Can Legal Weed Win? The Blunt Realities of Cannabis Economics

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Across North America, cannabis “legalization” hasn't lived up to the hype. Investors are reeling, tax collections are below projections, and people are pointing fingers. On the business side, companies have shut down, farms have failed, workers have lost their jobs, and consumers face high prices. Why has legal weed failed to deliver on many of its promises?

This general survey presentation gives a broad and accessible overview of the problems faced by the legal weed industry in the many states that have embarked upon various forms of the legalization experiment. The idea is to take on the euphoric claims about cannabis markets with straight dope and a full dose of economic reality.

This is not a technical paper, but rather a frank, fact-filled, entertaining presentation aimed at a general audience of agricultural economists across fields who may not have any exposure to the legal cannabis industry but may be interested in its progress, future potential, and ability to contribute to local and national economic production and become a bona fide part of agricultural economics.

In this presentation, the authors offer the unadulterated facts about the new legal segment of one of the world’s oldest industries. We offer a summary of the main questions, analyses, and conclusion in our new book on cannabis economics (University of California Press, June 2022). We draw upon data and anecdotes from our own experience working with California cannabis regulators since 2016. We explain why many cannabis businesses and some aspects of legalization fail to measure up, while others occasionally get it right.

Our stories stretch from before America's first medical weed dispensaries opened in 1996 through the short-term boom in legal consumption that happened during COVID-19 lockdowns. The presentation is peppered with unexpected insights about how cannabis markets can thrive, how regulators get the laws right or wrong, and what might happen to legal and illegal cannabis markets going forward.

Introduction: Legalization splits one weed market into two

Everywhere in North America, we once had a single illegal weed market. But then, starting in 1996, as we explained in Chapter 1, a variety of U.S. states and Canada begin legalizing various forms of weed in various ways.

In most of the places that have legalized, newly legal weed growers, manufacturers, and sellers must go through the process of entering the world of legal business. That means paying taxes, complying with labor laws and environmental regulations, and following a huge variety of other standard rules that other legal businesses take for granted.

Beyond these basic burdens, for weed businesses, becoming legal means getting a state license to operate, generally getting city or county permissions, paying licensing fees and taxes, and meeting many rigorous government-imposed cannabis-specific rules. Compliance with these rules is now enforced, to varying degrees, by government agencies.

At the same time, in all of these places there is still a thriving unlicensed and illegal weed market that competes side by side with legal weed, with old-fashioned illegal weed producers operating off the radar, getting no licenses, meeting no standards, paying no taxes, and selling through traditional illegal back channels.

From the point of view of economics, everywhere in North America that has introduced any form of legal weed system, weed is now divided into two markets: legal weed and illegal weed (Figure 1). Every consumer who buys weed in North America is participating in at least one of these two markets.

Figure 1. Legal weed and illegal weed.

What's the difference between legal weed and illegal weed?

From the perspective of most consumers, the short answer is that there's not much difference. The products are almost identical. Here's why.

First of all, when you take some weed flower out of the package, the weed inside one package looks a lot like the weed inside any other package. Experts and connoisseurs notice myriad differences between products, but to most consumers, weed just looks like weed.

Similarly, to most consumers, one glass of red wine, after being poured, looks a lot like any other glass of red wine. Experts may be able to tell the difference between a merlot and a pinot noir from the color of the wine or its aromas, but one thing that's impossible for anyone to discriminate, just from looking at or tasting wine in the glass, is the legal status of the wine's supplier. Even the world's greatest wine critic couldn't tell, from drinking a glass of red wine, whether or not its importer has a valid license from the U.S. government.

The world's greatest weed critic, if handed a bud, also wouldn't be able to tell—from the taste of the smoke or its effects on the body—whether or not the weed's producer and seller have a state license in good standing. Anyone would need to see the package or know where the weed came from in order to differentiate legal weed from illegal weed. The difference between legal and illegal weed is purely non-sensory information.

