Sector 53: Real Estate and Rental and Leasing	7.9%
Sector 54: Professional, Scientific, and Technical Services	1.7%
Sector 55: Management of Companies and Enterprises	1.8%
Sector 56: Administrative and Support and Waste Management and Remediation Services	1.1%
Sector 61: Educational Services	0.0%
Sector 62: Health Care and Social Assistance	0.0%
Sector 71: Arts, Entertainment, and Recreation	0.1%
Sector 72: Accommodation and Food Services	0.2%
Sector 81: Other Services (except Public Administration)	0.3%
Sector 92: Public Administration	1.0%
Value Added	74.7%
Labor	48.7%
Property Income	2.7%
Taxes	23.4%

As shown in Willis and Holland (1995) this expenditure pattern goes through the steps of being import ridden; converted to producer rather than consumer prices; margined for transportation, wholesale, and retail trade sectors; etc. Once completed this vector is added to the IMPLAN data set described in Chapter 3. One issue Willis and Holland (1995) neglected is how to handle the new row that must be added to the data set to account for the sector’s revenues. All cannabis sales were assumed to be derived from the household sector or exported via domestic and international visitors that purchased cannabis within the state.

Summary of the Economic Condition of Washington’s Cannabis Sector

The cannabis sector is still an infant industry and its growth will continue until the market demand is satiated and mirrors the growth rates of the population. The growth rate in cannabis retail sales over the past year was from \$1.05 billion to \$1.27 billion, roughly 21% growth. This can be juxtaposed with the Washington state population growth rate of 1.45%, from 7.54 million to 7.65 million. Total tax revenues from cannabis sales grew by 21% (the same as total retail sales) while total tax revenues grew only 4%.

The sector in 2020 spent 48.7% of their budgets, roughly \$1 billion became household income. That is money in the pockets of the citizens that will be spent in the local economy for kids' school clothes, for rent, for food, and for entertainment. That income will be spent within the economy and generate additional activity. Approximately \$525 million will be spent by the producers, processors, and retailers on goods and services for operating the firms within the sector. That money paid to vendors, most of whom are local, will also circulate in the economy. In a very short time period, the cannabis sector has become an integral part of Washington's economy and has become the single largest agricultural product by value, followed very closely by the apple industry.

The tax revenues directly collected do not reflect the total taxes derived from cannabis sector activity. Sales tax revenues are captured on the sectors spending as well. Outlining the sectors expenditures allows us to determine how other industries have evolved to meet the needs of the cannabis sector and those industries pay sales and production taxes as well. These indirect and induced effects will be outlined and captured in the following chapter, but it should be understood at this point that the operations of the sector extend beyond the boundaries of production, processing, and retail activities.

3. Economics Model and Contributions

This chapter of the report describes the input-output model used for assessing the extent of the cannabis sector in Washington's economy. It incorporates the data and cannabis sector's financial descriptions from the previous chapter into the IMPLAN model and calculates the contributions the sector has in generating Gross State Product (GSP), household income, and employment. In these ways the cannabis sector is no different than other agricultural industries. However, the political boundaries around cannabis do not exist for other commodities and it results in the sector being distinct in one critical way.

Basic industries provide income to a region by producing and *exporting* their output, which is technically what occurs when a visitor to the state buys and consumes cannabis. Their expenditures on Washington cannabis represent new dollars, otherwise known as financial injections, into the state's economy. This is the standard approach for most agricultural contribution analysis. However, the cannabis sector in Washington predominantly represents a resident serving industry or "non-basic" industry. The impacts of these industries are largely felt through the *retention and circulation* of dollars within the economy. This function of circulating money in the economy is commonly known as "deepening" the economy, since it prevents money from coming in and immediately exiting the market. As the money circulates within the economy it creates jobs and incomes throughout the state's supply chains. In the case of cannabis, local provision prevents consumers from seeking product outside of the state, or through illicit markets, and thus local production substitutes for imported production.

Cannabis sector retail sales, in this model, will represent the *direct* contributions of the sector to Washington. However, the sector generates *indirect* contributions as well through their expenditures on their suppliers in other industries. Once cannabis is sold, some portion of that revenue generated by the sector will be spent on electricity, for example. A portion of the revenues received by the utility industry will then be spent on a new turbine from a manufacturing industry, etc. And so, the dollar that was retained in the economy as a result of the cannabis industry circulates through many businesses throughout the state, all the while generating sales and incomes. Indirect effects represent additional economic activity in Washington's economy driven by the business-to-business transactions stemming from dollars retained by the cannabis sector, dollars that would have otherwise leaked out of the economy and failed to generate employment through the supply-chains in the state.

In addition to the direct and indirect impacts of the cannabis sector, are the *induced* economic contributions, captured in the form of local goods and services purchased by households. As cannabis sector employees spend their salaries and wages in the state economy on retail goods, home improvement, entertainment, etc., those household-to-business transactions ripple through the economy. These induced expenditures represent the households' supply-chains and translate into jobs and income for retailers, bank tellers, grocery store clerks, restaurant employees, gas station attendants, and so on. Typically, these expenditures occur locally, generating urban and rural economic development. These additional linkages, beyond the cannabis sector and indirectly related sectors of the economy, help to form a complex intertwining web of industries and institutions within Washington. So, the relevant question to ask is not only what cannabis retains in the Washington economy directly, but also, how that retention contributes to

Washington’s economy through this complex networking of industries.

