Hemp in the United States

A Case Study of Regulatory Path Dependency

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Abstract

The Agricultural Act of 2014 allowed for federally funded research on hemp for the first time since 1937. Since 2014, pro-hemp legislation has received increasingly bipartisan support, culminating with the Hemp Farming Act of 2018, which would remove industrial hemp from its current Schedule 1 listing and allow hemp to be treated like any other agricultural commodity. In part because of this legalization, hemp production in the United States has the potential to increase substantially. This study describes what is known about the economic and regulatory considerations of US hemp agriculture through the lens of path dependency. Important questions remain regarding the legal and regulatory landscape of hemp and are further complicated by its current listing as a Schedule 1 drug.

JEL codes: K23, Q18, R52

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Hemp in the United States:

A Case Study of Regulatory Path Dependence

Trey Malone and Kevin Gomez

Hemp is a crop deemed by some as "no more harmful than industrial switchgrass" (Mitchell 2013), yet the US government has labeled it a Schedule 1 drug. Hemp has been produced throughout the history of global agriculture and is on the verge of making a comeback. Powerful lobbying groups such as the American Farm Bureau Federation support a move toward increasing hemp production in the United States (Comer and Holte 2017). Despite bipartisan support, industrial hemp remains severely regulated, constraining potential market opportunities for US farmers. Thus, the primary objective of this paper is to describe the regulatory evolution of the US hemp market via the path dependence paradigm.

Path dependence argues, "Where we go next depends not only on where we are now, but also upon where we have been" (Liebowitz and Margolis 1999, 981). Much of this literature has focused on the potential for markets to "lock in" to what sometimes appear to be suboptimal equilibria. Relatedly, behavioral economics has identified the existence of "status quo bias," where individuals often rely on their current state of affairs as a reference point (Kahneman, Knetsch, and Thaler 1991). There are two different kinds of path dependence. First, there are accepted norms, such as driving on the right side of the road in the United States and driving on the left in Great Britain. Second, there is a type of path dependence in which agents might find difficulty in repealing inferior decisions when superior alternatives become available. Studies on these suboptimal equilibria range from the illustrative, such as 20th century American beer

(Stack and Gartland 2003) and the QWERTY keyboard (David 1985; Liebowitz and Margolis 1995), to the policy-relevant, such as nuclear reactors (Cowan 1990).[1]

The notion of path dependence hinges on the role of switching costs and switching benefits. That is, inefficient institutions should switch to more efficient institutions when the expected marginal benefits associated with the change exceed the expected marginal costs. From Khalil (2013, 29):

> Such switching cost must, of course, include the uncertainty concerning the cost of adopting the superior institutions or technologies; and the benefits of the superior institutions must, of course, express the ambiguity associated with future returns. So, the argument is that path dependence phenomenon cannot be taken necessarily as indicative of inefficiency once we take into consideration the switching costs or benefits that includes uncertainty and ambiguity.

As such, three mechanisms might eliminate inefficient regulations. First, a reduction of switching costs might induce the institutional transition. Second, an increase in the marginal benefit associated with the transition might induce institutional change. Finally, a reduction of uncertainty regarding the outcome of the transition has the potential to induce regulatory change. This article considers each of these three mechanisms in turn.

It is important to distinguish between two distinct groups of *Cannabis sativa L.*: marijuana and hemp. Because hemp does not contain psychoactive compounds, it is only logical to ask why it was illegal in the first place. This paper argues that the heightened regulations in US hemp markets are an unnecessary byproduct of the uncertainty and limited knowledge of the regulatory agencies of the early 20th century. As such, our research suggests that policymakers continue their march toward deregulation of hemp markets. Thus, this article contributes to the

[1] Stack and Gartland (2003) suggest that path dependence in beer markets contributed to the perpetuation of the American-style lager beer in the 20th century—a beer that many consider to be of low quality. Similarly, David (1985) argues that path dependence drove the QWERTY keyboard to prevail despite its inefficient design, although Liebowitz and Margolis (1995) dispute this finding. Cowan (1990) focuses on the use of light water in nuclear power even though it is considered inferior to other technologies.