For the market story we tell in this chapter, we limit the discussion to smokable flower, which looks something like the weed in Figure 5. We'll set aside vape pens, gummy bear candy, brownies, tinctures, wax, shatter, and other products, although the same general principles apply to those categories too.

Another thing to keep in mind is that when you have recreational legalization, it's not a crime for a consumer to buy or smoke illegal weed. It's only a crime to sell illegal weed. So there's no difference for the consumer from the perspective of legal risk. Consumers, from the start, have no particular incentive to favor legal weed.

Consumers' only incentive, as when they choose between brands of eggs, is to buy the product with the best price-quality combination they can find—legal or illegal. Quality matters to consumers, but so does price. Every consumer has a different definition of quality. So in the end, some consumers will buy legal weed, others will buy illegal weed, and still others will sample both and participate in both markets, buying some legal weed and some illegal weed.

How do you choose between legal weed and illegal weed?

Every consumer is an individual. Every consumer has their own beliefs, desires, likes, and dislikes that are different from every other consumer's. Your choice between legal and illegal weed, whoever you are, depends on a complex set of factors including the circumstances of the purchase, the price, the quality, and so on, measured against your own unique set of preferences.

We treat weed attributes such as convenience, perceived safety, and social acceptability of buying from one market versus the other as attributes that are valued by consumers in an individual way, not a universal way. Among some consumers who have been buying illegal weed for decades, the idea of walking into a store and buying from a licensed seller might just seem odd. Among other consumers, buying illegal weed might be considered morally wrong. Every consumer has a choice between the two, and will use their own preferences to make the choice.

But for almost every consumer, price also matters.

Let's say that back in the day when all weed was illegal, you were spending an average of $25 per eighth (1/8 ounce of smokable weed flower) for your usual illegal weed delivery from your trusted guy who knows a guy. Now, after legalization, you face a choice between sticking with your old illegal weed delivery service versus switching to a legal weed delivery service that's selling a very similar product.

If illegal weed were going to be delivered to your door in 10 minutes and cost you $25 per eighth, and legal weed were going to take several hours and cost you $50 per eighth, then unless you're very rich and very patient, you might find it hard to justify ditching illegal weed for legal weed.

Even if legal and illegal weed cost the same, were of the same quality, and were delivered in the same amount of time, you might have plenty of reasons beyond price not to switch to legal. Maybe you like the illegal weed you are used to smoking, you know who grows it, and you think the price is fair. Maybe you are buying from a friend you care about, and you want to keep supporting their livelihood. Maybe you enjoy being slightly rebellious and buying something underground.

One the other hand, you might also have some reasons to switch to legal weed, even if it costs more. It's certified as pesticide-free; it has exact THC, CBD, and other micro-measurements printed on the label; and it probably comes in a nicer package, suitable for gifting. Some consumers are clearly willing to pay extra for these safety, information, and beauty attributes.

As the legendary economist Thorstein Veblen famously argued, preferences can also include "social signaling" or "conspicuous consumption," i.e. the desire to impress others with one's own consumptions. Your choice between legal and illegal weed could also have social dimensions. Depending on your crowd (or which party you're showing up at), legal weed might be cooler or less cool than illegal weed.

Legal and illegal weed are close, competitive substitutes. Understanding the role of illegal weed in the market, and the effect of illegal weed on the prices and quantities of legal weed, is a major topic for economists studying weed markets. One way to stimulate the legal weed sales and revenue would be to attract customers away from the illegal sellers: for instance, with low taxes and looser legal weed regulations that lower the price and increase the availability of illegal weed. For example, Oklahoma, despite only legalizing medicinal weed, has allowed many retail licensees and a vibrant retail market for legal weed.

Another way to stimulate the legal weed segment is to attack the illegal weed segment with great vigor in attempt to raise the costs of those suppliers. Raising the cost of supplying illegal weed would imply that the price of illegal weed would rise and the quantity demanded of illegal weed would fall. Back in Figure 7, because the substitute has gotten expensive, the demand for legal weed would shift out and more legal weed would be demanded. It is not clear that governments are willing or able to impose large new costs on sellers of illegal weed, so this enforcement option seems limited.

