



Cannabis Benchmarks® Publication Special -- 2016 Preview

Ten factors that will influence and shape U.S. markets in the coming year, plus an examination of international developments.

1. The Consolidated Appropriations Act - or Spending Bill - of 2016 continues protections for medical cannabis businesses following state law, but does not include additional reform to further facilitate cannabis commerce. Section 538 of the 2015 Spending Bill - the Rohrabacher-Farr Amendment, noted in last week's report - was renewed in this year's appropriations legislation. Combined with District Court Justice Charles Breyer's defense of the law and continuing cuts to federal asset forfeiture programs, medical cannabis growers and dispensaries in states with legal systems will be able to operate with a significantly lessened threat of federal intervention. In California, the passage of the Medical Marijuana Regulation and Safety Act (MMRSA), should also work to decrease customary plant eradication efforts funded by federal dollars, meaning that supplies will likely be bolstered come fall. However, other measures supported by cannabis advocates that would have aided existing markets and fostered new ones - namely banking legislation and the ability of Washington, D.C. to develop a taxed and regulated commercial system - were ultimately left out of the Spending Bill.

2. Regulation and enforcement is tightening overall, both in states with existing legalization and new markets. Colorado and Washington are working continually to plug holes in their legal systems regarding pesticide enforcement, quality assurance testing, unregulated caregivers and collectives, and other issues. Simultaneously, states implementing new recreational or medical programs are putting in place more stringent rules in an effort to avoid the same pitfalls, as well as the liability that could potentially come with them. This can be seen in smaller edibles dosages established by Oregon and Alaska for their recreational systems - 5 mg of THC per serving as opposed to the 10 mg allowed in Colorado and Washington - and Oregon's cautious approach to infused products in its recreational market generally. Labor intensive compliance requirements that were recently novel - such as plant tracking, first implemented in Colorado at the end of 2013 - are becoming the norm in most states with legalization measures. Additionally, requirements regarding security, insurance, and licensing are mainstays for cannabis businesses in every state with a regulated system and add significant expenses that are reflected in legal wholesale prices. California, the nation's largest medical cannabis market by a wide margin, will begin to see state-level regulations for the first time this year, an issue discussed below in more detail.



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In states that have recently implemented or are in the process of developing medical cannabis programs - such as Illinois, Minnesota, Delaware, and New York - licensing caps, barriers to patient registration, limited qualifying conditions, or some combination of those factors, have to this point ensured small markets. Some states, such as New York and Minnesota, do not allow the sale of cannabis flower or any smokeable extraction, adding increased costs to the production process. Strict testing standards in Nevada and Massachusetts have led to extremely tight supply and the slow development of markets in those states. Such heavy regulation leads to product being expensive and not widely available. This can drive patients to the black market, which in turn can command higher prices due to the elevated rates and scarcity in the legal realm.

3. Significant changes are coming to established markets, while states with relatively new medical systems have the potential to blossom into sites of brisk commerce. Cannabis businesses in Washington and Oregon will see fundamental alterations to their market landscapes in the coming year. In Washington, unregulated medical dispensaries - which frequently operate without paying taxes or licensing fees - will be forced to close by July 1st, shuttling all legal commerce through the state's recreational system. Washington began accepting new applications for recreational dispensaries late in 2015, and could license upwards of 350 new shops in the year ahead, as the state cap on dispensary licenses was raised to 556. Just under 200 recreationally-licensed dispensaries are currently operational in Washington, and are vastly outnumbered by legal producers. Additional retailers will create more demand from and competition amongst buyers, which could help raise and stabilize the nation's lowest wholesale prices. New and existing Oregon businesses will be busy navigating the new licensed recreational system as it takes shape throughout 2016. Many medical operations are reported to be interested in moving to the new adult-use market. As things stand currently, Oregon's recreational and medical systems are governed by separate departments - the Oregon Liquor Control Commission and the state Health Authority, respectively - and businesses will have to decide which market to participate in, though lawmakers will reportedly look to merge the two in some fashion.

Massachusetts and Nevada - states with growing patient bases of roughly 16,500 and 13,000, respectively - have shown strong demand in their medical programs, which, as noted above, have been stunted to this point. Only a handful of dispensaries are currently open in each state. However, as cultivators hone their techniques and begin to produce compliant product, additional outlets will open, which should in turn spur further patient registration. In the Illinois medical market, which came online late in 2015, patient counts remain low (around 3,600) due to limited qualifying conditions and a stringent registration process. An update from the state on December 2nd noted that nearly 30,000 potential patients had begun applications, revealing the possibility



of significant market expansion. Illinois will also accept petitions for additional qualifying conditions in 2016.

