

Cannabis Licensing and Municipal Revenues

José Martinez

California State University Dominguez Hills

Fynnwin Prager

California State University Dominguez Hills

Jennifer Brodmann

California State University Dominguez Hills

Catherine Munsen

California State University Dominguez Hills

Azure Fisher

University of California Riverside

Municipal license policy has shaped the early roll-out and business outcomes of Proposition 64. Several stakeholders identify license availability as a key constraint to future cannabis market growth in California. Recent studies explore local cannabis licensing policy; however, key questions remain around municipal revenues, business location, and the role of supporting cannabis business ownership. Our paper explores the impacts of cannabis licensing on business locations and municipal taxable revenues. We use publicly-available Department of Cannabis Control licensing data to examine business locations using GIS analysis, conduct a regression analysis of city-level licenses and Department of Tax and Fee Administration revenues across California, and forecast potential municipal taxable revenues in South Bay Los Angeles. We find that licensed cannabis businesses appear to develop in Los Angeles County and are located close to borders of cities not issuing licenses, in areas of favorable zoning, in densely populated locations, and areas with higher poverty and minority populations. Our regression analysis suggests that city population drives municipal taxable revenue, indicating that business follows demand.

Keywords: cannabis licensing, tax revenue, cannabis policy

INTRODUCTION

Recent research on legalized recreational cannabis industries across U.S. states has covered many issues, including environmental impacts, illicit markets, social equity outcomes, public safety concerns, and public health issues; however, there is limited research examining the role of municipal policy in cannabis market growth, barriers to entry, and the implications for social equity concerns. This topic has been

discussed in numerous news articles (e.g., De Sault, 2020; Gerber, 2022) and yet only a limited amount of academic research. Our study focuses on municipal cannabis policy, cannabis growth, policy alternatives, current economic impacts, and potential economic impacts from municipal policy alternatives. Local jurisdiction over cannabis licensing policy has led to significant variability in whether or not cannabis licenses are issued, how many are issued, and where businesses can locate.

The 2016 legalization of recreational cannabis in California created a new licensed market in cultivation, distribution, retail, and delivery that a market including cultivation and sales for licensed medicinal usage¹ and illegal activity had previously served. A cannabis business can hold both a medicinal and recreational cannabis license. Municipalities issue licenses based on the type of cannabis business. Before the legalization of recreational use and production, the regulated medical usage market featured around 2,800 dispensaries, with retail sales approximating \$845 million (McVey, 2016). By 2022—four years into implementation—licensed retail sales within California were consistently above \$5 billion, despite being generated by only around 1,000 legal dispensaries across the state.

The smaller number of dispensaries after 2016 results from municipalities issuing limited numbers of retail licenses, and there are various explanations as to municipal caution in this respect. One explanation is a form of NIMBYism, such that while voters support cannabis legalization across the state they are concerned about cannabis activity in their neighborhoods. Statewide, Proposition 64 (2016 California Marijuana Legalization Initiative) passed by a margin of 57% to 43% against, with voters in most California counties supporting it. Yet by 2023, 44% of cities and counties had issued licenses for at least one type of cannabis business (DCC, 2023). There appears to be particular concern about retail cannabis business, which is more visible, as only 39% of cities issue licenses for this activity (DCC, 2023).

Cities not issuing licenses appear to be missing out on municipal tax revenue. Several studies have explored the economic impacts of cannabis legalization, finding positive economic impacts (Kavousi et al., 2022), especially in rural areas (Kelly & Formosa, 2020) including in Massachusetts (Doonan et al., 2020), California (R. S. Goldstein & Sumner, 2021), Colorado (Felix, 2018), and New York State (Schultz, 2019) that translate to boosted tax revenue. Krane (2020) discusses how legalizing cannabis can provide municipalities with much-needed tax revenue and jobs, reminiscent of how ending alcohol prohibition helped mitigate the effects of the Great Depression. Moreover, cities not issuing licenses appear to be, in effect, handing over municipal tax revenues to neighboring cities. As there are no restrictions on transportation of cannabis within the state, cannabis businesses can locate close to city borders to serve customers outside their jurisdiction or provide delivery services.

Cannabis entrepreneurs are creating various licensed businesses in L.A. County, from manufacturing, testing, retail, and delivery. Delivery is the primary cannabis business license type in L.A. County (Table 1), reflecting the large and diverse economy of the region. In late 2021, cultivators comprised 22 percent (346) of County of Los Angeles licenses, while some 292 distinct businesses were cultivating cannabis. As shown in Table 2, most cultivator businesses were vertically integrated with other sectors; only 89 businesses appear to hold cultivator licenses only (30 percent). Sixty percent of cultivator businesses (180) are also distributors, half of cultivator businesses also manufacture cannabis products, and 24 percent of cultivator businesses also operate retail enterprises. In contrast to the cultivation business, the retail side is less likely to be integrated with other cannabis business sectors — 54 percent (156)—are retail only. Forty-two percent (122) of retail businesses also have distribution operations, while lower proportions also cultivate cannabis (24 percent; 70) and or manufacture it (18 percent; 52).

The 2016 legalization of recreational cannabis in California created a new licensed market in cultivation, distribution, retail, and delivery that a market including cultivation and sales for medicinal usage and illegal activity had previously served. While recreational use was legalized statewide, the licenses would be issued by municipalities, allowing for local input on policy design and implementation. Of California's 486 municipalities, by 2021, some 79 locations (including some unincorporated areas) were collecting tax revenue for cannabis retail activity. Most of these locations voted in favor of Proposition 64. The average voting in favor of cities now collecting retail revenue was 60.6%, which suggests that cities may feel a high threshold of voter support is necessary to implement cannabis license policies.

Municipal license policy has clearly shaped the early roll-out and business outcomes of Proposition 64, and many stakeholders have identified license availability—both whether licenses are issued, and the number issued—as the key constraints to future market growth. However, other factors will continue to play a key role in the ability of the cannabis industry to grow, attract new innovators, investors, and workers, and achieve more equitable market outcomes.

TABLE 1
LOS ANGELES COUNTY CANNABIS LICENSE TYPES AS OF OCTOBER 2021

License Type	Number of licenses	% of Total
Cultivator	346	22%
Distributor	430	27%
Manufacturer	394	25%
Microbusiness	112	7%
Retailer – Delivery	52	3%
Retailer – Storefront	245	15%
Testing Laboratory	15	1%
Total	1,594	

TABLE 2
LOS ANGELES COUNTY OVERLAPPING CANNABIS LICENSEES AS OF OCTOBER 2021

License Type (using DCC categories)	Number of businesses	% of Total
Cultivator	89	10.1%
Cultivator/Distributor	34	3.9%
Cultivator/Distributor/Manufacturer	79	9.0%
Cultivator/Distributor/Manufacturer/Microbusiness	3	0.3%
Cultivator/Distributor/Manufacturer/Retailer	49	5.6%
Cultivator/Distributor/Retailer	15	1.7%
Cultivator/Manufacturer	14	1.6%
Cultivator/Manufacturer/Microbusiness	1	0.1%
Cultivator/Microbusiness	2	0.2%
Cultivator/Retailer	6	0.7%
Distributor	62	7.0%
Distributor/Manufacturer	105	11.9%
Distributor/Manufacturer/Microbusiness	3	0.3%
Distributor/Manufacturer/Microbusiness/Retailer	1	0.1%
Distributor/Manufacturer/Retailer	27	3.1%
Distributor/Microbusiness/Retailer	1	0.1%
Distributor/Retailer	29	3.3%
Manufacturer	92	10.4%
Manufacturer/Microbusiness	2	0.2%
Manufacturer/Retailer	2	0.2%
Microbusiness	94	10.7%
Microbusiness/Retailer	1	0.1%
Retailer	156	17.7%
Testing Laboratory	15	1.7%
Total	882	