As long as legal weed remains expensive and highly regulated, and buyers will continue to find illegal weed a good alternative compared with illegal weed, the legal weed segment will continue to be severely limited in its potential to get big.

Legal weed in 2050

We now turn to the legal weed market 30 years in the future, around 2050. By then, we expect that there will be a mature, vigorous market where weed is legalized and regulated nationally in the United States, traded between U.S. states, and probably traded among the U.S., Canada, and Mexico.

A central question we consider in this section is: Are typical prognosticators right about the long-term future market for legal weed, or are they high?

Many observers agree with the basics of the long-term expectations we just listed, including national legalization and probably international trade. With that starting outline, lots of industry representatives, analysts, forecasters, and media observers promise the moon. They see a rapidly expanding pie and a huge amount of money that will be shared by all sorts of legal weed businesses in the future.

Many analysts project, based on early percentage growth rates and assumptions, that the value of revenue in the U.S. (and international) legal retail weed market will become vastly larger decade by decade. And many project that national legalization will help almost all legal weed businesses by allowing better access to capital and a much bigger market.

In 2018, the San Francisco market research firm Grand View Research projected a $146 billion global cannabis retail market by the end of 2025. In 2020, Cowen & Co., "Wall Street's top cannabis analysts," projected a $85 billion retail market by 2030 in the United States alone.

Using the economic principles and background data developed in previous chapters, we now take our own turn looking into the future. We look at the cannabis industry in 2050, further out than most analysts. As you will see, we differ from them in other important ways, and we end up with dramatically different conclusions.

(Some prognosticators come up with dramatically different conclusions than their own past selves: as of 2021, the same Grand View Research folks who in 2018 had projected a $146 billion market in 2025 are now projecting a $91.5 billion market in 2028. We say: good for them, better late than never, and 2025 is uncomfortably close.)

We start by stating and exploring four expectations about big changes we see ahead for the cannabis industry. All four expected changes might (on their surface) sound positive for the industry, and they tend to be given a positive spin in the media. The first two changes we expect relate to laws and regulations, and the third and fourth changes relate to technology and business developments.

We find all four to be quite plausible and even highly likely. After these four changes are incorporated into the market, we expect that weed will eventually develop into a normal mainstream industry. We find their consequences interesting, and not necessarily positive for many current weed businesses. The four big changes are:

1. U.S. national legalization and regulation of weed
2. Legal interstate and international weed trade
3. More efficient weed farm and processing production technology
4. Real agribusiness: scale, specialization, financing, and management improvements

We'll now look at each of these four expected changes in the context of weed regulation, taxation, farming, technology and business management. We'll uncover how the four expected changes affect the likely path of revenue of legal cannabis business.

Expected long-run change 1: U.S. national legalization and regulation of weed

As of 2021, under U.S. federal (national) law, weed is a Schedule I illegal narcotic—a designation reserved for substances with "no currently accepted medical use and a high potential for abuse" under the Controlled Substances Act of 1970—bringing the laws in all 28 states with some form of weed legalization into conflict with federal law.

The federal legalization of weed is a major change that seems like a matter of time, and the time is almost at hand. Here use the term "federal legalization" the way that some others use "federal decriminalization" or "descheduling," meaning the removal of weed from the U.S. Drug Enforcement Administration (DEA)'s list of Schedule I illegal narcotics. Along with this federal change there is likely to be the continued spread of weed legalization in all (or effectively all) states and local jurisdictions. An additional step beyond this, that may or may not occur at the same time (but would not occur sooner than legalization), is what we call "federal regulation": the introduction of a federal system of licensing, taxes, and standards. Such a system could look similar or different to the one we have for alcohol.