4. Cultivators will move out of warehouses to growing methods that are more cost-effective and less energy-intensive. Exploding demand across the country buoyed prices in the latter half of 2015. Still, most cultivators are aware that the continued proliferation of both legal and illicit production means that prices will eventually fall to levels that make indoor growing unprofitable, though this will almost certainly not occur in 2016. The establishment of large-scale outdoor and greenhouse sites in southern Colorado speaks to the recognition of the ultimate direction of the market by cultivators, and should yield significant new production by fall of the coming year. Additionally, the cannabis industry received bad press in recent months for the inefficient, energy-hogging character of growing crops in warehouses under 1000-watt lamps. Meanwhile, events such as the Emerald Cup and Golden Tarp Awards in California - which celebrate, respectively, outdoor and light-deprivation greenhouse crops - combined with the efforts of sun growers organizations in states such as Washington and Oregon, are raising awareness of the high quality able to be achieved by product grown outdoors and refuting prevailing notions that indoor flower is unassailably superior. The industry will not change its practices overnight, but an increased proportion of new cultivation coming online in the next year will seek to employ the sun, rather than the grid, to achieve superior profitability and staying power in the market.

5. Cannabis testing standards will become more unified. The pesticide fracas in Colorado's cannabis industry, along with investigative reports from numerous news outlets, focused attention on cannabis testing labs, which in most cases are private entities licensed by their respective state. Contrary to the common conception that laboratory science is straightforward and objective, it was revealed that cannabis testing labs had few, if any, required, universal standards to which they were held, meaning that different labs were using various types of instruments and methods, in many cases arriving at divergent results. Some labs have been accused of being "easy pass" operations, where cultivators can be assured of favorable evaluations for product tainted by pesticides, mildews, or other contaminants. Labs that followed the law and failed samples accordingly reported seeing their business shrink, as producers shopped around for those labs that would provide compliant results. In most states, samples are provided by growers themselves, opening up the possibility that clean product from a different source could be submitted for testing to enable a contaminated batch to reach market. In Colorado, Cannlabs, widely considered to be an industry leader in the testing realm, closed just prior to Thanksgiving. An October Order to Show Cause issued to Cannlabs by the state Marijuana Enforcement Division (MED) lists dozens of violations, including not operating instruments according to manufacturer recommendations, not validating analytical procedures,



allowing unqualified staff to perform analyses, and advertising testing capabilities that had not been certified by the state.

The issues noted above have led Oregon to promulgate specific requirements to which every licensed lab must hold. Nearly 60 pesticides will be tested for beginning in June 2016, and product that does not pass muster will not be able to be transferred to a dispensary. Additionally, lab personnel will be charged with taking samples, rather than the producers themselves. Now that a class-action lawsuit has been filed in Colorado against LivWell, a situation stemming in part from lax testing and quality assurance standards, it is likely that states and businesses will seek to protect themselves from liability by working to adopt effective, agreed-upon criteria for testing cannabis. The adoption of more unified standards will in the long run allow cultivators and processors to produce compliant product more efficiently, as the thresholds will be stable and consistent, allowing for the honing of production methods required to meet them.

6. Industrial hemp is emerging as a potential low-cost source of CBD, but faces an uncertain regulatory future. In the past year, we observed that high-CBD varieties of cannabis frequently commanded higher prices due to their relative rarity and the exploding demand from medical patients for CBD-based products. Since high-CBD plant material is overwhelmingly processed into infused products - many medical patients are unable to smoke for health reasons - the quality and appearance of the flowers themselves is not a high priority. Hence, farmers of industrial hemp - defined in law as containing 0.3% THC or less - have realized that they could grow acres of a CBD-containing variety for a fraction of the cost of traditional indoor cannabis cultivation and potentially reap large profits.