literature in three ways. First, we utilize the theory of path dependence to describe the complex landscape of hemp regulations. Second, from this description, we show how these regulations constrain the production and commercial use of hemp across the United States. Finally, we consider three reasons that current conditions might lead to the reduction of hemp regulation (decreased switching costs, increased switching benefits, and reduced uncertainty). This is most evident in the wide-ranging bipartisan support of current hemp legislation; Republicans such as Senator Mitch McConnell and Democrats such as Representative Jared Polis are at the forefront of eliminating hemp regulations.

Path Dependence in Hemp

As noted, marijuana and hemp are two distinct varieties of *Cannabis Sativa L*. Marijuana is grown for its intoxicating nature, which is caused by tetrahydrocannabinol (THC) in the crop. By contrast, in order for cannabis to be considered "hemp," it must contain less than 0.3 percent THC (Cherney and Small 2016), although it can contain other chemical compounds such as cannabidiol (CBD),[2] which is valued for its medical and therapeutic properties. As such, consumers cannot become intoxicated by hemp, and industrial hemp has historically been grown for its seeds, seed oils, and fiber.

The majority of Americans support some form of legalization of marijuana, and more than half the states have legalized it in some form (Geiger 2018). To date, the debate surrounding hemp has been conflated with that surrounding marijuana, although the differences between the two crops are not trivial. That is, rather than focusing on industrial hemp, conversations

[2] The relationship between THC and CBD is generally inverse, although currently available hemp varieties are considered a rather poor source of CBD. Despite lower levels of total CBD production, the CBD-to-THC ratio may still reach levels of above 10:1 (Mead 2017).

surrounding hemp production generally focus on the successes and failures of increasing access to all varieties of cannabis.

Hemp has a long, storied past. It is considered one of the first cultivated crops in world history and was first commercially grown in the United States in the 17th century (Fortenbery and Bennett 2004). Hemp was crucial in the country's early years, but its production began to decrease in the late 1800s as innovations in cotton processing—such as the cotton gin—made hemp processing too expensive. Despite this decline, one estimate in 1938 suggested that hemp could be found as an input in over 25,000 products (*Popular Mechanics* 1938).

The Marijuana Tax Act (MTA) of 1937 was the first substantial regulatory blow to hemp producers. The law did not explicitly ban marijuana and hemp production, but rather imposed an additional tax on the commodity. There is some debate about the motivations behind the MTA. Some argue that the law coincided with a heightened public interest in (1) disapproval of behavior that could cause loss of self-control, (2) disapproval of action taken solely to produce states of ecstasy, and (3) a view that concern for human welfare or humanitarianism requires the suppression of drugs (Becker 1963; Galliher and Walker 1977). More cynically, others argue that the MTA was politically linked to racism and the creation of federal narcotics control (Rogers 2011). These arguments take a public choice angle, suggesting that rent-seeking and budget-maximizing bureaus led to the legislation's passage and the Drug Enforcement Agency's subsequent policies (Shepherd 1999). It is also worth mentioning that officials at the Federal Bureau on Narcotics might have been interested in expanding the size of their budget and control by pushing for the MTA. Some groups have even made the unsubstantiated claim that major 20th-century businesses headed by the DuPont Company and William Randolph Hearst wanted

to keep hemp from competing with paper and other products (Luginbuhl 2001).[3] Regardless of the political incentives, limited knowledge about cannabis has helped generate a century of misguided public policy.

