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Prices of Cannabis in California from Licensed and Unlicensed Retailers

Robin S. Goldstein, Raffaele Saposhnik, and Daniel A. Sumner

Little public information or analysis is available about licensed or unlicensed cannabis prices. Here, we report on about 232,000 online cannabis prices from about 2,600 cannabis retailers across California, classified by location, package and product type, storefront or delivery-only, and licensed versus unlicensed status. We find that dried cannabis flower prices listed by licensed retailers average 11% higher than prices listed by unlicensed cannabis retailers. Prices are 25% higher at licensed compared to unlicensed storefronts and 7% higher at licensed compared to unlicensed delivery services. In this article, we further explore dried flower price comparisons by package size, delivery-only vs. storefront retailers, and region.



Estimates indicate that dried cannabis flower makes up about two-thirds of the California cannabis market by volume.

Cannabis from illegal channels has long been widely available and used. In California, cannabis for California residents with doctors' recommendations has been sold legally in dispensaries for more than two decades. Cannabis purchase and use has been legal for all adult users in California since the passage of California's Proposition 64 on November 8, 2016. However, California has had its thoroughly regulated cannabis market and taxed cannabis market only since 2018, when the Medical and Adult-Use Cannabis Regulation and Safety Act (MAUCRSA) went into effect. Some rules, such as testing for heavy metals, were not enforced until as late as January 2019. Here, we report on patterns of listed prices of cannabis from licensed and unlicensed retailers across California in July 2019, 18 months after the taxed and regulated market first opened, and one year after state regulations were first fully implemented.

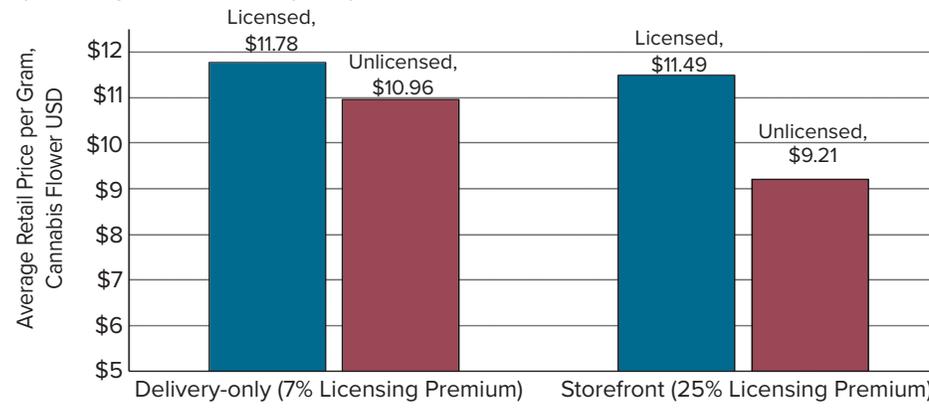
What is Licensed Cannabis?

In all U.S. states with legal "recreational" or "adult-use" cannabis regimes, cannabis producers, distributors, and retailers must obtain state licenses in order to sell legally. Licensing and "seed-to-sale" tracking systems help states collect taxes, monitor the

flow of cannabis through the legal system, and enforce safety, testing, and labeling regulations. Unlicensed retailers face neither the costs of complying with taxes and regulations themselves nor the costs of buying supply from compliant producers. So unlicensed cannabis sellers tend to sell at lower prices than licensed sellers. In this article, for simplicity, we will use the term "licensed cannabis" to refer to products sold through the supply chain from licensed growers through licensed retailers. It is useful to note that it is not unlawful for consumers to buy from unlicensed sellers or possess unlicensed products.

To the ordinary California consumer, in most cases, there is no obvious difference between licensed and unlicensed cannabis, nor between licensed and unlicensed retailers. Some consumers in California may recognize and be willing to pay more for licensed cannabis, but our consumer research and interviews with industry experts and market participants suggest that many, perhaps most, consumers are not able to differentiate between licensed and most unlicensed retailers or their products. That seems to be especially true for unlicensed sellers that use the Weedmaps services from which we have collected data.