Model Description

Input-Output models are designed to capture the entirety of this complex networking of industries and institutions. In this case it serves to show what portion of that economic web is dependent on the cannabis sector. To that end, this section of the report covers the technical aspects of the model and the nuances made to various components of it in order to ensure its accuracy. We begin by explaining the basics of any input-output model as well as the data used for this particular analysis. Next, we discuss how the model needed to be modified to ensure there was no double counting when evaluating the contributions of the production vs. processing components of the sector. Lastly, we outline the direct effects, sometimes referred to as the shock, the cannabis sector provides to the economy. The subsequent multiplier effects and total contributions are reported at the end of the chapter.

Basics of Input-Output Analysis

The system of accounts known as Input-Output (I-O) tables represent an economist’s version of double-entry bookkeeping for industries. Figure 3.1 below shows a simplified version of an I-O matrix with just a hand full of industries. Each cell, in this table of accounts, is populated by dollar transactions.

Figure 3.1: Aggregated form Input-Output Matrix

		Producers as Consumers						Final Demand			
		Agric.	Min.	Const.	Manuf.	Services	Other	Households	Investment	Government	Net exports
Producers	Agric.										
	Min.										
	Const.										
	Manuf.										
	Services										
	Other										
Value Added	Labor							Gross Domestic Product			
	Returns to Capital										
	Taxes										

Reading down a column of this table shows what inputs an industry is buying in order to produce their output. This is what was done in Chapter 2. The Agriculture column, for example, may buy seeds from themselves, fertilizer and farm equipment from the manufacturing sector, and legal and accounting services from the service sector. Payments to employees are captured in the “Labor” row. Payments must be made to owners of capital, and the industry pays taxes to the government. This is where the expenditure data enabled us to isolate operations. Reading across a row tells us where an industry’s income originates. Because we created a single vector for the

cannabis sector there is only a single primary buyer, that being households, and a small portion being sold to visitors, which would be captured under exports.³ A portion of a household's expenditures will go to buying cannabis products.

Summing all the labor, capital, and tax payments for all industries gives the sum of all value-added and will equal the Gross Regional Product (GRP) of the region.⁴ Similarly summing all of the expenditures of households, government, investment, and net exports yields the GRP of the region. These two methods of calculating GRP are known as the Income and Expenditure approaches, respectively, and they represent a check for ensuring all accounts balance. It is through the I-O system that we are able to trace the dollars through the economy, quite literally following the money. It is through this tracing of dollars that we are able to calculate multiplier effects associated with the cannabis sector.

Model and Sector Modifications

One of the primary concerns when doing economic contribution studies is the potential for double counting. If we were to claim all the sales within the cannabis sector, rather than just the sales of the final goods, we would be double counting certain values e.g., the value of the cannabis sales from the grower/processor to the retailer would be captured twice. This double and, sometimes, triple counting of the sector supply chain has to be prevented for an accurate analysis. However, we cannot claim only the direct effects of the sector either. Doing so would miss the non-cannabis sector components of the supply chain, i.e., leaving out electricity, transportation, lab testing expenses, etc. To capture all contributions through the supply chain and prevent the double counting issue, we can sever the expenditure link between the industries within the sector (Steinback 2004). We accomplished this through the aggregation of the sector and elimination of intra-sectoral purchases, only capturing the sales of goods to the final consumer.

The other important component in avoiding double counting is to report value-added, also known as gross state product (GSP), rather than sales. Though the model is built on producer prices and sales transactions, summing up all sales receipts will overstate the actual productivity of a region. If a grower produces cannabis, which is sold to a processor, the processor sells edibles to a retailer, and the retailer sells edibles to a consumer. The value of the cannabis is being incorporated and captured in each round of transactions. To prevent this type of double, triple, and quadruple counting we report contributions on a value-added basis. The following text box describes why sales is not an appropriate metric for reporting contributions.

³ Another approach would be to separate the growers as an agricultural industry, the processors as a manufacturing industry, and the retailers as a specialty retail goods industry. While such a model would provide increased specificity by function, the contributions of the entire sector would be the same, and the level of information necessary for model construction would be extensive.

⁴ In our case the region is Washington State.

Sales vs. value-added

A way to explain why sales overstates contributions is to imagine individuals spending money in a regional economy. Suppose an individual spends \$40,000 on a new truck. Another individual spends the same amount on an appendectomy at the regional hospital. From a sales perspective, the contributions are the same, \$40,000. However, from a value-added perspective the purchase of the truck provides less to the regional economy. Perhaps \$30,000 of the truck purchase had to immediately go to the manufacturer back in Detroit or Japan. Conversely, the appendectomy at the hospital probably saw most of the spending stay local as income to the doctors, nurses and hospital staff. Perhaps only \$10,000 leaves the region for importing of capital assets like the hospital bed, scalpels, etc. From a value-added perspective, the hospital is more valuable than the auto dealership even though they are equivalent from a sales perspective.

Because the cannabis sector is non-basic in nature, we must build our model in an import-substitution framework rather than the more traditional export-base framework. The assumption underlying this model is that contributions are based on retaining monies that otherwise would have exited the economy for the importation of similar goods and services. Were legal cannabis not available in Washington, and because legal substitutes would not otherwise be available, consumers would have to import such goods by travelling to a state where cannabis were legal. For a full explanation of the distinctions of such models, readers should refer to Cooke and Watson (2011) and Arrow (1954).