The MTA was largely viewed as a symbolic gesture, as state governments had already recently taken steps to prohibit marijuana production and consumption. Only 16 states had passed laws prohibiting the use of marijuana in 1930; by the time the MTA passed, all states had passed a prohibition of marijuana. The unintended consequence of the law, however, was to link hemp and marijuana for decades. As noted, the law itself did not entirely eliminate hemp production in the United States. In fact, the USDA even created a film a few years later to encourage the production of hemp during World War II (US Department of Agriculture 1942). In 1943 alone, nearly 141 million pounds of hemp were harvested—up from a 5.1 million pound average from 1938 to 1942 (US Department of Agriculture 1944). Because of this interest, hemp was grown despite being heavily taxed and regulated into the 1950s. By then, the regulatory path dependence had been established, and its effects can be felt to this day.

Another key change in hemp regulation occurred in 1961, when the United Nations convened the Single Convention on Narcotic Drugs. While Article 28 of the Single Convention firmly excluded industrial hemp from the regulatory framework, the fact that it was mentioned at all suggests that hemp was a candidate for heightened regulatory oversight. Even at the Single Convention on Narcotic Drugs, there was substantial debate about cannabis. Unfortunately, the regulatory authorities were slow to change the existing regulations. As noted by the Senate of Canada, "The WHO later found that cannabis could have medical applications after all, but the

[3] Even though it is a popular story, there seems to be limited evidence to support this nefarious origin.

structure was already in place and no international action has since been taken to correct this anomaly" (Kenny and Nolin 2003).

The next important change in hemp regulation occurred in 1970 via the Controlled Substances Act (CSA).[4] Before this act, regulations were separate for hemp and marijuana. While hemp fiber, seed oil, and seed cake were listed as exempt in the CSA, the act also established that viable hemp *seeds* were not fundamentally distinct from marijuana. Furthermore, the act required that all hemp production be licensed by the Drug Enforcement Agency (DEA), which rejected almost every application for decades.[5] Similar to the MTA, enforcement by the DEA has also been linked to public choice motivations, as the DEA increasingly moved to suppress state-level reductions in hemp regulations (Thedinger 2006). The costly application process limited research on hemp varieties and thus hindered future market development, which depended on that research. Issues continue to arise surrounding decisions by the DEA to regulate hemp foods under Schedule 1 (Keahey 2017).

From the 1970s until 2014, hemp producers existed in a highly regulated grey area. Heightened federal government restrictions eliminated processing facilities, which effectively regulated the hemp industry out of existence. Since then, commercial hemp production has remained minimal, with interest in the crop reappearing in the past few years (Cherney and Small 2016). Producers finally began to receive additional clarification from the 2014 Farm Bill, which legalized the growth and cultivation of industrial hemp for research purposes in states where the law permits such activity. Labeled as establishing the "Legitimacy of Industrial Hemp Research," Section 7606 of the Agriculture Act of 2014 legally defined industrial hemp as different from marijuana and allowed state governments and universities to regulate and conduct

[4] For a thorough discussion of hemp under the CSA, see Kolosov (2009).
[5] Notable exceptions include Hawaii in the first decade of the 21st century and North Dakota in 2007.

research on industrial hemp. Since then, the majority of states have allowed for some production of industrial hemp in an effort to evaluate the potential for their farmers to sell to this burgeoning market (Schluttenhofer and Yuan 2017). Each state has opted for varying levels of regulatory constraints, and those constraints have influenced total acreage produced. However, the confusion surrounding hemp's status on the list of controlled substances, combined with subsequent federal scrutiny, has kept many potential hemp farmers from entering the marketplace (Peters 2017).

In light of this 2014 Farm Bill, the US Department of Agriculture (USDA), the DEA, and the US Food and Drug Administration (FDA) wrote provisions titled the "Statement of Principles on Industrial Hemp" in an effort to clarify the vague language that caused uncertainty (National Institute of Food and Agriculture 2016). However, this created additional uncertainty and confusion in the marketplace (Warren 2017). Similarly, the DEA's "Marijuana Extract Rule" was supposed to provide clarity regarding the position of the agency. The rule states,

The term "marihuana" means all parts of the plant *Cannabis sativa L.*, whether growing or not; the seeds thereof; the resin extracted from any part of such plant; and every compound, manufacture salt derivative mixture, or preparation of such plant, its seeds or resin. Such term does not include the mature stalks of such plant, fiber reduced from such stalks, oil or cake made from the seeds of such plant, any other compound, manufacture, salt derivative, or preparation of such mature stalks (except the resin extracted therefrom), fiber, oil, or cake, or the sterilized seed of such plant which is incapable of germination.