TABLE 3
TOTAL TAXABLE SALES BY COUNTY (FOR COUNTRIES >\$1B TOTAL SALES), 2018-22

Year	Los Angeles		San Diego		Alameda		Sacramento		Riverside		San Francisco		State
	\$M	%	\$M	%	\$M	%	\$M	%	\$M	%	\$M	%	
2018	544.4	25.3	191.1	8.9	197.8	9.2	159.5	7.4	64.2	3.0	238.1	11.1	2,151.9
2019	872.2	28.2	239.5	7.7	231.5	7.5	219.0	7.1	133.2	4.3	256.4	8.3	3,098.3
2020	1,393.8	29.7	373.9	8.0	324.2	6.9	311.7	6.6	278.2	5.9	256.7	5.5	4,700.1
2021	1,667.9	28.9	514.6	8.9	338.8	5.9	344.6	6.0	450.0	7.8	260.6	4.5	5,773.4
2022	1,495.9	28.1	569.3	10.7	291.0	5.5	290.9	5.5	415.3	7.8	227.1	4.3	5,332.9

Note: 2018 and 2022 are both projected based on an average of 3 quarters

TABLE 4
LICENSES BY SECTOR FOR CALIFORNIA COUNTIES ISSUING MOST LICENSES

Sector	Alameda		Humboldt		Lake		LA		Mendocino		Monterey		Riverside		Santa Barbara		Trinity		Grand Total
	Urban (Oakland)	Rural (Eureka)	Rural (Lake-town)	Urban (L.A.)	Rural (Ukiah)	Rural (Salinas)	Urban (Riverside)	Mixed (S.B.)	Rural (Weaver ville)	Urban (Oakland)	Rural (Eureka)	Rural (Lake-town)	Urban (L.A.)	Rural (Ukiah)	Rural (Salinas)	Urban (Riverside)	Mixed (S.B.)	Rural (Weaver ville)	
Distribution	162	167	10	430	73	79	107	37	23	1,639									
	24.8%	7.5%	1.0%	27.0%	6.6%	10.0%	21.1%	1.8%	4.7%	11.6%									
Micro-business	68	21	1	112	9	58	4	2	384										
	10.4%	0.9%	0.1%	7.0%	0.8%	0.0%	11.4%	0.2%	0.4%	2.7%									
Retailer	201	27	6	297	24	32	104	27	4	1,364									
	30.7%	1.2%	0.6%	18.6%	2.2%	4.1%	20.5%	1.3%	0.8%	9.6%									
Testing	6			15	1	1	3	1		50									
	0.9%	0.0%	0.0%	0.9%	0.1%	0.1%	0.6%	0.0%	0.0%	0.4%									
Cultivation	75	1954	982	346	992	637	148	1929	464	9,510									
	11.5%	87.4%	97.8%	21.7%	89.1%	80.8%	29.1%	96.0%	93.9%	67.1%									
Manufacturer	142	67	5	394	14	39	88	12	1	1,221									
	21.7%	3.0%	0.5%	24.7%	1.3%	4.9%	17.3%	0.6%	0.2%	8.6%									
Total	654	2,236	1,004	1,594	1,113	788	508	2,010	494	14,168									
	4.6%	15.8%	7.1%	11.3%	7.9%	5.6%	3.6%	14.2%	3.5%										

This study aims to contribute to the literature on the cannabis industry from an economic perspective, focusing on the key drivers of municipal revenues. Section 2 reviews the literature to inform the research questions and hypotheses proposed in Section 3. Data and methodology are discussed in Section 4, Findings in Section 5, and Conclusions in Section 6.

LITERATURE REVIEW

The academic study of the cannabis industry has increased significantly in recent years. However, many questions remain regarding cannabis business development, barriers to growth in this industry, and the role of municipal policy in constraining and promoting market growth. Here we focus on the issues of cannabis licensing and municipal revenues to best inform the development of our research questions and hypotheses.

Cannabis Licensing

The creation of a licensed recreational cannabis market in California has not eliminated the unlicensed market that preceded it¹. In contrast, some evidence suggests that the unlicensed market has grown since the recreational legalization of Prop 64 (Pineda, 2022). The academic and news literature on this topic provides numerous explanations for these current conditions, which are reviewed below. This literature is both general (Goldstein & Sumner, 2021; Goldstein et al., 2020; Parker et al., 2019; Sambucci et al., 2020) and applied to the experience of cannabis legalization and decriminalization in California (Blood, 2022; Bodwitch et al., 2019; Bodwitch et al., 2021; Dostal, 2021; Firth et al., 2022; Goldstein & Sumner, 2019; Goldstein et al., 2019; Kleiman, 2017; Martin & Lewis, 2021; Pedersen et al., 2021; Pineda, 2022; Rhee et al., 2022; St. John, 2022; Unger et al., 2020) as well as other U.S. states (Caulkins et al., 2019; Fataar et al., 2021; Goodman et al., 2022; Jensen & Roussell, 2016; Miller & Miller, 2021; Subritzky et al., 2016; Subritzky et al., 2020; Tansey, 2021) and countries worldwide (Bryan et al., 2013; Childs & Stevens, 2019; Donnan et al., 2022; Goodman et al., 2022; Unger et al., 2020; Wadsworth et al., 2022; Wouters & Korf, 2009; Wouters, 2013).

Municipal Revenues

At the state level, California initially focused on a cultivation tax based on the weight and category of the cannabis (flowers, leaves, and plants) and calculated to be consistent with cultivator records in the Track-and-Trace system. This tax amounted to \$9.25 per ounce of cannabis flower and \$2.75 per ounce for leaves. Cannabis retailers pay a 15% excise tax applied to gross receipts (at average market price) to the California Department of Tax and Fee Administration.

California counties and cities also tax cannabis cultivation, distribution, manufacturing and sales at a variety of rates. Many counties defer non-state cannabis tax collection to municipalities, but some levy cannabis taxes along with cities. City-level cannabis taxes vary widely, with some only taxing single cannabis market segments and others levying charges on every cannabis market segment (City of Los Angeles, 2023; Downs & Williams, 2022; DTFA, 2023a; DTFA, 2023b; Flowhub, 2020; MedMen, 2020; SCI Consulting Group, n.d.). Depending on the city, these cannabis business taxes can be applied to either the subtotal (i.e., the cannabis retail prices) or the gross amount (i.e., the subtotal plus the excise state tax). In addition, cities may require business taxes to be applied to all products sold at dispensaries or only to cannabis products. On top of all this, retail dispensaries must pay regular sales taxes—which range from 7.25% to 10.75% depending on the location—on all products unless the customer has a state-issued medical marijuana card. These taxes are also compounded across the tax rates.

For example, a cannabis retail business in the City of Santa Cruz will first pay the state excise tax of 15%, e.g., a gross receipt of \$115 on a subtotal of \$100. Second, local cannabis business taxes of 6% of county cannabis tax and 7% of city cannabis tax are paid on gross receipts. This 13% would amount to \$14.95 on the \$115 gross receipt or a total of \$129.95. Finally, regular retail taxes of 9.25% are then charged on top of the total prior amounts—subtotal, excise tax and local cannabis business taxes—or \$12.02 in our example for a total of \$141.97. In other words, the effective sales tax rate is 42%.