Contributions

The input-output model used in this analysis came from the IMPLAN software and model data for Washington. The contribution of the sector to the Washington economy is measured by different types of impact: direct effects, the immediate effects related to the production and processing of cannabis; indirect effects, changes arising from inter-industry transactions as supplying industries respond to the demand from the directly affected industry; and induced effects, the effects due to the local spending on goods and services by employees in the directly and indirectly affected industry sectors. Table 3.1 shows these effects measured in terms of Sales transactions, value added or gross regional product, household income, and full-time equivalent employment. Table 3.2 reports those total contributions for the top 15 industries most affected by the cannabis sector. Were we to report these values for all 1,100 industries we could see how the “Total” rows in Table 3.1 and 3.2 would match.

Table 3.1: *Washington State Cannabis Contributions by Measure and Effect*

Effect	Sales	Value Added (GSP)	Income	Jobs
Direct	\$1,266,224,177	\$602,375,289	\$403,151,507	5,816
Indirect	\$454,930,142	\$285,917,519	\$155,117,656	2,385
Induced	\$1,478,522,307	\$960,404,415	\$635,722,690	10,496
Total	\$3,199,676,626	\$1,848,697,222	\$1,193,991,853	18,697

Source: IMPLAN and Author's Calculations

Table 3.2: Key Industries in Washington Affected by the Cannabis Sector (Value Added Dollars)

Industries	GSP	Income	Employment
Owner-occupied dwellings	\$102,332,470	\$29,206,835	506
* Employment and payroll of local govt, education	\$65,914,915	\$56,183,148	590
* Employment and payroll of local govt, non-education	\$56,915,793	\$49,934,501	572
Internet publishing and broadcasting and web search portals	\$45,002,307	\$36,267,813	259
* Employment and payroll of state govt, non-education	\$35,354,637	\$30,104,939	389
Hospitals	\$34,712,156	\$31,542,104	702
* Employment and payroll of state govt, education	\$21,848,161	\$18,662,021	193
Limited-service restaurants	\$19,654,034	\$12,787,755	374
Warehousing and storage	\$17,842,648	\$9,888,307	179
Management of companies and enterprises	\$16,302,815	\$45,698,071	606
Legal services	\$15,141,832	\$9,046,276	123
Truck transportation	\$10,395,935	\$8,024,268	390
Data processing, hosting, and related services	\$10,273,685	\$6,898,744	62
Accounting, tax preparation, bookkeeping, and payroll services	\$9,555,731	\$7,979,346	87
Scientific research and development services	\$8,273,527	\$4,676,326	74

Source: IMPLAN and Author's Calculations

Fiscal Analysis

Of course, all of these interactions of sales and incomes, result in increased tax collections to the state. Just as the contributions of the cannabis sector extend beyond total sales, so total tax contributions extend beyond the sales and excise taxes paid. Table 3.3 shows total tax collections resulting from cannabis sector operations in Washington. Total state tax collections stemming from the cannabis sector are nearly double, 88% larger, than the direct excise taxes paid on retail sales.

Table 3.3: Washington State Tax Revenues from Cannabis Sector Operations by Tax Source

Revenue Source	Direct	Indirect	Induced	Total
Property	\$195,029,566	\$13,253,770	\$40,104,220	\$248,387,556
2020 Sales & Excise Taxes	\$468,502,946	\$31,838,408	\$96,338,949	\$596,680,303
Corporate and Other	\$23,252,704	\$5,787,700	\$9,275,281	\$38,315,684
Total	\$686,785,216	\$50,879,878	\$145,718,450	\$883,383,543

4. Home-Grow Operations and Fiscal Effects

This chapter of the report focuses on the aspects of home-grown cannabis. Unfortunately, research in this area is varied and the average portion of markets that home-growers occupy is a matter of debate. Colorado, California, and Canada have all legalized recreational home-grown operations, albeit with regulations on the volume and flowering of plants. This issue is greatly compounded in Washington where medical home-grow operations are already legal, see RCW 69.51A. However, recreational home-grow operations have not yet been legalized. It is unclear the extent to which recreational home-grow operations are already occurring in Washington but the existence of medical home production has allowed us to distinguish home-grown production costs relative to commercial growing costs.

Sales Taxes

There are several issues surrounding how the recreational home-grown segment of the market will influence overall state tax collections. Many would argue that legalization would result in home-growers having to expend their incomes on grow lights, growing medium, etc., and all these expenditures would result in sales-tax revenues to the state. The flaw in this line of reasoning comes from what economists refer to as “alternative use of funds.” Had the home-grower not been growing cannabis they would have spent their income in other pursuits and generated tax revenue from those alternative spending patterns. Home production, understood in this light, will not increase overall tax collections since we are “robbing Peter to pay Paul” as it were.

However, it is true that sales and use taxes are not broken out by the purpose of the expenditure. Home gardeners produce agricultural outputs as a hobby, but the tax revenue generated from their expenditures are not attributed to agricultural production. Stay-at-home parents spend money in the care for their children, which results in sales tax revenues that are not attributed to the childcare industry. Similarly, home-grown cannabis production generates a portion of the sales and use taxes collected by the state and those totals can be estimated. According to the National Survey on Drug Use and Health, data cited by reports for the Colorado Department of Revenue, the portion of Cannabis users engaged in home production represents between 1% and 4% of the entire cannabis market.