Mere federal legalization, without federal regulation, would make life easier for the legal weed industry in some ways. The federal prohibition on weed currently creates a variety of problems for weed businesses that are operating legally under state laws. These problems include the weird income tax rules and highly restricted access to the banking system: for instance, banks with protection from the FDIC (Federal Deposit Insurance Corporation) are prohibited from lending to businesses engaged in federally illegal activities, including weed. Some of this is what prompted the *Standing Akimbo* legal case that Justice Thomas wanted the U.S. Supreme Court to review (see "Weed Supreme" later in this chapter).

Federal legalization would not necessarily help everyone in the industry. First, it would probably imply interstate commerce (expected long-run change 2), which means the same type of interstate market that is guaranteed by the Commerce Clause of the U.S. Constitution for legal products. The U.S. Constitution limits most trade restrictions across states for other legal farm commodities and products. Trade economists know that not everyone wins from free trade. As we discussed above, the basics tell us that producers and suppliers in high-priced places may sell less or even go out of business when markets are opened. However, the Supreme Court has allowed the State of California to impose California farming rules production of eggs and pork in the rest of the United States and Canada, before it will allow its residents to buy those products. Alcohol trade across states, meanwhile, remains explicitly limited under Constitutional Amendment 21, which ended Prohibition.

Much uncertainty and political complexity surrounds the timeline for federal decriminalization—the process could take anywhere from one to 5 or even 15 years. But we predict that full federal weed legalization, and probably regulation and taxation, will happen well before 2050. Recent momentum suggests a faster timetable. Some think the schedule for federal legalization should be considered in months, not decades.

We think federal decriminalization or legalization could lower weed pre-tax wholesale prices and retail markups to such an extent that the total value of legal weed markets could be decimated even if the quantity of legal weed produced rises a lot. How could that happen?

A big unknown here is whether, and how, the federal government chooses to regulate the weed industry. If an additional layer of federal regulations and taxation is imposed on top of state taxes (as is currently done for alcohol), or if federal barriers to licensing are high, then an unknown number of additional costs could be added, further jeopardizing the legal market's chances for success. In that case, legal weed quantities would likely fall, driven by rising after-tax costs at retail.

U.S. alcohol taxes for alcoholic beverages are fixed per unit of alcohol. They are not set as a percent of price. That means alcohol taxes are a big deal for cheap booze, but have little effect on fancy wine. In contrast, alcohol taxes have relatively little impact on the prices of expensive alcohol or alcohol bought in bars and restaurants, where the retail markup is high.

Expected long-run change 2: Legal and international interstate weed trade

One part of federal legalization would almost surely be interstate competition in weed. This is so important and so misunderstood that we want to highlight it separately.

As of mid-2021, 18 U.S. states (plus the District of Columbia) had passed legislation or voter ballot initiatives to legalize recreational weed, of which 12 of them had set up legal regulate the recreational industry; and 36 states had passed legislation or voter ballot initiatives to legalize medical weed. In the medical-only states, a wide range of different standards govern the circumstances under which patients may legally be permitted to use weed.

The Commerce Clause of the U.S. Constitution (Article I, Section 8) prohibits states from using laws that impede the free exchange of goods between states, unless states have a compelling public interest in impeding such free exchange. However, the Commerce Clause does not protect the interstate trade of federally illegal goods such as weed. As a result, all of the states that have legalized adult-use or medicinal weed have universally passed laws pertaining only to in-state commerce. Although the U.S. Department of Justice (DOJ), in recent years, has increasingly refrained from prosecuting in-state weed sales that are legal under state law, federal prosecutors are still actively enforcing laws against interstate shipping.

For as long as interstate weed commerce remains illegal, producers in states where legal weed is relatively expensive because of high regulatory costs and high taxes are at least partially protected. In Massachusetts, for example, where the average wholesale price of weed was about $3,500 per pound in 2021, local legal weed does not have to compete with supply from states where legal weed is relatively cheap, such as Washington, where state regulations and taxation are less costly and the average wholesale price of weed was about $1,150 per pound in 2021.