All else equal, reducing tax rates on licensed market operations will likely move more consumers and businesses into the licensed market. As the cost of taxes and regulatory compliance has been found to reduce demand for licensed cannabis and increase demand for unlicensed cannabis (Sambucci et al., 2020), the reverse is also likely. Questions remain, however, as to what the “elasticity of substitution” is between these two markets and whether the relationship works the same way in either direction. From a consumer standpoint, price will likely be a dominant factor influencing choices between the two markets. As such, high taxes are expected to push consumers towards illicit market retailers. However, other factors such as business locations, convenience, habit, brand loyalty, and risk (e.g., fear of criminal penalties) are also likely to influence consumer decisions. As such, many consumers, especially newer entrants, will likely be inelastic with their choices and only ever consider purchasing from licensed dispensaries.

RESEARCH QUESTIONS AND HYPOTHESES

Building on this literature, our study aims to build a deeper understanding of how cannabis licensing impacts municipal revenues. For example, one of the main proposed benefits to city residents as well as elected officials for cannabis business activity was the increase in tax revenue to the city it is located in. To examine this further, we seek to answer the following research questions:

- *Where are cannabis entrepreneurs growing businesses in L.A. County?*
- *What types of cannabis businesses are developing in L.A. County?*
- *In what ways are businesses meeting demand within local licensing constraints?*
- *What factors influence municipal tax revenue and cannabis licensing at the city-level?*
- *How much could cannabis licensing add to municipal tax revenues if more licenses are issued?*

This section proposes several hypotheses to explain cannabis industry growth, or lack thereof, across Californian municipalities. The newly legal recreational market in California offers an interesting case study on how new businesses develop and the barriers they face. “Cannapreneurs” face similar business development challenges as those in other industries. If we frame this in terms of the Covin-Slevin model of entrepreneurship, cannabis entrepreneurs are similar to those in other industries: They aim to develop strategies around innovation, product differentiation and marketing, manage internal factors such as labor issues, and improve organizational performance (Covin & Slevin, 1991; Zahra, 1993).

What appears to set the emerging cannabis industry apart are the external factors, such as regulatory issues, access to capital and real estate, historical issues, and unlicensed market presence. These external factors are driven mainly by the unique nature of the industry gradually exiting prohibition in the state—through medical marijuana licensing from 1996 and legalization of recreational market activity in 2016—yet remaining illegal at the federal level (Shover & Humphreys, 2019).

This tension between state and federal law creates numerous challenges for all cannabis industry businesses in legalization states, most notably that major national banks are not able to offer them financial services such as loans, investments, insurance, and business accounts. Cannabis entrepreneurs instead develop their businesses using smaller online banks and credit unions for banking services, cash for transactions and employee pay, loans from family and friends, and higher-cost investment networks (Plakias et al., 2022). While all California cannabis businesses face these barriers and costs, some entrepreneurs may face particular challenges. There is a growing body of evidence that women and minority entrepreneurs face disproportionate challenges in accessing capital (e.g., Bates & Robb, 2013; Fairlie, Robb & Robinson, 2022; Lins & Lutz, 2016; Morazzoni & Sy, 2022; Palia, 2016). These and other societal and cannabis-related inequalities may contribute to cannabis market inequalities (Adinoff & Reiman, 2019; Doonan et al., 2022; Kilmer & Neel, 2020). We hypothesize that those cities with higher proportions of minorities are likely to have more minority-owned businesses, which in turn are likely to face disproportionate barriers to entry and associated business costs.

In terms of regulatory issues within California, this study highlights the role that city-level licensing plays in cannabis market growth and revenue generation, in terms of whether licenses are issued at all, and the number of licenses issued for each market category type, especially cultivation, distribution,

manufacturing, and retail. We hypothesize that while more licenses of all types lead to more revenues, there are diminishing marginal revenues per each additional license. Moreover, we anticipate there being spillover effects between cities. If a city resident without a license wishes to purchase cannabis for recreational use, they might travel to a licensed retailer in a neighboring city or purchase from a licensed delivery service based in a neighboring city. While the lack of local purchasing options might dissuade some potential cannabis consumers, these spillover effects are likely to further reduce the diminishing marginal revenues per additional license.

All licenses are not created equal, as additional city and county regulations and taxes can provide further barriers to market development. For example, some cities have seen businesses unable or unwilling to acquire licenses due to zoning restrictions and buffer zones. Even when “green zones” are implemented to allow cannabis business activity in a particular location, cannabis businesses have reported facing rental premia. Furthermore, each city and county have unique regulatory requirements with respect to various business activities, including emissions, energy and water usage, store frontages, security, and workers’ rights, as well as unique tax codes for each cannabis industry sector that may compound state-level taxes. We hypothesize that these regulatory and tax requirements will likely add costs, inflate consumer prices, and ultimately dampen business activity.

Another consequence of significant regulatory and tax burdens is that cannabis entrepreneurs are less likely to enter the licensed market and instead choose to operate in the unlicensed market. Unlicensed market activity is inherently difficult to measure, especially at the city level. However, there is evidence from Los Angeles County that unlicensed retailers are more likely to operate in census tracts with higher numbers of minority and single female-headed households (Firth et al., 2022).

DATA AND METHODOLOGY

Spatial Analysis

To identify spatial patterns and visual representations of demographic information surrounding cannabis licenses, several approaches were used. First, data on cannabis locations were obtained from the Department of Cannabis Control (DCC) to define licenses specified for cultivation, distribution, manufacturing, retail, retail delivery, testing, or vertical microbusiness (DCC, 2022). These specializations of licenses were also used to define “licenses” in general when focusing on demographic information. Demographic information of license holders was obtained by two means: (1) through surveys conducted within this study and (2) through a geocoding analysis utilizing publicly available information of names to identify the likelihood of a corresponding race or ethnicity (Consumer Financial Protection Bureau, 2014).

Information was displayed on a map created using Geographic Information System, ArcGIS Pro by Esri, and several data layers were used to identify the demographics of cities, clarify borders and political boundaries, and display locations of various cannabis licenses. The known information about cannabis license holders was combined with data layers on various maps to display license type and location in reference to demographics of Los Angeles County, Los Angeles Metropolitan Area, Los Angeles Disadvantaged areas, and freeways within the region. The South Bay region was created using ArcGIS. Los Angeles Disadvantaged areas are defined by SB 535.

California Office of Environmental Health Hazard Assessment (OEHHA) provides GIS data layers identifying different demographic and environmental information of census tracts throughout California. The CalEnviroScreen 4.0 data layer identifying poverty, racial demographics, and borders is displayed in percentiles (0th to 100th) of a variable’s intensity with the entity of California counties’ demographic information as reference (OEHHA, 2021 cal4.0). OEHHA’s SB 535 CalEnviroScreen layer identifies disadvantaged areas and percentiles of a variable’s intensity in the form of percentiles (0th to 100th) in reference to California’s SB 535 disadvantaged areas (OEHHA, 2022). Data layers from these sources display a heat map of various sociodemographic phenomena, allowing for visual interpretations of spatial patterns as described in the Spatial Analysis Overview.

Border Analysis

When plotting the cannabis business, we find that cannabis license-holders are clustered near city borders within L.A. County. We examined this further by looking at the business type and entrepreneur demographics to see if factors impact the types of clusters forming alongside city borders.