Total home production costs range between \$110 and \$140 per square foot of growing space per year. Based on the 1% to 4% market range, and estimates of Washington cannabis demand, total home-growing expenses range between \$4.5 million and \$22.8 million dollars. At a 6.5% retail sales tax rate in Washington, between \$300 thousand and \$1.5 million in state sales tax revenues are derived from home growers. Moving this segment of the market from the illegal to the legal market will not influence these numbers though it may affect enforcement expenses. According to the WSLCB’s annual report, 14,720 lbs of cannabis were incinerated, of which roughly 1,600 lbs were related to unlicensed growers. Unlicensed grow operations do not specifically mean recreational home-growers. Large illicit growing operations still exist in the state. According to a December 2020 article by the Peninsula Daily News, six Port-Angeles addresses were found to have over 3,000 plants.⁵ According to violation data compiled by and accessed from WSLCB,

⁵ <https://www.peninsuladailynews.com/crime/multi-million-dollar-illegal-pot-grow-operation-seized/>

there were 36 total cultivation violations for grow operations that would have been legal under the proposed recreational home-grow legislation (HB1019).

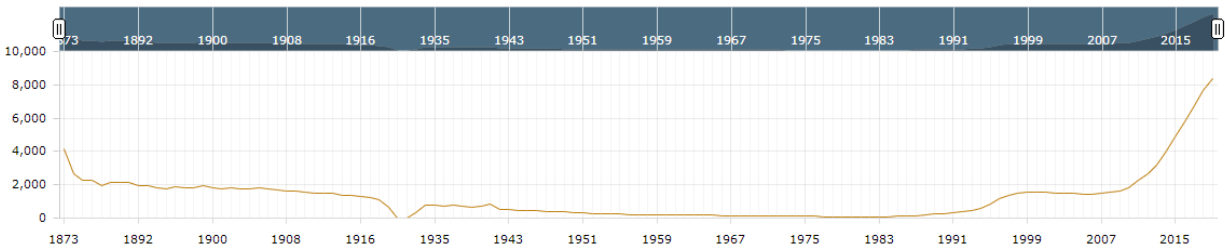
Sectoral Growth rates

The average annual 28% growth rate, being sustained by the Washington cannabis sector, is not likely to stop in the medium-term. The first question to ask is, how the legalization of home production will influence those growth rates moving forward. Next, we must address how home production will affect the commercial retail market, i.e., will home production substitute for commercial production and retail sales? Each of these questions will require assumptions as to the sensitivity of those relationships. The following sections will outline the expected range of relationships and provide an upper and lower-bound for the expected influence on cannabis excise tax receipts.

Home Production as Varietal Research and Development: What we learn from Microbreweries

From 1950 to 1983 the number of breweries in the U.S. fell from 300 to 100. Consolidation was leading to market power and limited variety. In the early 90's a new movement began with microbreweries and brewpubs beginning to breathe new life into a stagnant industry. The market was beginning to show signs of renewed life. As the range of home-brewers to craft-brewers began making new distinct beers, the demand for variety finally found suppliers. By 2019 the U.S. had 8,386 breweries. The market prior to the 90's had vastly underestimated the demand for variety, and the market power of the large breweries prevented competition in the market.

Figure 4.1: Historically Licensed Breweries



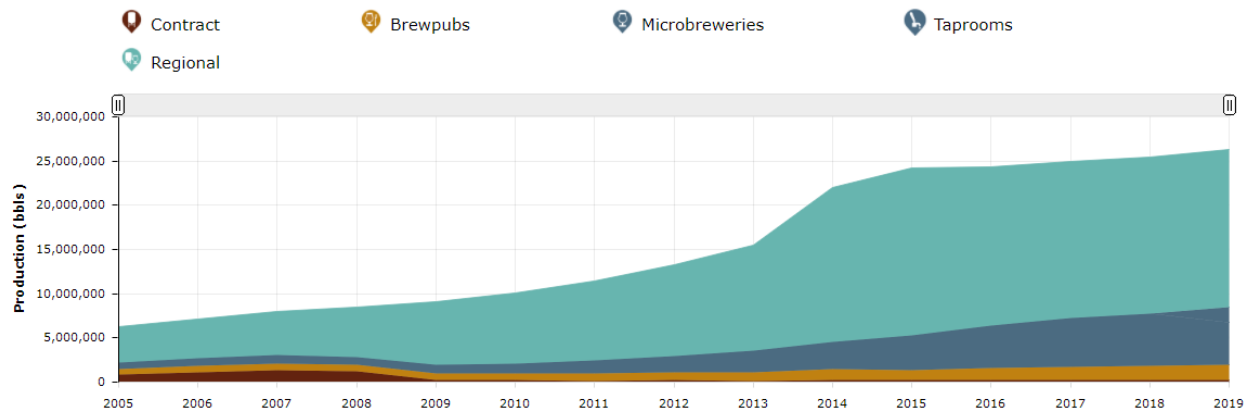
Source: Brewers Association

Where the beer sector miscalculated consumer demand, Washington is regulating it in the cannabis sector. Most homebrewers do not have the capital infrastructure to start their own brewery, and many home-grow cannabis cultivars would face similar, if not more stringent, fixed operating expenses. The economic incentives of maximizing profits and returns to investors will influence cannabis growers in the same ways it influences every industry. This may lead to economies of scale, reduced costs, and ultimately to market power, which will inhibit cultivation of new varieties. The winery sector, unlike the brewery sector, has always valued collaboration and the shared fate of regional AVA designations. They recognize the network and reputation externalities associated with quality production regions. What the beer industry discovered late was that, while micro and craft-breweries posed a minor threat to corporate brewery profits, they were a compliment to the industry as a whole by attracting new consumers into the market.