The unclear wording led to a lawsuit: *Hemp Industries Association v. US Drug Enforcement Administration*. The Hemp Industries Association (HIA) sued the DEA for implying that CBD was illegal despite it being derived from hemp. Instead of making a clear

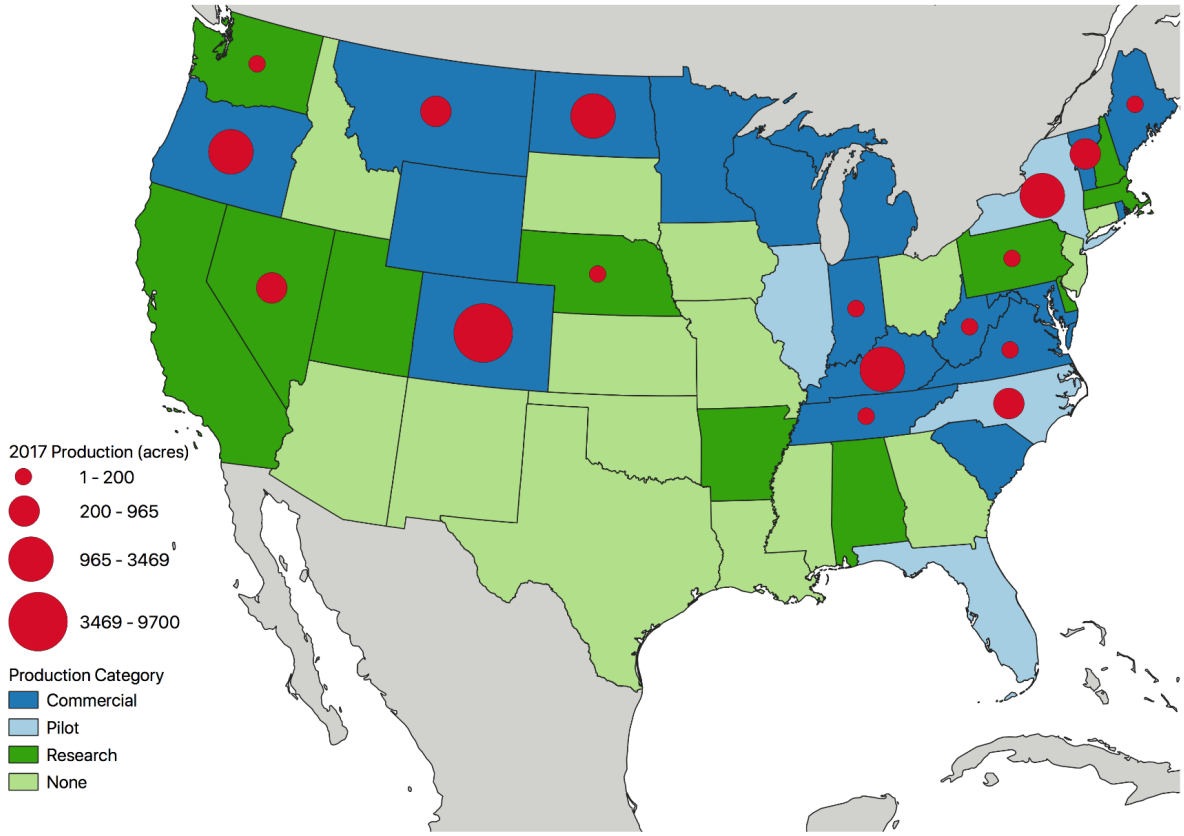
decision, the court dismissed the case, causing further confusion as it allowed the legal debate to continue (O'Connell 2018).