But when U.S. interstate weed commerce eventually opens—which could even happen before full federal legalization—cultivators and wholesalers in high-cost states like Massachusetts will have to compete with weed imported from states like Washington. The opening of interstate commerce could deal a severe blow to weed producers in states where it is expensive to produce weed because of natural conditions and input costs, or because of cannabis regulations and taxes.

California has long been the dominant force in the U.S. illegal weed market, producing (according to many estimates) more than half of America's illegal supply. California weed producers also support the country's largest legal market. In the past, much of California weed was grown outdoors. With outdoor-grown weed, as with wine, California's favorable growing climate has contributed to its comparative advantage. Many observers have naturally assumed that California will be a strong player in a future interstate weed market.

Not so fast. Let's take this step by step.

In many places, including California, efficient large-scale weed production has tended to move into indoor or covered spaces with some artificial lighting, including greenhouses with supplemental lighting, where crops can be harvested multiple times per year. With greenhouse production, outdoor climate is much less relevant to costs and yields. As a testament to this point, greenhouse-grown, high-quality tomatoes from Holland and British Columbia, which has little sunlight but cheap hydro-power, are imported into California, while California grows acres and acres in cheap tomatoes for tomato paste. With indoor production, climate is irrelevant, except as it may impact utility costs. California's climate advantage may be almost irrelevant in the future weed market.

On the other hand, illegal weed in California has had a second advantage: many square miles of rugged and inaccessible places like the national forests of the North Coast, where outdoor illegal weed growers could operate off the grid for years on end, in reasonably hospitable conditions.

Indoor and greenhouse weed production are electricity-heavy, and compared with other states. California has the highest commercial electricity rates outside of Hawaii. California regulations, though they may be justifiable from the point of view of social aims, do not come cheap for farm producers. Cannabis may learn this too. Some state and local taxes and regulations governing minimum wage and other employment terms, worker safety, water rights, and environmental standards are more costly in California than they are in most other U.S. agricultural states, or in Canadian provinces, or in all of Mexico.

For weed, these between-states differences in rules and their enforcement will create regulatory arbitrage opportunities for production of legal weed grown in states with less costly regulations. Industry-friendly laws, regulations, and enforcement have become a vital part of comparative advantage, just like sunshine or good roads. This is a lesson from many other farm and food industries, from eggs to milk. Unless climate is king, production will move.

The economic beneficiaries of the opening of interstate commerce will likely be producers in states with low production and processing costs, including costs of complying with regulations and taxes. The losers will be producers that attempt to remain in states with higher production and processing costs, including costs of complying with regulations. The California and Massachusetts legal weed industries may have a tough time under interstate competition.

The below-average retail weed prices in thinly populated states where business costs are low, like Oklahoma, and in states with the long-running legal weed industries and relatively light regulations, such as Colorado and Washington, suggests that both of these types of states could become net exporters of legal weed in an interstate market.

Our best assessment is that weed is not really like almonds, lettuce, or winegrapes, which are crucially dependent on climate, soil, or related conditions for yields and quality. Producing weed is more like producing eggs, where, because production is confined, general business costs, including regulations affect location more than specific weather or soil conditions.

To be clear, there are winegrapes in lots of places where local buyers get a kick out of "buying local" and showing off the label to their friends. But not so much for almonds—even though, technically, a farm in New Jersey could grow almonds in greenhouses. (Aside, off-season, greenhouse-grown mandarin trees are lucrative for a few farms in Korea, so when price is no object, many things are possible.) Because California has 40 million nearby consumers and shipping eggs is expensive, California farms continue to supply almost half of local egg production. California farms dominated US egg output 30 years ago and shipped eggs all over the United States, but those days ended as costs rose and producers elsewhere adopted California-level technology and management systems.