These smaller scaled brewers expanded their own consumption as well. As they began to try and figure out what competitors were doing differently, they consumed more alcohol than the average consumer. This is part of what has reignited the growth of the beer industry.

Corporate breweries began to see the complementarity of craft brewers as well, buying up small breweries but letting them maintain their local branding. This allowed craft breweries to be the research and development wing of the larger companies. Some microbreweries saw such success that they entered the craft-brewery market segment, Sam Adams®, for example. But regional flavor profiles now dominate craft production. Figure 4.2 Shows craft-brewery production by category.

Figure 4.2: U.S. Craft Beer Production by Category (Barrels)



Source: Brewers Association

If legalization of home cannabis production is a compliment to the sector then, as it was in the beer sector, legalization may generate increased growth in the sector and prevent oligopolies from forming over time. Given that the cannabis sector is still young, and the growth rates exceed most other commodities in the state, home production will not generate drastic increases in growth rates moving forward, though it may keep them from slowing as quickly once the sector begins to mature.

The other aspect of home production that may be a complement to commercial production, is that individuals are learning the basics of plant anatomy and plant health in a low-risk environment, which will make them more valuable and productive employees. Economists refer to this type of human capital development as knowledge spillover effects, which contributes to growth and development in nearly all production practices, from aircraft manufacturing to software development.

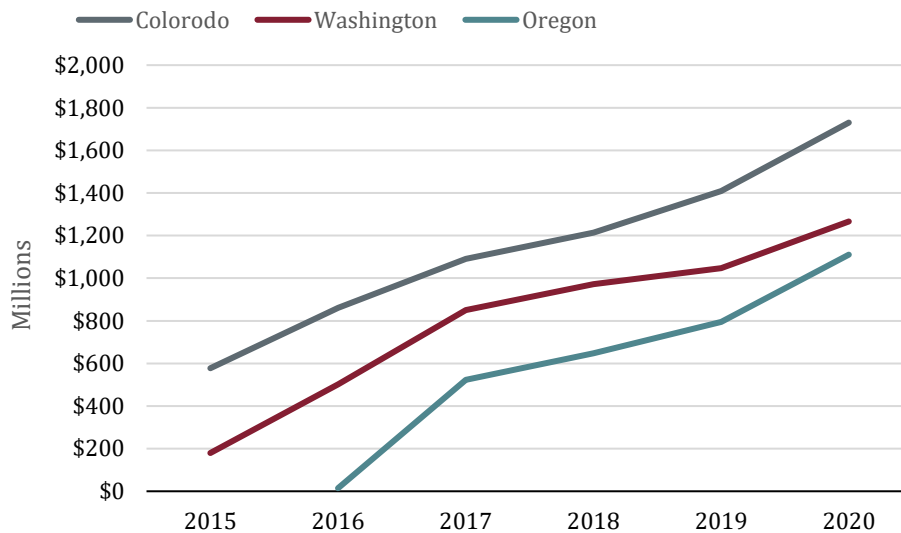
Substitutability of Home and Commercial Production

While there is anecdotal evidence that home production is already occurring in Washington for recreational use, the extent to which this occurs is unknown. Assuming that recreational home-growers are already fully engaged in growing operations, legalization would not influence the retail market at all, or rather, current retail sales and cannabis excise taxes already reflect the existence of home production. If no home production is currently occurring, and home-production represents a perfect substitute for retail sales, then legalization could have

consequences for the retail market and subsequently for marijuana excise tax revenues.

Given the growth of the sector in other states, where home production is legal, one would be hard pressed to argue that retail sales would be harmed by legalization of home production. In fact, those states with legal home production have higher growth rates than Washington overall. Figure 4.3 shows the recreational retail sales for Washington, Colorado, and Oregon, which legalized recreation markets in October of 2016. Of the three states, Washington has had the slowest overall growth rates since 2017. Though a full hedonic model would be required to determine the specific causes influencing recreational retail sales in each state, the legalization of home production does not appear to be a significant detriment to commercial retail sales. If home production is a compliment rather than a substitute, for retail sales, then legalization may in fact result in increased stability of the retail market. Colorado, for example, has had 10% higher growth rates than Washington for the years since 2017.

Figure 4.3: Recreational Retail Cannabis Sales by State and Year



Source: WSLCB annual reports, OLCC Marijuana Market Data, and Colorado Department of Revenue Marijuana Sales Reports

Estimated Revenues with and without Legalization

Based on the examples and data above we model the sensitivity of retail sales and excise tax revenues under a variety of conditions. We begin by creating a lower bound, assuming that 1) there is currently no recreational home production occurring, 2) that home-grown cannabis is a perfect substitute for retail sales, and 3) that legalization of home production will not improve sector growth rates. If home production were legalized under these assumptions, retail sales would begin to fall as home-growers begin production, leading to reductions in retail sales and excise taxes.