Regression Analysis

Within the South Bay region of Los Angeles County, the majority of cities voted in favor, with an average of 57%. The only exceptions were by narrow margins: Palos Verdes Estates (48% in favor), Rancho Palos Verdes (48%), and Rolling Hills Estates (47%). Meanwhile, the average voting shares by city in Los Angeles County was 55% (unweighted by population).

Despite the broad support for Proposition 64, even at the city level, only one South Bay city, Carson, has allowed licensing (though no retail licenses have been issued), and only 11 counties of Los Angeles cities are issuing licenses for any cannabis industry activity. Overall, having more voter support does appear to increase the likelihood of cannabis licensing. The average unweighted voting shares for County of Los Angeles cities allowing licensing was 61 percent, compared to 54 percent for those without. However, most voters support licensing and, as shown in Table X-3 below, many cities with high voter support did not issue cannabis licenses as of late 2021, such as Santa Monica (75%), Hermosa Beach (71%), Malibu (69%), Redondo Beach (65%), Inglewood (64%), Beverly Hills (64%), Signal Hill (64%), and Manhattan Beach (62%).

FINDINGS

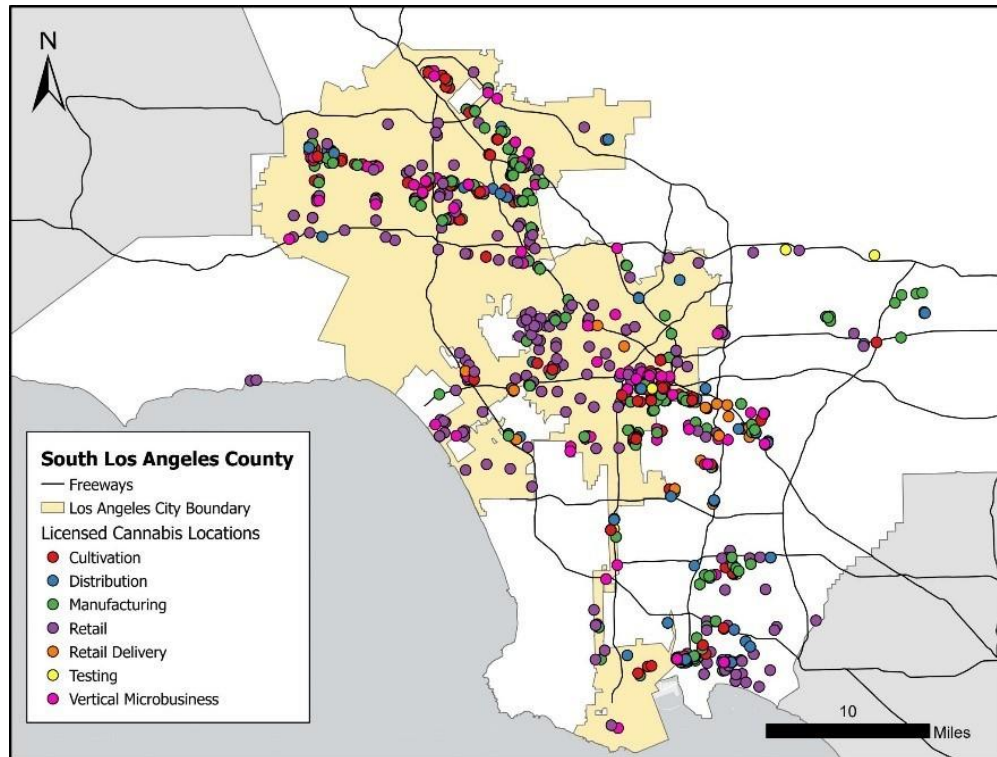
Spatial Analysis

Although Prop 64 was supported by the majority of Los Angeles County, 71%, the lack of municipal licenses granted has led to most license holders locating within the Los Angeles Metropolitan Area. There is a loose relationship with cannabis license holders located along freeways, although there is a stronger relationship with locating in economic centers, such as a city's downtown. There are intense areas of clustering in Downtown Los Angeles, West Hollywood, Long Beach and the Sun Valley area. Downtown areas have denser populations, so higher concentrations are expected (Figure 1).

Licensed locations settle on the borders of the Los Angeles Metropolitan before entering other cities in Beverly Hills, East Los Angeles, and the South Bay. These three areas have specified their lack of desire for licensed cannabis activity within their cities and experience relatively concentrated amounts of clustering around borders shared with the city of Los Angeles.

Long Beach, Northeast Lakewood, and East Los Angeles are a few areas outside of the City of Los Angeles with high concentrations of cannabis-licensed location clustering, and all are within the highest percentiles of poverty (76th to 100th). All regions clustering within the city of Los Angeles that the California government has identified within the highest percentiles of poverty through SB 535 (OEEHS, 2021). The only locations with cannabis licenses outside of the top 50th percentiles and higher are along the I-134 Freeway in Westchester and two outlying locations in Malibu. The DCC issues cannabis license types grouped by industry: cultivation, distribution, manufacturing, retail, retail delivery, testing, and vertical micro businesses. Retail is the most popular license type in areas with lower poverty rates. The South Bay is within the 0th to 25th percentile and does not contain any cannabis licenses, although the licensed locations bordering the South Bay are in areas with higher poverty (Figure X-1).

FIGURE 1
LICENSED CANNABIS LOCATIONS IN SOUTH LOS ANGELES COUNTY

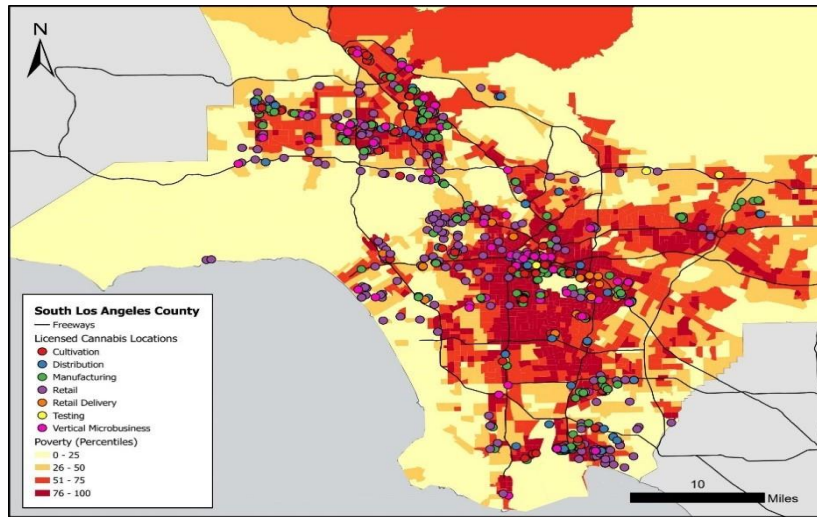


The intense relationship between more cannabis-licensed locations and higher poverty rates seen throughout South Los Angeles County likely falls within the phenomenon of “Not in My Backyard” (NIMBY). Poverty is higher within economic centers and areas of dense living, which may be beneficial to reach consumers and for economic efficiency. However, the spatial concentration in impoverished neighborhoods allows for increased advertisement to communities of color. Whether on the citizen or governmental level, affluent cities with greater historic socioeconomic status, including the South Bay region, have a visual-spatial pattern of concentrating cannabis-licensed locations away from affluent neighborhoods and into areas with higher poverty rates.