Current State Legislation

Modern-day interest in industrial hemp can be found in all regions of the country, from Arizona (Moberly 2015) to Kentucky (Rogers 2011). While growers in most states must provide contact information and coordinates of land being used to grow hemp, many other constraints vary by state. Figure 1 displays a map of the state-level regulatory constraints of hemp layered with the total number of licensed acres in each state in 2017.

From 2015 to 2017, the United States saw the total number of acres registered to grow industrial hemp quadruple from 6,712 to 25,713 (Vote Hemp 2018). The states with the largest levels of production in 2017 were Colorado, Kentucky, and Oregon. As of 2017, Colorado growers registered 9,700 acres, a 64 percent increase from the previous year, with 527 registered participants. Oregon growers registered 3,469 acres. Kentucky growers registered 3,271 acres with 161 participants. Estimates suggest that Kentucky growers might increase their total production to approximately 80,000 acres of industrial hemp and remain profitable, but supply chain issues are likely to induce substantial price volatility (Thompson, Berger, and Allen 1998; Robbins et al. 2013). Even states with meager prior production have significantly increased the licensed number of hemp acreages. For example, North Dakota has seen a significant increase in registered acres and interest in industrial hemp plots; 70 acres of hemp were planted in 2016, and more than 3,000 acres were planted in 2017 (North Dakota Department of Agriculture 2017).

Figure 1. Licensed Production Acres in 2017 in the United States



Sources: Hemp production statutes by state can be found at National Conference of State Legislatures, "State Industrial Hemp Statutes," August 8, 2018, http://www.ncsl.org/research/agriculture-and-rural-development/state-industrial-hemp-statutes.aspx. Hemp production by state can be found at VoteHemp.org, "State Hemp Law," accessed October 25, 2018, https://www.votehemp.com/resources/state-hemp-law/.

The licensing fees required to produce hemp vary substantially by state. Colorado has two types of registrations, one for research and development and the other for commercial purposes. In either case, registrants are not limited in size of acreage dedicated to industrial hemp and are charged a $500 registration fee plus $5.00 per acre registered. The current rules to obtain a license to grow in Kentucky require potential growers to go through an extensive application process costing $520 (Kentucky Department of Agriculture 2018). Furthermore, the Kentucky Department of Agriculture charges an additional $1,000 for any modifications to the plot of land

after the original location of the plot has been approved. Participants must also pay annual licensing fees of $500 for "handlers," $500 for "fiber processers," $500 for "grain processors," and $3,000 for "floral material processors." To register for the North Dakota pilot program, growers are charged a $150 registration fee plus an additional $25 per acre. In Oregon, growers must pay a $1,300 annual fee as well as a $120 annual registration fee for "agricultural hemp seed" handlers (Oregon Department of Agriculture 2018). A hemp license cost $450 in Montana. There are no application fees in South Carolina owing to the limited quantity of farmers permitted to grow. The cost to obtain a license in Nevada is $500, and growers are charged an additional $5.00 per registered outdoor acre and $0.33 per square foot of indoor grow space.

To import seeds, growers must undergo inspection and approval from the DEA, although state licensing agencies vary significantly in the way they handle hemp seeds. In Oregon, growers and handlers may sell seeds or hemp products to other licensed participants.[6] In Montana, "all seeds must be devitalized after harvest and no seed production for future planting is allowed," unlike in Oregon, where seeds may be retained after harvest for future growths (Montana Department of Agriculture 2018).

Some states also place constraints on the size and location of hemp acreages. Oregon's regulators require that industrial hemp must be grown on fields that are at least 2.5 acres in size, although there is no limit on the maximum number of acres growers can register. In Kentucky, the plot must not be "adjacent to any structure that is used for residential purposes, in any outdoor field or site that is located within 1,000 feet of schools, or a public recreational area, or on property which is not owned or completely controlled by the license holder" (Kentucky Department of Agriculture 2018).

[6] See *Oregon Laws* ch. 71 (2016).