We relax these assumptions until we reach an upper-bound where 1) all home production is already underway, 2) home-grown cannabis is a compliment to retail sales,⁶ and 3) that legalizing home production would increase the growth rate of the sector by as much as 10%. We choose 10% for the upper bound on growth rate projections because it reflects the difference between Colorado and Washington’s growth since 2017, when both states’ markets were considered fully established. All of these results will be measured against the baseline model described in Chapter 3.

It is important to understand that this is not a traditional contribution analysis, as we are looking forward to the sales and taxes that are expected to be generated in 2021 and comparing those values under a variety of assumptions. These counterfactual analyses are intended to give insights as to the range of possible outcomes, not to provide point estimates. That said, we are not truly talking about reductions in tax revenues. The sector is projected to grow again in 2021 regardless of the passage of HB1019. The debate is over the volume of growth, not whether or not there will be a “decline.” Total 2020 tax revenues stemming from retail sales were \$883.4 million. Under even our most conservative assumptions, 2021 tax revenues from the sector are expected to be over \$980.0 million.

Table 4.1 shows the Baseline, upper and lower-bound contributions under the assumptions discussed above. Table 4.2 shows the expected 2021 tax contributions to state revenues under the various set of assumptions. Both sets of assumptions are aggressive and the true sales and revenues will likely fall nearer to the baseline than either of the extreme examples, however, the risks from legalization seem low relative to the potential gains. These values are not fully realized until years into the future.

⁶ We cannot assume home production is a perfect complement because that would suggest no retail sales would occur in the absence of home production.

Table 4.1: Range of 2021 Economic Contributions from Washington's Cannabis Sector

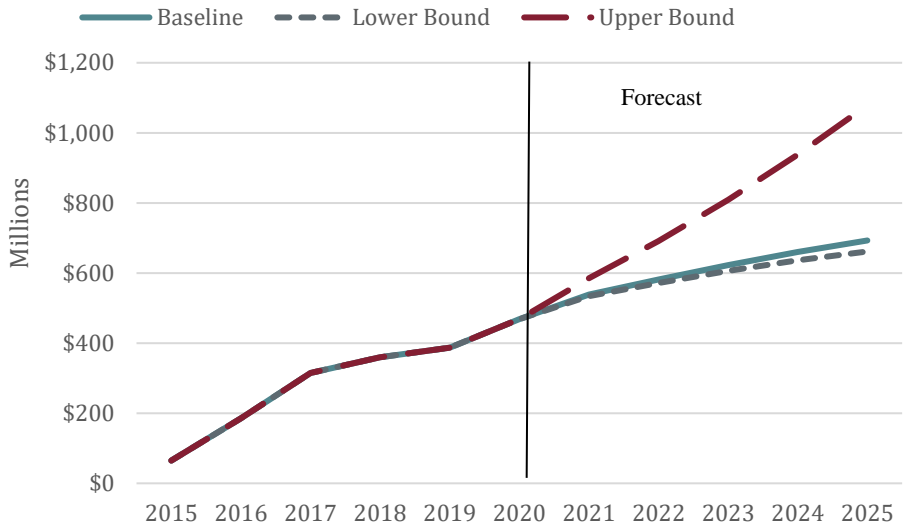
	Lower Bound	Baseline	Upper Bound
Sales			
Direct	\$1,405,508,837	\$1,456,157,804	\$1,582,780,221
Indirect	\$504,972,458	\$523,169,663	\$568,662,677
Induced	\$1,641,159,761	\$1,700,300,653	\$1,848,152,884
Total	\$3,551,641,055	\$3,679,628,120	\$3,999,595,783
Value Added			
Direct	\$668,636,570	\$692,731,582	\$752,969,111
Indirect	\$317,368,446	\$328,805,146	\$357,396,898
Induced	\$1,066,048,901	\$1,104,465,078	\$1,200,505,519
Total	\$2,052,053,917	\$2,126,001,806	\$2,310,871,528
Income			
Direct	\$447,498,173	\$463,624,233	\$503,939,383
Indirect	\$172,180,598	\$178,385,305	\$193,897,070
Induced	\$705,652,186	\$731,081,094	\$794,653,363
Total	\$1,325,330,957	\$1,373,090,631	\$1,492,489,817
Employment			
Direct	6,456	6,689	7,270
Indirect	2,648	2,743	2,982
Induced	11,650	12,070	13,119
Total	20,754	21,502	23,372

Table 4.2: Range of 2021 Fiscal Contributions from Washington's Cannabis Sector

Revenue Source	Lower Bound	Baseline	Upper Bound
Property	\$275,710,187	\$285,645,690	\$310,484,445
2021 Sales & Excise Taxes	\$662,315,136	\$686,182,348	\$745,850,378
Corporate and Other	\$42,530,410	\$44,063,037	\$47,894,606
Total	\$980,555,733	\$1,015,891,074	\$1,104,229,429

Figure 4.4 shows the trajectory of excise taxes under the baseline and both sets of assumptions out to 2025. These forecasts are far from certain but are designed to show the potential range of excise revenue that may be expected under each set of assumptions. Unexpected events such as COVID-19, have large influence over demand, and such events are not captured in the forecast. The upper-bound scenario results in market growth from knowledge spillovers and network externalities, resulting in home production having a compounding effect. In the lower bound scenario, home production reduces retail sales by a fixed portion of the market. The difference in the nature of these assumptions suggest minimal downside risk from legalization of home production and large potential economic benefits.