There are two main economic implications of interstate (and international) competition: (1) Expect legal production to move to where it can be done most efficiently, given the most important inputs costs of energy and labor, and given the degree to which regulations affects business costs. However, this effect may be mitigated to some extent if California or other places impose taxes, or costly and unique testing or regulatory standards, that raise costs for out-of-state products trying to enter the local market. (2) As weed production and processing moves, it will get cheaper, and prices in all states will converge to prices in the cheaper states. Such arbitrage-based price declines can happen very rapidly when trade restrictions are lifted. Currently there is wide variation in state-by-state wholesale weed prices, as we discussed in Chapter 3. Prices are 70% higher in California than in Colorado, even though the California industry claims great local climate and expertise.

Finally, there’s the international market, which may be the hardest thing of all to predict. Depending on how it is implemented, legal interstate trade in the U.S. could also mean legal international trade in weed by 2050, at least with some countries. This means that U.S. producers would have to compete with low-priced supply coming from places like Saskatchewan—which has a big share of the North American industrial hemp market—or, maybe even more threateningly, Mexico, where retail illegal weed from street dealers commonly sells in local markets for less than $20 per ounce!

Meanwhile, on the top shelf, premium California weed might have to compete with premium Dutch weed. International trade in weed, like international trade in strawberries, will benefit consumers with more variety and lower prices, at a cost to U.S. producers who must compete with imported goods. It is not clear that U.S. weed would win in the low-price or high-quality competition.

A final note here is that local retailers might eventually have to compete with mega-retail chains in retail weed sales. The current limitations of, and implications of, state laws mean that weed retailers must specialize on weed and sell few other things. Generalized pharmacies, convenience stores, and supermarkets do not sell weed. This could easily change in the future. If Walgreens and Costco are eventually competing on retail sales, then the local weed retailer may be no more likely to stay in business than the local shoe store.

Expected long-run change 3: More efficient weed farm and processing production technology

The third change that we expect will drive the evolution of the legal weed industry between now and 2050 is not a regulatory change, but rather a structural one: the development of new technology that makes weed growing, harvesting, trimming, packaging, and distribution far more efficient than it has been until now.

The future of technological developments and adoption are always hard to define or predict. So we don’t dwell on specifics other than to point out that even in the absence of major regulatory changes, prices would still be likely to fall substantially as modern technology and farm practices spread through the industry.

Nationwide, the weed industry is still transitioning out of a long cottage-industry phase during which high margins and legal risks incentivized costly, small-scale production over lower-cost, large-scale production. As far back as 2010, scholars such as RAND researcher Jonathan Caulkins have pointed out that there is no fundamental barrier to stop weed from being produced much more cheaply, and sold for an order of magnitude lower than prevailing prices.

We tend to concur. Even outdoor production takes trivial amounts of farmland and can locate where it is best suited. Greenhouse and warehouse production does not depend on climate, and will move to where purchase inputs and labor are cheap. None of the inputs used for weed are inherently scarce, and skills and experience are expanding rapidly.

Going down the list: land is an almost negligible cost of production; there are no major barriers to training a highly skilled weed labor force; and there is nothing especially costly about breeding or producing high-yield and high quality seeds or seedlings. New, more efficient lighting and indoor spaces, labor-saving equipment, and manufacturing facilities are on the horizon. In all, there is no obvious reason why the wholesale price of weed could not someday fall to $75 per pound or even $30 per pound, as Caulkins suggests. Improvements in the supply chain would push retail product prices down—at least for standard products bought by normal weed consumers.

Even below $100 per pound, weed will still be handled with care, not harvested by sloppy machines like $50-per-ton tomatoes that leave much of the crop in the field and harvest green tomatoes that must be discarded at the factory. Remember, $100-per-pound weed still has 20 times the wholesale value of high-priced cabernet sauvignon grapes from Napa Valley, and nobody leaves those on the vine or on the ground. “Handle with care” will still prevail even as the price of legal weed falls in the future.