Figure 1. Average California Retail Price per Gram of Cannabis Flower by Package Size: Delivery-only vs. Storefront



Measuring Licensed and Unlicensed Prices

The UC Ag Issues Center has been collecting cannabis retail price data since 2016. Our data come from Weedmaps, a popular cannabis e-commerce platform where retailers list prices by product attributes and package sizes, and report a wide variety of retailer information, including store location or service area for delivery-only retailers.

For this article, we report retailers' license status directly from license number information that retailers post on Weedmaps. The license number of a retailer is found at the bottom of a list of details on the third tab of a retailer's landing page. We designate as unlicensed those retailers whose listings leave the license number field blank. There is no reason why a retailer would not want to list a license number

if it had one, unless the retailer were engaged in cannabis business activity outside the scope of its license. Typically, customers would not notice the distinction between licensed and unlicensed retailers, unless they were specifically looking for this information.

Weedmaps has been operating for more than a decade, initially for retailers offering "medicinal" cannabis, which was the only legal market in California at the time. Several academic studies have indicated that the majority of cannabis retailers list on Weedmaps. However, some unlicensed retailers may be hesitant to advertise publicly. We cannot rule out the possibility that Weedmaps prices are not representative of overall California prices, especially small informal "street" retailers. Nonetheless, to our knowledge, Weedmaps has the most comprehensive data

on California retail cannabis prices available. We argue that these Weedmaps data provide a useful window on the market, and that they are the most reliable data set currently available for comparing licensed and unlicensed prices while holding many other factors constant.

Cannabis Flower Products

We analyze the retail prices of dried cannabis flower, the most common cannabis product, which is sold in stores or delivered to customers in plastic or glass packages in sizes ranging from one gram (about two typical "joints") to one ounce (28.35 grams). Industry and government analysts estimate that dried cannabis flower makes up about two-thirds of the California cannabis market by volume. The remaining third of the market, which we do not consider in this paper, includes a wide variety of products manufactured from extracted cannabis oil and specialty flower products such as extra-high-potency "moonrocks" or extra-low-potency "trim."

What is a Retailer?

Some California cannabis retailers have storefronts, but most retailers (72% in our data) are delivery-only. Storefront and delivery-only retailers are separate state license categories and separate listing categories on Weedmaps. We treat each storefront location with a Weedmaps listing as a separate retailer. However, some delivery-only retailers post multiple listings on Weedmaps that have identical product menus, prices, and phone numbers, but with different locations within their delivery radius and different numbers of customer reviews. In our retailer counts and price average calculations, we omit duplicate listings that have zero customer reviews (whether storefronts or delivery-only services) because this indicates either it is not a separate retailer or it is no longer operating.

Figure 2. Average California Retail Price per Gram of Cannabis Flower by Package Size



Figure 3. Regions of California for Calculations of Numbers of Retailers and Average Prices



Price Data

Our data set consists of retail prices per gram of cannabis flower for the eight most common package sizes: 1 g, 2 g, 1/8 oz, 4 g, 5 g, 1/4 oz, 1/2 oz, and 1 oz. In computing averages, we used each cannabis flower package as an observation. We did not weight each price observation by the volume of cannabis in the package because we understand from interviews that larger packages comprise a smaller volume of transactions. We excluded uncommon flower packages other than the eight sizes listed above. These uncommon packages made up less than 1% of the potential prices listed.

We took two important steps to remove spurious listings and other sources of noise from the data set. First, as noted above, we excluded (both from retailer counts and price averages) retailers that had zero reviews. This excluded about 10% of potential retailers. Second, for delivery-only retailers that had duplicate listings with identical menus, price lists, and phone numbers, we counted their listings only once. This reduced the data set from about 4,855 to 2,589 active and distinct retailers. The prices reported here are based on 231,538 flower prices, of which 63,192 prices (27%) are from licensed retailers and 168,336 prices (73%) are from unlicensed retailers.

Licensed-Unlicensed Price Differences Overall and by Type of Retailer

Overall, licensed cannabis flower averages \$11.64 per gram, 11% more than unlicensed flower, which averages \$10.50 per gram. But this 11% difference, which we call a “licensing premium,” conceals more complex relationships beneath the surface. Some retailers operate storefronts, while far more operate delivery-only services. Figure 1 compares average flower prices at delivery-only retailers and storefront retailers. The average licensing premium is about 3.5 times higher at storefronts (25%) than at delivery services (7%). In the unlicensed market, delivery-only prices are 19% higher than storefronts, but in the licensed market, delivery-only prices are only 3% higher.