Figure 4.4: 2025 Projected Upper and Lower-Bound Estimates of Cannabis Excise Tax Revenues Under Legalization of Home Production



5. Conclusions

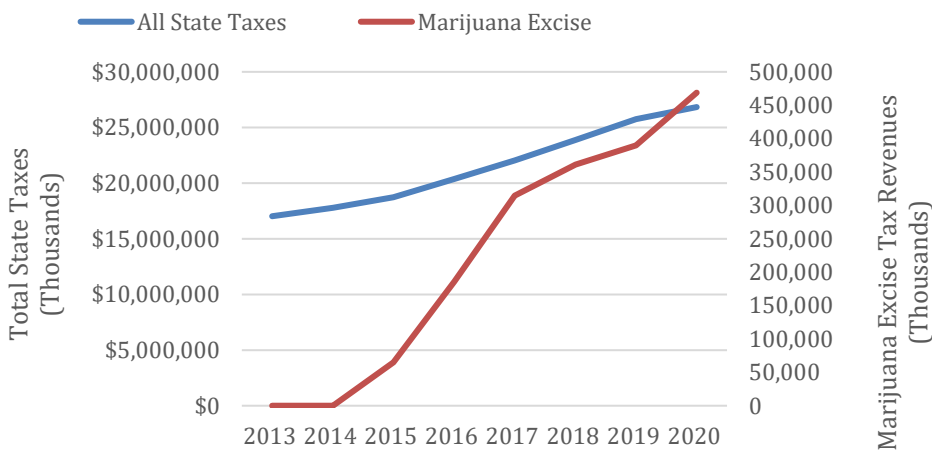
The economic contributions of the cannabis sector are strong and growing. In 2020, the sector produced over \$602.3 million in direct value-added economic contribution for the state, commonly referred to as gross state product or GSP. That represents dollars that would not have existed in the state without the sector’s activity. Those dollars retained in the state then circulate in the economy traveling backwards through the sector’s supply chain, supporting nearly another \$286 million in indirect, business-to-business, value-added transactions. Employee income is also spent in the state’s economy, generating activity in those industries that support household purchases such as food retailers, automotive maintenance, electricity, etc. Those household-to-business expenditures, and the associated ripple effects, generated approximately \$960 million in additional value-added activity. The entire sector in Washington is responsible for just under \$1.85 billion dollars in economic activity and supports over 18,697 full time equivalent jobs. This information, along with the total volume of transactions (Sales), and household incomes are reported in Table 5.1 below.

Table 5.1: 2020 Economic Contributions of the Cannabis Sector by Effect and Measure

Effect	Sales	Value Added	Income	Jobs
Direct	\$1,266,224,177	\$602,375,289	\$403,151,507	5,816
Indirect	\$454,930,142	\$285,917,519	\$155,117,656	2,385
Induced	\$1,478,522,307	\$960,404,415	\$635,722,690	10,496
Total	\$3,199,676,626	\$1,848,697,222	\$1,193,991,853	18,697

The Cannabis sector remains the fastest growing line item in Washington’s General & Selective Sales Taxes collections category. Figure 5.1 shows the growth of the cannabis sector relative to overall collections. Even as a single commodity it accounted for 1.7% (\$468.8 million) of all state tax collections in 2020 (\$26.8 billion).⁷

Figure 5.1: Total Washington State Tax revenues and Cannabis Excise Tax Revenues (\$1,000)

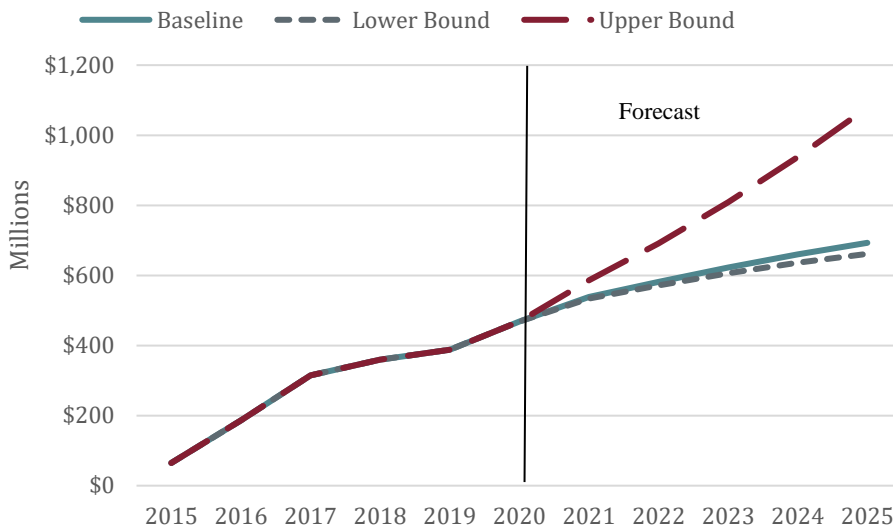


Source: Washington Department of Revenue Tax Statistics 2020 Table 2

⁷ See Appendix 1 for the Washington Department of Revenue tax collections table.

Figure 5.2 shows the baseline forecast, upper-bound, and lower-bound forecasts of excise tax revenues to the state that result from the legalization of home-grown recreational cannabis. While the risks associated with legalization result in slightly low growth as a fixed portion of the market, the potential benefits result in market expansion and production efficiencies which compound the potential gains from legalization. The expected 2021 contributions to Washington’s gross state product resulting from the Cannabis sector is \$2.13 billion, up from the \$1.8 billion in 2020. If legalization of recreational home production were in effect, the 2021 contributions could range from a low of just over \$2.05 billion to a high of \$2.3 billion. Total contributions under either case are expected to grow, as would excise taxes. Table 5.3 reports the potential range of 2021 contributions in terms of sales, gross state product, income, and employment.