The City of Compton has a negative history with cannabis as many residents are lower income, people of color, and suffer from cannabis criminalization and the “war on drugs.” Compton’s city government does not grant cannabis licenses due to this history, though they still experience high concentrations near its southeast border. This is significant due to neighboring Lakewood concentrating cannabis-licensed locations in this area of high poverty and away from the more affluent remainder of the city. Licensed locations within the affluent areas of Lakewood are retail licenses.

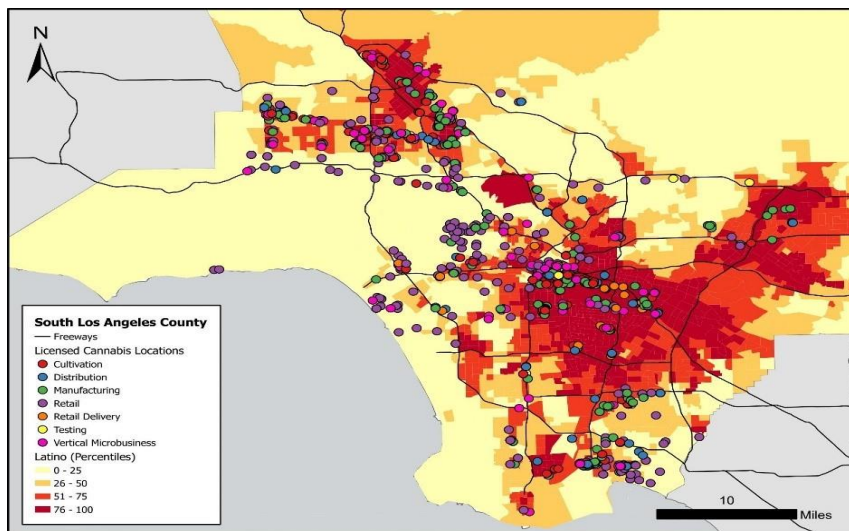
Retail and vertical microbusiness licenses are common in both areas with higher poverty rates and areas of affluence; however, it is more common to see diversity in license types (cultivation, distribution, manufacturing, retail, retail delivery, testing, vertical micro businesses) in areas with higher rates of poverty. Areas with lower poverty rates tend to have less diversity in license types, tending to be primarily retail licenses. This is seen in West Hollywood clusters bordering Beverly Hills, Malibu, and along the I-134 freeway. This is reflected in Figure 2 below.

FIGURE 2
LICENSED CANNABIS LOCATION AND POVERTY IN SOUTH LOS ANGELES COUNTY



Historical circumstances, including slavery, immigration, white supremacy, and redlining in the housing industry, have solidified a lack of socioeconomic and political power for people of color. This results in Latino and Black populations experiencing higher rates of poverty. There is great similarity in maps expressing variables for higher rates of poverty and higher rates of LatinX populations (Figure 3). Cities with a higher Black population, such as Compton, Inglewood, and Carson, generally do not grant cannabis licenses. These areas remain close to licensed locations due to facilities near their borders. The spatial relationship between race, economic status, and cannabis locations can be attributed to NIMBY and the historic inability of socioeconomically disadvantaged groups to compete for land.

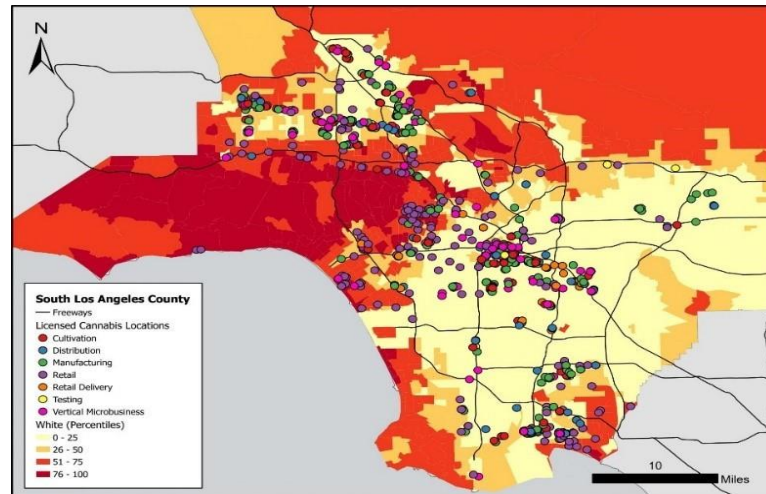
FIGURE 3
LICENSED CANNABIS LOCATION AND THE LATINX POPULATION IN SOUTH LOS ANGELES COUNTY



The white population tends to have more affluence and be concentrated in areas outside of cannabis facility clusters, such as Malibu, Beverley Crest, Burbank, and the coastal cities. An estimated 90% of total

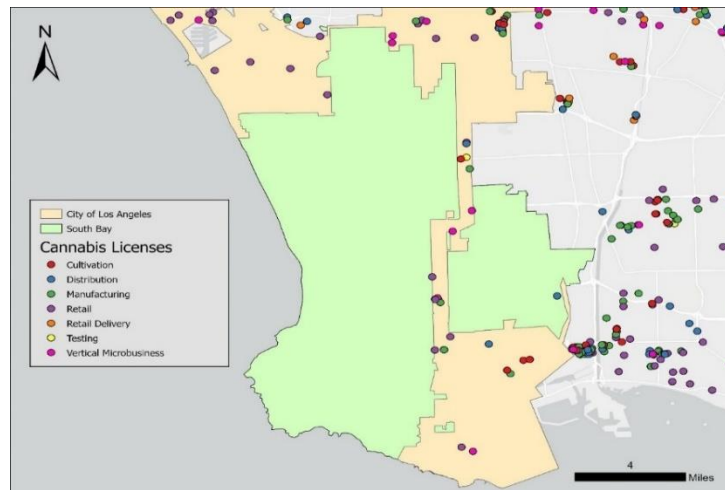
licensed holders are white, although most licensed locations are outside of areas with a high proportion of white people. White license holders seeking and/or being granted land outside of their own neighborhoods is another instance of NIMBY. The exception to this spatial pattern is West Hollywood, which is a relatively affluent White area with high clustering of cannabis-licensed locations. As this area has greater affluence, the pattern remains that most of these licenses were granted for retail (Figure 4).

FIGURE 4
LICENSED CANNABIS LOCATION AND THE WHITE POPULATION IN SOUTH LOS ANGELES COUNTY



There is a spatial pattern of licensed cannabis locations clustering within the city of Los Angeles, and this pattern continues in the South Bay region as all licensed cannabis locations within the South Bay are in the city of Los Angeles, except for a distribution license in Carson. The City of Los Angeles strip, running parallel to the I-710 freeway, contains 17 licensed facilities. One retail and one micro business licensed locations border Inglewood and Lennox. Retail, followed by vertical microbusiness licenses, are the most common licenses bordering South Bay cities within the City of Los Angeles (Figure 5). These two license types are more commonly found alone in areas with less poverty.