However, despite existing nationwide commerce in CBD products, the non-psychoactive cannabinoid remains a Schedule 1 controlled substance. The FDA earlier this year stated that CBD could not be sold legally as a dietary supplement, sent warnings to companies making claims that their CBD products could treat specific ailments, and published test results showing that many products did not in fact contain what they claimed. On a state level, due to the configuration of Colorado's regulatory systems for cannabis and hemp, high-CBD infused products made from hemp cannot enter the state's legal cannabis market, as they are not produced within the MED's licensed system. However, an opinion from the Office of Legislative Legal Services on the classification of CBD - reported on in the Forward Curve report for November 27th - suggests that state lawmakers may be considering this issue. Oregon essentially put a hold on its industrial hemp program this year to update regulations to address the unanticipated production target of CBD. Kentucky, which has perhaps the largest and most advanced industrial hemp program in the nation, passed a bill in 2014 allowing the use of CBD



oil by epilepsy patients, but it is considered unworkable due to the omission of any language regarding the production and distribution of the products it authorizes.

This year's Spending Bill does include continued protections for hemp growers operating under the provisions of the 2014 Farm Bill, and Section 763 of the 2016 Spending Bill prohibits federal funds from being used to prohibit the transportation, processing, and sale of hemp "within or outside" the state in which it was grown. While this provision apparently authorizes interstate hemp commerce, numerous alterations to existing state law and new rulemaking will likely need to be carried out to truly facilitate the opening of this potentially massive new market. Still, the threat of federal intervention in the CBD realm persists. Such intervention could eliminate current interstate commerce in CBD products, restricting their production and sale to states with legal medical cannabis systems and driving up prices for CBD-rich plant material drastically. Despite current uncertainties, some businesses are already moving to establish necessary infrastructure, specifically the planned conversion of a former Boeing plant in Pueblo into a processing facility to produce high-CBD hemp oil by CBD Biosciences, a joint venture of Thar Process and O.penVape, a Denver-based manufacturer of vaporizer pens and infused products that already serves the state's recreational and medical cannabis markets. Notably, the project is being partially subsidized with public money in the form of a nearly \$5 million grant from the Pueblo Economic Development Corporation, which will be drawn from the city's sales tax fund.

7. California's medical cannabis program is moving toward regulation, but the "Wild West" will persist. The details of California's MMRSA, signed into law in October, will begin to be fleshed out this year by the legislature, providing a clearer picture to cannabis businesses of the requirements they will need to address to achieve a state license and maintain compliance. Cities and counties have already and will continue to enact measures to preserve local control of the operations in their municipalities. Certain regulations, such as those announced this year by the North Coast and Central Valley Regional Water Quality Control Boards, have already gone into effect or will in early 2016, increasing costs for cultivators desiring to remain compliant with environmental rules. Those businesses hoping to secure a license in California's regulated system will incur elevated costs this year as they work to alter processes, premises, and other aspects of their operations to align with new rules; indeed, some operators began to address such issues in the past year in anticipation of the coming system.

However, the age and size of California's market means that the implementation of regulation will be an exceedingly difficult process that will likely take years to complete. In the meantime, operations hoping to make fast money will continue to attempt to take advantage of the unregulated character of the state's market by pursuing illicit backwoods cultivation, unlicensed



delivery services, or other schemes characteristic to California. Those businesses attempting to run compliantly with the goal of a state license will likely be at a distinct disadvantage in the coming year, as illegal operators will continue their activities without paying taxes, licensing fees, or other regulatory costs.

8. The popularity of infused products continues to grow and could spur changes to cultivation models. Numerous anecdotal reports from dispensary operators indicate that infused products - particularly edibles and concentrates - already account for roughly 30%-50% of sales in states with legal markets that allow them, and that their market share is growing. Medical patients that are unable to smoke favor such items. New users who are uncomfortable or unfamiliar with smoking can find edibles and vaporizer pens to be less intimidating and easier to consume. Regular users are also turning increasingly to infused products due to their higher potency. Despite their popularity, however, some new markets are banning smokeable concentrates, edibles, or both in favor of sublingual tinctures, pills, and topical products. Minnesota and New York are examples of such states, and the proposed rules for Vermont (noted below) would ban edibles as well.

Standard procedure for cultivators has been to process only their “trim,” or the small leaves sheared away from flowers, into infused products, preserving the vast majority of plant material for sale in bud form. However, if market trends hold and infused product sales continue to climb, cultivators could find it prudent to send away a greater portion of their production to be processed, possibly altering harvesting or trimming procedures to better accommodate that strategy. It is conceivable that whole operations, particularly very large-scale outdoor ones, could be cultivated with the intent of processing the entirety of the crop. While it may seem that growing with the exclusive goal of processing should logically entail a low-cost method characterized by minimal maintenance and labor, it must be noted that well-tended, high-quality flowers contain more cannabinoids and terpenes, and therefore yield greater amounts of extracted oils by weight. Depending on scale and the type of site, growers and processors desiring to produce high-quality infused products will likely have to work to find efficient cultivation styles that are cost-effective, but still yield potent flowers. Finally, the findings this year that pesticide residues are concentrated along with cannabinoids in extracted products requires that compliant production will necessarily involve plant material from crops cultivated without chemical pesticides.