Licensed-Unlicensed Price Differences by Package Size

Figure 2 shows licensed and unlicensed cannabis flower prices by package size. As for most other packaged consumer products, there are price discounts for buying cannabis flower in larger retail packages. Single-gram packages of licensed cannabis are 54% more expensive per gram than one-ounce packages, and single-gram packages of unlicensed cannabis are 66% more

expensive per gram than one-ounce packages.

Price premiums for licensed retailers are lower for small packages such as single-gram (10%) and 1/8-ounce (6%), and higher for larger packages such as 1/2-ounce (14%) and one-ounce (19%).

Licensed-Unlicensed Price Differences by Region

For our regional price averages, we chose the simple partitioning shown in Figure 3. We acknowledge that any such division of California into six regions is arbitrary by nature, and we attempt to err on the side of simplicity. In further econometric work, we use much more specific location identifiers.

Locations of Licensed and Unlicensed Retailers

Figure 4 shows the numbers and percentages of licensed vs. unlicensed retailers by region. We order the regions along the X-axis from north (left) to south (right). We define a retailer’s location by the zip code of the storefront, or area of the primary listing for delivery-only retailers.

In regions with fewer total retailers, more of the retailers are licensed retailers. In the populous, retailer-dense areas of Los Angeles County and our Southern California region, only about a quarter of retailers are licensed,

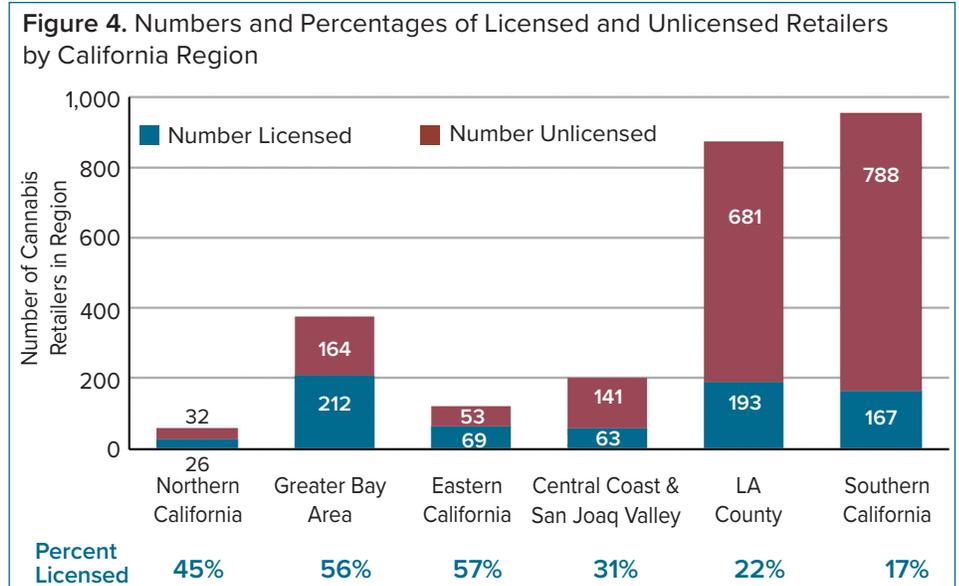
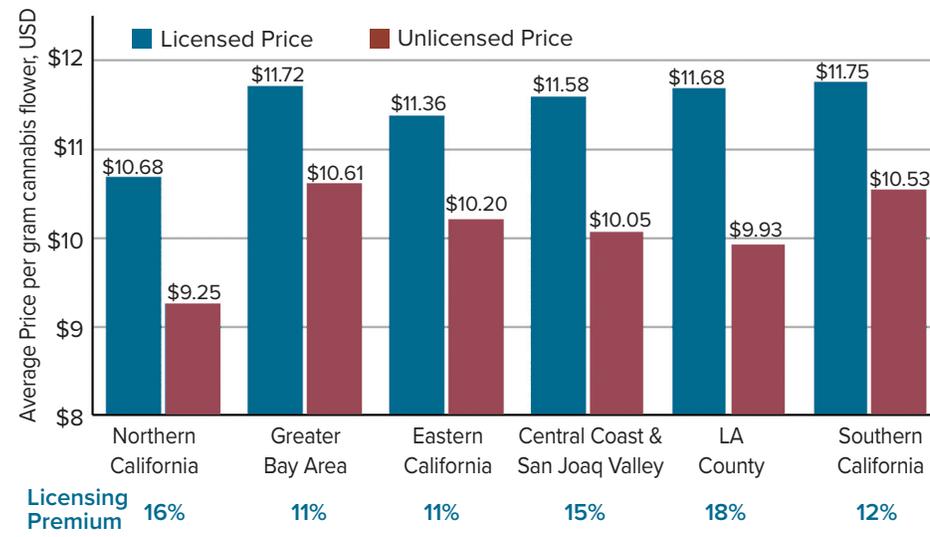