FIGURE 5
LICENSED CANNABIS LOCATION IN SOUTH BAY LOS ANGELES

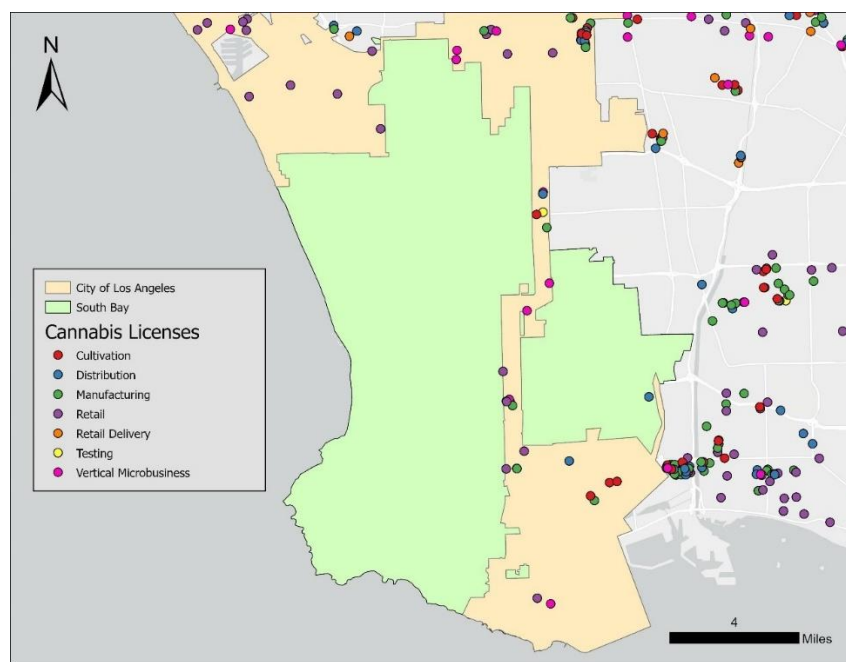


To meet demand in the South Bay region, numerous cannabis-related businesses have been established in locations bordering South Bay cities while remaining within the borders of the City of Los Angeles. This is seen near Torrance, Carson, West Rancho Dominguez, and Compton (Figure 6). Most businesses located near South Bay city borders are for retail licenses, with a few for vertical microbusiness licenses.

Border Analysis

We examine cannabis business activity alongside the city borders of cities in Los Angeles County. There is a spatial pattern of licensed cannabis locations clustering within the city of Los Angeles, and this pattern continues in the South Bay region as all licensed cannabis locations within the South Bay are in the city of Los Angeles, except for a distribution license in Carson. The City of Los Angeles strip, running parallel to the I-710 freeway, contains 17 licensed facilities. One retail and one micro business licensed locations border Inglewood and Lennox. Retail, followed by vertical microbusiness licenses, are the most common licenses bordering South Bay cities within the City of Los Angeles (Figure 6). These two license types are more commonly found alone in areas with less poverty and have been issued only within the last year. To meet demand in the South Bay region, numerous cannabis-related businesses have been established in locations bordering South Bay cities while remaining within the borders of the City of Los Angeles. This is seen near Torrance, Carson, West Rancho Dominguez, and Compton. Most businesses located near South Bay city borders are for retail licenses, with a few for vertical microbusiness licenses.

FIGURE 6
LICENSED CANNABIS LOCATION IN SOUTH BAY LOS ANGELES



Regression Analysis

Potential South Bay city cannabis market growth can be estimated by analyzing those cities which have already issued licenses and are collecting revenue. The analysis below is based on data from DCC gathered in late 2021. However, the municipal licensing picture is dynamic and ever-changing. For example, according to cannabis industry consultant Hirsh Jain, by early 2019, 161 of 482 California municipalities and 24 of 58 counties allowed any cannabis business (Schroyer, 2022). As of July 2021, 182 cities and 31 counties now permitted cannabis business activity of some kind. However, only 114 allow for cannabis retailers, and the California Department of Tax and Fee Administration has collected revenue data for 79

locations (including unincorporated areas). Of these locations, 64 had revenue in the most recent period, and data was collected on 51 cities across numerous independent variables, including racial demographics, household income, education levels, political voting in general, and voting on Proposition 64.

Regression analyses using cities as the unit of analysis were run against data on revenue, the number of retail licenses, and the number of storefront licenses (Table 5). These results suggest that population is the dominant factor, whether or not voting factors are included (comparing the two models for each dependent variable). These results suggest that business follows demand. Other factors such as race, education levels, unemployment, and voting habits are not statistically significant, even when voting for Prop 64 is accounted for. Household income is the only other factor statistically significant for one of the revenue models. Indeed, when regressions are run on the same dependent variables per capita, household income becomes the only statistically significant factor for all three dependent variables; however, the effect size is small (Table 6). This suggests that the cannabis industry may generate more in cities with lower average incomes.

TABLE 5
ANALYSIS OF CITY-LEVEL FACTORS INFLUENCING REVENUE, RETAIL LICENSES, AND STOREFRONT LICENSES

	Revenues 2021		Retail Licenses		Storefront Licenses	
African American Population %	70.832	53.145	53.046	52.712	-3.834	-4.357
	(0.83)	(0.62)	(1.63)	(1.57)	(0.17)	(0.19)
Household Income	-0.001	-0.001	-0.000	-0.000	-0.000	-0.000
	(1.68)*	(1.89)	(1.76)	(1.72)	(0.71)	(0.72)
Population % with Bachelor	-8.501	60.836	19.383	18.174	5.971	5.406
	(0.25)	(1.11)	(1.46)	(0.84)	(0.67)	(0.37)
Unemployment Rate	-229.223	-247.793	-62.288	-64.083	-7.933	-9.982
	(1.19)	(1.29)	(0.85)	(0.85)	(0.16)	(0.20)
Population	216.336	214.428	31.586	31.618	22.321	22.335
	(26.42)***	(26.10)**	(10.08)**	(9.77)**	(10.57)**	(10.25)**
Registered Voters		-115.848		1.710		0.622
		(1.62)		(0.06)		(0.03)
Proposition 64 Voting		-5.554		3.699		3.786
		(0.16)		(0.28)		(0.42)
Constant	65.974	118.937	21.148	17.335	9.474	6.041
	(1.94)*	(2.14)*	(1.63)	(0.79)	(1.08)	(0.41)
R^2	0.94	0.95	0.72	0.72	0.73	0.73
N	51	51	51	51	51	51

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

TABLE 6
ANALYSIS OF CITY-LEVEL FACTORS INFLUENCING PER CAPITA REVENUE, RETAIL LICENSES, AND STOREFRONT LICENSES

	Per Capita Revenue 2021		Licenses Per Capita		Storefronts Per Capita	
African American Population %	-1,044.096	-639.897	0.046	4.715	-3.629	-2.059
	(0.80)	(0.46)	(0.01)	(0.65)	(0.87)	(0.46)
Household Income	-0.012	-0.012	-0.000	-0.000	-0.000	-0.000
	(2.36)**	(2.46)*	(5.54)**	(5.44)**	(4.31)**	(4.01)**
Population % with Bachelor	-215.298	480.891	4.142	-0.309	2.017	1.854
	(0.41)	(0.56)	(1.44)	(0.07)	(1.19)	(0.66)
Unemployment Rate	-2,354.059	-3,345.272	-44.978	-48.504	-14.722	-15.815
	(0.81)	(1.11)	(2.83)**	(3.09)**	(1.57)	(1.62)
Registered Voters		-1,634.037		3.878		-0.346
		(1.34)		(0.61)		(0.09)
Democrat Voters		-2,713.190		-17.562		-6.169
		(1.46)		(1.80)		(1.02)
Republican		-2,511.138		-17.947		-4.836
		(1.41)		(1.92)		(0.83)
Constant	1,614.875	4,289.312	16.032	27.875	7.382	11.649
	(3.13)***	(2.48)*	(5.72)**	(3.08)**	(4.47)**	(2.07)*
R^2	0.18	0.23	0.42	0.50	0.33	0.35
N	51	51	51	51	51	51

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Regression results are used to project South Bay cities' revenue, retail licenses, and storefront licenses should recreational cannabis be licensed (Table 7). As regressions are based on data from 2021, four years after retail licenses were first issued in 2018, projections in Table 7 are estimated for four years after retail licenses were first issued in South Bay cities. Several important caveats are important to add here. First, these current regressions and projections do not account for zoning within each city. As the experience of Carson shows, even when licenses are allowed, zoning limits might further curtail business activity. Second, as these cities would not be the first movers in this market, cannabis retailers already established on the borders of South Bay cities may have claimed a market share and reputation that limits the growth of new entrants. Third, this analysis assumes that South Bay cities broadly follow the same regulatory approach as those currently issuing licenses. If they were to take a more heavy-handed approach, with additional taxes, fees, or regulatory requirements, it is possible that cannabis retail revenues, licenses and storefronts would grow at slower rates.