9. Increased availability of and access to data, as well as more open and transparent communication, will help businesses operate more efficiently. 2015 saw the establishment of numerous data services providers and exchanges designed to help businesses analyze their own



operations and facilitate commerce. The formation of industry groups in states with legal systems has also led to more open communication amongst market participants. Additionally, now that Colorado has two years of recreational cannabis in the books, with Washington not far behind, more formal data on the market - compiled by the states themselves, in many cases - is naturally available and operators have undergone the seasonal trends characteristic to the industry. Previously, whether due to the threat of federal intervention or simply the new, volatile character of early markets, data was not being gathered and analyzed on a large scale and many operations went about their business secretively. Market participants relied primarily on word-of-mouth communication with their immediate peers to make decisions regarding pricing their product or attempting to increase the efficiency of their operations. Such insularity could be extremely damaging to a business in both the short and long term, as it forces decisions to be made without proper context and perspective. Due to the unregulated and illicit character of much of the nation's cannabis markets, serious gaps still exist in the efforts to gather comprehensive data. However, with the rise of the services and exchanges mentioned, cannabis businesses in 2016 will have more information and a wider perspective on which to base their decisions and strategies than ever before.

10. New recreational legalization initiatives will promote increased attention to and awareness of cannabis, but any passing measures will not result in new legal markets until at least 2017. Numerous states could potentially legalize cannabis for recreational use via the elections to be held in November 2016. Chief among them is California, though that state, like a number of others, still has work to do to make sure that an initiative is on the ballot. Other states working toward a 2016 ballot initiative include Maine, Arizona, Ohio, and Massachusetts. Nevada is the only state to have its recreational legalization initiative securely on its ballot at this point. Vermont lawmakers intend to address a recreational cannabis bill that could be the country's first legalization measure to be enacted via a state legislature. Michigan is also on track to have an initiative on the 2016 ballot, though developments in the regulation of the state's medical cannabis program could affect the potential for recreational legalization; bills to regulate the medical system are currently stalled in the state Senate, but may be voted on next year.

Again, while the passage of any of these bills or initiatives will not result in new markets appearing overnight, the ever-increasing media coverage and normalization of cannabis, combined with decriminalization measures on state and local levels, will expand awareness and, likely, acceptance of cannabis to ever wider, more varied demographics. The passage of legalization measures also emboldens individuals to begin small-scale grows or even test the illicit market prior to a system of regulated sales being implemented, a phenomenon observed in Oregon this year.



International legalization developments could affect U.S. markets. Canada’s Liberal Party, led by newly elected Prime Minister Justin Trudeau, appears to be moving ahead with its plans to legalize cannabis for adult-use and create a regulated market for the product. However, exactly how this will be carried out has yet to be determined. Observers have speculated that the country’s tightly regulated medical cannabis producers are logical candidates to be the first to grow for the new market, and some have suggested that distribution could take place via Canada’s liquor stores. Meanwhile, legal medical cannabis providers, particularly those in the western provinces, are threatened by the proliferation of illegal dispensaries, a development the federal government has yet to address comprehensively. Increased illicit and legal production in Canada could make its way into the U.S. - British Columbia is a traditional hub for such activity - potentially disrupting the legal markets in Washington and Oregon, as well as providing additional illegal supply to compete with that produced domestically. The expansion of legal markets in Canada could also divert investment from the U.S. cannabis industry, as federal legalization makes for more secure business propositions.

To the south, a ruling by the Mexican Supreme Court recognized the use of cannabis as a human right, though President Peña Nieto has voiced his opposition to full legalization. However, nationwide debates on the issue will be held beginning next month, and may spark legislative action. Colombia's President Juan Manuel Santos legalized the cultivation and sale of medical cannabis by decree. Santos’ ruling also legalized the import and export of cannabis for medical and scientific purposes, though it is unlikely that provision will provide any immediate opportunities to legal U.S. cannabis businesses, barring further legislation and international agreements.

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