Figure 5.2: *Upper and Lower-bound Estimates of Cannabis Excise Taxes receipts from Legalization of Recreational Home Production*



Source: WSLCB and Author’s Calculations

Table 5.2: *Upper and Lower-Bound Economic Contributions to Washington State’s Economy Resulting from Legalization of Recreational Home Production of Cannabis*

Contributions	Lower Bound	Baseline	Upper Bound
Sales	\$3,551,641,055	\$3,679,628,120	\$3,999,595,783
Gross State Product	\$2,052,053,917	\$2,126,001,806	\$2,310,871,528
Income	\$1,325,330,957	\$1,373,090,631	\$1,492,489,817
Employment	20,754	21,502	23,372

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Appendix: Washington State 2020 Tax Statistics

Table 2

NET WASHINGTON STATE TAX COLLECTIONS:					
LATEST FIVE YEARS					
Fiscal Years 2016 to 2020 (\$000)					
Source	2016	2017	2018	2019	2020
ALL STATE TAXES	\$20,369,676	\$22,043,170	\$23,885,196	\$25,743,777	\$26,834,601
<i>General & Selective Sales Taxes</i>	<i>12,144,425</i>	<i>13,223,491</i>	<i>13,973,973</i>	<i>14,938,729</i>	<i>15,039,002</i>
Retail Sales	8,979,623	9,514,975	10,291,675	11,170,430	11,357,457
Use	643,880	682,737	702,756	765,206	728,483
Motor Fuels	1,436,773	1,812,676	1,717,943	1,687,803	1,565,036
Liquor Sales	141,573	148,589	156,304	167,222	184,259
Liquor Liter	147,541	151,822	157,388	163,657	174,505
Beer Excise	31,345	29,390	31,037	31,048	30,058
Wine Excise	24,966	25,488	25,244	26,443	26,461
Marijuana Excise	185,762	314,460	361,169	389,975	468,810
Cigarette	391,487	377,899	357,445	345,688	324,855
Tobacco Products	51,641	52,437	57,110	61,011	53,061
Vapor Products	0	0	0	0	5,635
Solid Waste Collection	42,912	45,239	48,506	50,007	54,253
Wood Stove Fee	219	220	201	201	220
Brokered Natural Gas	21,370	21,347	19,258	30,123	23,116
Rental Car	31,765	32,611	34,047	36,110	31,663
Shared Tribal Cigarette Taxes	9,175	9,236	9,271	8,814	6,495
Replacement Vehicle Tire Fee	4,276	4,262	4,123	4,496	4,232
Studded Tire Fee	0	491	408	355	307
Derelict Vessel Fee	118	104	86	140	97
Alcohol	345,425	355,288	369,975	388,370	415,283
<i>Gross Receipts Taxes</i>	<i>4,601,517</i>	<i>4,869,444</i>	<i>5,221,646</i>	<i>5,517,003</i>	<i>5,762,022</i>
Business and Occupation	3,633,250	3,826,274	4,156,327	4,440,702	4,633,201
Public Utility	420,623	425,985	421,403	421,737	423,230
Litter	11,453	11,727	11,795	13,023	13,340
Insurance Premiums	534,663	603,963	630,657	640,128	691,393
Pari-mutuel	1,528	1,495	1,463	1,413	858
<i>Property & In-lieu Excise Taxes</i>	<i>2,162,114</i>	<i>2,202,931</i>	<i>2,867,043</i>	<i>3,472,027</i>	<i>3,679,297</i>
State Property Tax	2,061,206	2,099,211	2,758,217	3,359,107	3,568,185
Watercraft/Aircraft Excises	14,159	14,914	16,124	15,731	17,390
PUD Privilege	51,180	53,903	56,942	58,608	58,356
Timber Excise	2,669	1,786	1,610	2,299	-840
Leasehold Excise	32,900	33,118	34,150	36,281	36,205
<i>Other State Taxes</i>	<i>1,461,620</i>	<i>1,747,303</i>	<i>1,822,534</i>	<i>1,816,018</i>	<i>2,354,280</i>
Estate	134,680	168,710	203,411	298,017	646,251

Real Estate Excise	959,492	1,088,609	1,183,271	1,186,273	1,245,078
Fish	2,987	3,013	2,956	2,994	1,994
Hazardous Substance (incl. local)	113,225	123,638	141,897	151,513	257,827
Carbonated Beverage Syrup	8,650	7,122	14,915	7,579	6,697
Petroleum Products	25,563	32,665	10,245	32,828	11,042
Oil Spill	4,016	4,551	4,705	6,814	6,809
Intermediate Care Facilities	9,020	9,507	10,203	10,312	10,640
Enhanced 911 Telephone (state)	25,249	25,860	26,256	26,525	27,273
Telephone Lines (WTAP & TRS)	0	0	0	0	0
Penalties and Interest	178,738	283,628	224,675	93,163	140,667

Source: https://dor.wa.gov/sites/default/files/legacy/Docs/Reports/2020/Tax_Statistics_2020/Tax_Statistics_2020.pdf