TABLE 7
PROJECTIONS OF SOUTH BAY CITY CANNABIS RETAIL REVENUE, LICENSES, AND STOREFRONTS

City	Population	Percent Voting Yes on Prop 64	Projections (four years after licensing)		
			Taxable Retail Revenue (\$M)	Licenses	Storefronts
Carson	95,558	56%	27.5	3	2
El Segundo	17,272	61%	5.0	1	N/A
Gardena	61,027	57%	17.6	2	1
Hawthorne	88,083	59%	25.4	3	2
Hermosa Beach	19,728	71%	5.7	1	N/A
Inglewood	107,762	64%	31.0	3	2
Lawndale	31,807	58%	9.2	1	1
Lomita	20,921	55%	6.0	1	N/A
Manhattan Beach	35,506	62%	10.2	1	1
Palos Verdes Estates	13,347	48%	3.8	N/A	N/A
Rancho Palos Verdes	42,287	48%	12.2	1	1
Redondo Beach	71,576	65%	20.6	2	2
Rolling Hills	1,739	47%	0.5	N/A	N/A
Rolling Hills Estates	8,280	47%	2.4	N/A	N/A
Torrance	147,067	52%	42.4	5	3
Total	761,960		219.5	24	15

CONCLUSIONS AND POLICY IMPLICATIONS

In this paper, we examine the impact of cannabis licensing on municipal revenues in the early years (2018-2022) of recreational cannabis legalization in California by focusing on implementation in Los Angeles County. We map where cannabis entrepreneurs growing businesses in L.A. County, identify which types of cannabis businesses are developing in L.A. County, explore business development within local licensing constraints, analyze statistically which factors influence municipal tax revenue and cannabis licensing at the city-level, estimate municipal tax revenues if additional cannabis licenses were issued.

Spatial analysis of cannabis business location choice suggests that agglomeration appears to have occurred across numerous locations in the County of Los Angeles. These cannabis business agglomerations appear to be associated with several factors. Primarily, it stands to reason that businesses are only in cities issuing licenses. However, within those cities, some businesses—especially retail—appear to be located close to the borders of cities not issuing licenses. This is especially evident concerning the City of Los Angeles and the City of Long Beach borders with neighboring South Bay and West LA cities that have seen resistance or caution when debating license granting. A second key factor is that of zoning within cities. State law buffers discussed above leave limited locations available to cannabis businesses. This appears to push cannabis businesses towards industrial zones, which are also correlated with freeways. In some cities, such as Long Beach, “green zones” for cannabis business activity have been established, creating further clusters.

Regression analysis of municipal taxable revenues across cities issuing licenses suggests that, at the city level, the population is the dominant factor. This suggests that business follows the demand for retail

cannabis, especially in an environment with limited licenses. Race, education levels, unemployment, and voting habits are not statistically significant at the city level. Household income is the only other statistically significant factor, and even here, there is a small effect size. That said, the negative direction suggests lower-income cities generate higher revenues, which may be a fiscal boon to those cities.

Digging deeper here, the association with per capita revenue, licenses, and storefronts is only statistically significant—again with a slight negative relationship—for household income across dependent variables in each model. This further suggests that other factors, such as race, education, and political leaning, are not as important as economic factors. For licenses per capita, unemployment is also statistically significant; a lower unemployment rate is associated with a higher number of licenses per capita. Cannabis retail industry jobs are a small fraction of total employment, so this result suggests that cities with lower unemployment are likely to issue more licenses per capita. It is possible that a city with favorable business environments and conditions might be influencing both cannabis license activity and unemployment levels.

Using these regression models, we project the number of licenses cities might issue and revenues that South Bay cities might obtain after a comparable stage of market development (i.e., after four years). We estimate that South Bay cities were missing out on a taxable retail revenue of \$220 million. Depending on the sales and cannabis tax rates in those cities, this might benefit the tax base in the region of \$20-30 million for the retail sector alone. It is important to note that this might serve as an upper-bound estimate as retail businesses in neighboring cities are already meeting some demand by establishing near borders and offering delivery services. Moreover, any new market entrants would face additional competition compared to the current operators in a market that continues to face substantial competition from the unlicensed sector.

Licensing limitations and regulatory compliance can be time-consuming and costly, which the illegal market is not subject to. This allows the illegal market to offer products at a lower price to lower operating costs. Enforcement is also an issue that impacts legal cannabis providers. Prior to implementation, it was hoped that Prop 64 would lead to a reduction in illegal cannabis activity, which in turn would reduce the need for enforcement (Kleiman, 2017). However, Prop 64 implementation appears to have first led to reduced enforcement of the unlicensed or illicit markets. Moreover, reducing criminal penalties for illegal cannabis activity has influenced a rise in illegal cannabis businesses (Pineda, 2022; St. John, 2022).

Results from our study provide additional insight into the factors impacting cannabis industry and municipal revenues. These findings have implications for cannabis policymakers, investors, and entrepreneurs.

ENDNOTES

1. Medical marijuana use and cultivation was decriminalized in the Compassionate Use Act of 1996 (Proposition 215).
2. Numerous terms refer to the unlicensed cannabis industry, including illegal, illicit, traditional, legacy, underground, and grey markets. This latter term refers to unlicensed products moving into the licensed market, for example, an unlicensed plant purchased by a licensed manufacturer and sold at a licensed retailer. We use the term “unlicensed” in the context of Prop 64 and the municipal licensing that has followed. However, prior to Prop 64, the term “illegal” is more appropriate for those businesses operating outside medical marijuana law parameters.

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APPENDIX

Cannabis Licensing in the South Bay

Businesses must be licensed at both the city level, then by the DCC at the state level in order to operate legally. As of the end of 2022, no South Bay cities were issuing licenses for cultivation, distribution, retail sale or delivery. This means there are very few brick-and-mortar businesses operating in the cannabis sector in the South Bay, though there is a presence of delivery services.

Interestingly, the City of Carson passed an ordinance allowing for cultivation, distribution, manufacturing and testing, but no retail. In 2019, the city issued two licenses for “Cannabis Business Centers” covering all four production stages, with plans to issue two additional licenses. (California Cannabis CPA, 2019). Due to zoning constraints, the only locations available to the license holders were city owned. However, neither of the licenses became operational. Efforts to rescind/amend the ordinance prohibiting retail has been underway since 2019.