But in terms of costs, weed today is still in the pre-hybrid phase of crop production. Technology allowed corn yields to rise from 50 bushels per acre to 200 bushels per acre on the same land, while cutting labor use to almost nothing. For weed, no one currently cares much about yield per acre, since the price is so high as to render land input costs trivial. But the same principle that applies to winegrapes or corn will eventually apply to weed. Revenue per unit of labor and unit of greenhouse electricity may be ratios that matter more. Science and engineering have only just begun to be applied in a serious way. For example, modern plant breeding and the new genetic revolution (see the 2020 Nobel Prize in Medicine) are nowhere to be seen in weed.

Of course, no one should expect to see the same technology in weed that applies to field crops or even fruit and vegetable crops. But just as technology is a big deal in improving organic raspberries or blackberries, the revolution in greenhouse-grown weed with efficient lighting. Optimal humidity control and disease resistant varieties is happening quickly. This revolution is increasing the ratio of dried flowers to total biomass to get high-potency flowers (and increased

THC generally) at a lower cost. The labor-saving innovation of mechanical trimming is not yet commonplace in the industry, but someday it will be. All of these innovations, when they happen, will lower costs.

The first decade of full legalization will be a time when weed catches up to other parts of farming and agribusiness technology. After that, incentives for new and weed-specific technology will become more important.

Expected long-run change 4: Real agribusiness

Old hippies (or even young hippies) are not necessarily naturals at running agribusinesses, or at running any legal business at scale. In states with recreational legalization, we're already seeing the entry of more suits with typical business backgrounds.

But farming isn't a typical business background either. Hedge-fund managers and private equity hustlers don't bring much agribusiness experience to the table.

Harvard University, after being taken to the cleaners on land and water by local yokels from San Luis Obispo to Mato Grosso, recently pulled out of big investments in orchards, vineyards, cotton, and dairy farms. The Harvard investments in California starting in 2012 were not in cannabis farms, but in paying top dollar for land converted to vineyards after large investments in irrigation water. They sold out in 2020.

Nothing raises farm costs more than suits from Wall Street trying to satisfy stock analysts looking at quarterly returns (especially for crops harvested annually).

Farm families typically have huge amounts of equity and very little debt, and little of that has gone into weed because of the illegality taint. So legal weed will allow the people who really know their ~~shit~~ fertilizer to get into the business big time. Once weed becomes just another agricultural commodity, you can expect the management expertise of real farmers doing real farming to kick in. And there are plenty of farm families with a cousin Louise (MBA, Wharton), and nephew Louie, (Engineering, Georgia Tech) in the business, along with Aunt Robin who is a plant science graduate from UC Davis. Modern and successful farms have a combination of technical expertise to be at the profitable edge of technology while having the practical experience to understand what is likely to pay off in the field (or the greenhouse).

So far, both the Ziploc bag of mom-and-pop legal weed and the flashy legal weed in the glass jar with the dot-com logo have been grown, processed, distributed, and marketed outside regular agribusiness channels. But wait until companies similar to Driscoll's Berries (packing in retail packages in the field) are farming weed. These farming companies will work with marketers similar to Walmart or Costco to get weed to customers in a form and at a price that customers demand. Costs will be a fraction of what they are in the current 19th-century system.

But if you're into craft weed, don't worry: craft weed will thrive too, if not to the extent hoped for by Ryan Stoa in his romantically optimistic 2018 book *Craft Weed.* Just like many of us enjoy driving out to a farm and picking apples one Saturday a year, or are happy to pay triple for a locally-produced jelly we are told is made by somebody's grandmother, there will still be a market for those of us who want to pay more for less because it seems like fun. But competition from companies run by people who are good at it will drive prices down by an order of magnitude.

To summarize: in all competitive industries, the market price is determined by the highest-cost producers that can remain in business. (Those with costs even higher than that price lose money and exit.)

Low-cost producers make substantial profits which stimulates them to expand. Those profits also stimulate observant neighbors, and new entrants, to copy what those with profits have done and the price falls. Some businesses fail, and the efficient producers have incentives to innovate in order to harvest greater profits. The price falls again and the cycle of innovation continues. This is the set of incentives driving the future of weed.