Figure 5. Average Licensed and Unlicensed Prices and Percent Licensing Premiums by California Region



whereas in our Greater Bay Area region, almost three-fifths are licensed. The Bay Area has more licensed retailers than Los Angeles or Southern California, but only about one-fifth as many unlicensed retailers. We note that this is correlated with the prevalence of delivery-only retailers, which comprise 78% of licensed retailers and 89% of unlicensed retailers in these data.

Licensed and Unlicensed Prices by Region

Figure 5 shows price differences by region. Again, we list regions in order from north to south. In general, more densely populated regions appear to have more expensive cannabis, with unlicensed prices appearing to be even more sensitive to the same regional variations than licensed prices are. Our Northern California region (not including the Bay Area), home to the so-called “Emerald Triangle” of Humboldt, Mendocino, and Trinity counties, a sparsely populated area where much of the state’s cannabis is produced, has the lowest retail prices.

Interpretation and Limitations

Although studies have reported that the majority of licensed cannabis retailers in the U.S. post listings on Weedmaps, unlicensed retailers are likely less well represented, as many

of them may choose not to advertise their services publicly. The numbers we report for unlicensed retailers may not be representative of all unlicensed retailers in California. We have data on listed prices for each product for each retailer, but we have no access to data on quantities. We compute the averages for each retailer, and averages of these retailer average prices, by counting each listed item once. These concerns with the price data affect both licensed and unlicensed retailers alike. Some licensed retailers are large, others small, and size differences also apply to unlicensed retailers. We think that the reported comparisons between licensed and unlicensed retail prices are useful even given the limitations of the Weedmaps data set. We note, however, that if we were able to include “street” dealers in the definition of “unlicensed retailers,” then we would expect the estimated average prices of unlicensed retailers to be lower.

Conclusions

Our large data set offers a unique window into licensed and unlicensed cannabis flower retail prices in California. Aside from giving the first systematic glimpse into licensing premiums in a U.S. state, our data appear to illuminate two interesting phenomena that warrant further exploration: first,

substantial price premiums exist for delivery-only service retailing versus storefront retailing in the unlicensed market but not the licensed market; and second, larger licensing premiums are present for large package sizes (e.g. one ounce) than for small package sizes (e.g. 1/8-ounce). Our results may be useful for economists and policymakers who face the challenging task of assessing substitution between licensed and unlicensed cannabis.

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Authors’ Bios

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For additional information, the authors recommend:

Bureau of Cannabis Control (BCC). 2019. [Cannabis Regulations](https://www.bcc.ca.gov/). Available at: [bcc.ca.gov](https://www.bcc.ca.gov/).

Goldstein, R., and Sumner, D. 2019. [California Cannabis Regulation: An Overview](https://www.caleag.org/~/media/Files/2019/07/3-4-19-101-102.pdf). *California Agriculture*, 73(3–4): 101–102.

Goldstein, R., Sumner, D., and Fafard, A. 2019. [Retail Cannabis Prices in California Through Legalization, Regulation and Taxation](https://www.caleag.org/~/media/Files/2019/07/3-4-19-136-145.pdf). *California Agriculture*, 73(3–4), 136–145.

Weedmaps. Available at: <http://weedmaps.com> (accessed June to November 2019).