Several coastal cities, including Manhattan Beach and Redondo Beach, circulated petitions in 2021 for local initiatives to lift the ban on commercial cannabis. In 2023, voters in Redondo Beach will have the opportunity to vote on such a local initiative to repeal the existing commercial ban and make way for retail dispensaries (Evains, 2023).

The table below shows the status by production stage for all Los Angeles County cities and the proportion of voters who approved Prop 64 in 2016. Despite voters in 90% of these cities supporting Prop 64 by over 50% and over half of the cities supporting Prop 64 by over 60%, only 11 cities have licensed recreational cannabis businesses of some kind. As the column at the end of the table illustrates, the picture is evolving and changing in some municipalities.

It should also be noted this table refers specifically to commercial production stages for recreational use; medicinal use falls under different regulations. Furthermore, “home grows” are treated separately, and their legal requirements vary from city to city. For example, the city of Gardena bans individual outdoor grows and requires a permit to grow up to six plants indoors. This stands in contrast to the city of Los Angeles, which allows both indoor and outdoor growing for up to six plants, with no permit required. As is generally the case with commercial production, there appears to be a correlation between the legality of “home grows” and Prop 64 passage: cities with a higher percentage of Prop 64 passage above 55% either allow both indoor/outdoor “home grows” without a permit or require a permit for outdoor only.

**TABLE 1
LOS ANGELES COUNTY CITIES CANNABIS LICENSING**

City	Region	Population	YesProp 64	Cultivation	Mfg	Distribution	Retail	Testing	Recent status update
Carson	1-South Bay	95,558	56%	✓	✓	✓	✗	✓	Local efforts underway to rescind the retail ban
El Segundo	1-South Bay	17,272	61%	✗	✗	✗	✗	✗	Petitions gathering signatures - a local initiative
Gardena	1-South Bay	61,027	57%	✗	✗	✗	✗	✗	Seeking RFPs for implementation
Hawthorne	1-South Bay	88,083	59%	✗	✗	✗	✗	✗	Petitions gathering signatures - a local initiative
Hermosa Beach	1-South Bay	19,728	71%	✗	✗	✗	✗	✗	Petitions gathering signatures - a local initiative
Inglewood	1-South Bay	107,762	64%	✗	✗	✗	✗	✗	
Lawndale	1-South Bay	31,807	58%	✗	✗	✗	✗	✗	
Lomita	1-South Bay	20,921	55%	✗	✗	✗	✗	✗	
Manhattan Beach	1-South Bay	35,506	62%	✗	✗	✗	✗	✗	Petitions gathering signatures - a local initiative
Palos Verdes Estates	1-South Bay	13,347	48%	✗	✗	✗	✗	✗	
Rancho Palos Verdes	1-South Bay	42,287	48%	✗	✗	✗	✗	✗	
Redondo Beach	1-South Bay	71,576	65%	✗	✗	✗	✗	✗	Voters decide in 2023 on a local initiative to lift the ban
Rolling Hills	1-South Bay	1,739	47%	✗	✗	✗	✗	✗	
Rolling Hills Estates	1-South Bay	8,280	47%	✗	✗	✗	✗	✗	
Torrance	1-South Bay	147,067	52%	✗	✗	✗	✗	✗	

Calabasas	4-Rest of LAC	23,241	62%	X	X	X	X	X	X	X	X
Cerritos	4-Rest of LAC	49,578	44%	X	X	X	X	X	X	X	X
Claremont	4-Rest of LAC	37,266	59%	X	X	X	X	X	X	X	X
Commerce	4-Rest of LAC	12,378	55%	X	X	X	X	X	X	X	X
Compton	4-Rest of LAC	95,740	62%	X	X	X	X	X	X	X	X
Covina	4-Rest of LAC	51,268	52%	X	X	X	X	X	X	X	X
Cudahy	4-Rest of LAC	22,811	55%	X	X	X	X	X	X	X	X
Culver City	4-Rest of LAC	40,779	69%	✓	✓	✓	✓	✓	✓	✓	✓
Diamond Bar	4-Rest of LAC	55,072	47%	X	X	X	X	X	X	X	X
Downey	4-Rest of LAC	114,355	51%	X	X	X	X	X	X	X	X
Duarte	4-Rest of LAC	21,727	54%	X	X	X	X	X	X	X	X
El Monte	4-Rest of LAC	109,450	54%	X	X	X	X	X	X	X	X
Glendale	4-Rest of LAC	196,543	55%	X	X	X	X	X	X	X	X
Glendora	4-Rest of LAC	52,558	49%	X	X	X	X	X	X	X	X
Hawaiian Gardens	4-Rest of LAC	14,149	55%	X	X	X	X	X	X	X	X
Hidden Hills	4-Rest of LAC	1,887	62%	X	X	X	X	X	X	X	X
Huntington Park	4-Rest of LAC	54,883	51%	X	X	X	X	X	X	X	X

Industry	4-Rest of LAC	264	43%	X	X	X	X	X	X	X	X	X
Irwindale	4-Rest of LAC	1,472	55%	X	X	X	X	X	X	X	X	X
La Cañada Flintridge	4-Rest of LAC	20,573	48%	X	X	X	X	X	X	X	X	X
La Habra Heights	4-Rest of LAC	5,682	49%	X	X	X	X	X	X	X	X	X
La Mirada	4-Rest of LAC	48,008	47%	X	X	X	X	X	X	X	X	X
La Puente	4-Rest of LAC	38,062	53%	X	X	X	X	X	X	X	X	X
La Verne	4-Rest of LAC	31,334	49%	X	X	X	X	X	X	X	X	X
Lakewood	4-Rest of LAC	82,496	55%	X	X	X	X	X	X	X	X	X
Lancaster	4-Rest of LAC	173,516	54%	X	X	X	X	X	X	X	X	X
Lynwood	4-Rest of LAC	67,265	55%	✓	✓	✓	✓	✓	✓	✓	✓	✓
Malibu	4-Rest of LAC	10,654	69%	X	X	X	X	X	X	✓	✓	X
Maywood	4-Rest of LAC	25,138	51%	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monrovia	4-Rest of LAC	37,931	57%	X	X	X	X	X	X	X	X	X
Montebello	4-Rest of LAC	62,640	54%	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monterey Park	4-Rest of LAC	61,096	49%	X	X	X	X	X	X	X	X	X
Norwalk	4-Rest of LAC	102,773	53%	X	X	X	X	X	X	X	X	X
Palmdale	4-Rest of LAC	169,450	55%	X	X	X	X	X	X	X	X	X

South Gate	4-Rest of LAC	92,726	53%	X	X	X	X	X	X	X	X
South Pasadena	4-Rest of LAC	26,943	62%	X	X	X	X	X	X	X	X
Temple City	4-Rest of LAC	36,494	47%	X	X	X	X	X	X	X	X
Vernon	4-Rest of LAC	222	55%	X	X	X	X	X	X	X	X
Walnut	4-Rest of LAC	28,430	47%	X	X	X	X	X	X	X	X
West Covina	4-Rest of LAC	109,501	51%	X	X	X	X	X	X	X	X
West Hollywood	4-Rest of LAC	35,757	83%	X	X	X	X	X	✓	✓	✓
Westlake Village	4-Rest of LAC	8,029	56%	X	X	X	X	X	X	X	X
Whittier	4-Rest of LAC	87,306	53%	X	X	X	X	X	X	X	X

City is pushing to have one of the highest number of per capita cannabis businesses in the world.

Sources: U.S. Census Data, OCR Projects