Public policies surrounding hemp are changing rapidly, with support from all parts of the political spectrum. In the following section, we assess three reasons that this might be the case: reduced uncertainty, reduced switching costs, and reduced switching benefits.

Reduced Uncertainty

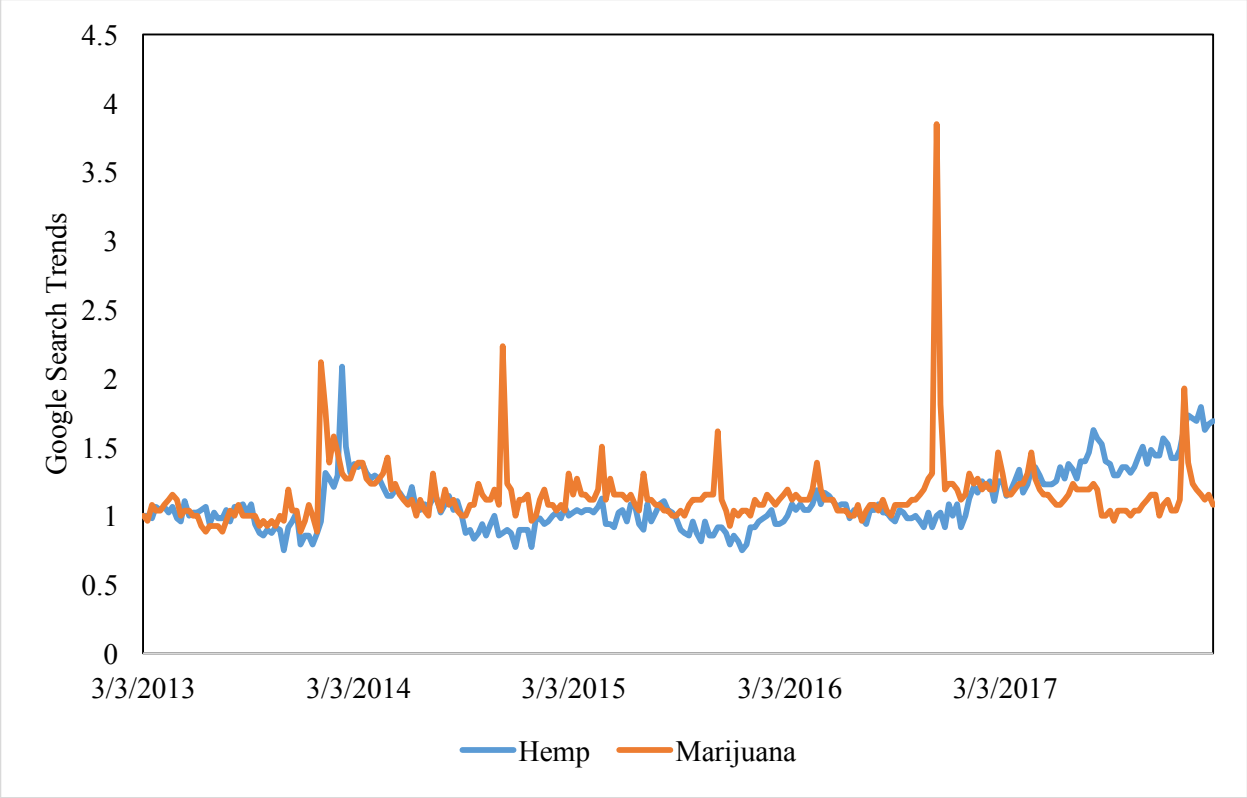
Although reform of industrial hemp regulations is increasingly popular, such popularity does not mean that consumers have become more mindful of the differences between hemp and marijuana. As such, the reduced political risk of legalizing hemp seems to echo the reduced political risk of legalizing marijuana. Figure 2 displays Google Trends data associated with the search terms "hemp" and "marijuana" in the United States from March 3, 2013, to February 18, 2018, where the data are normalized to a value of 1 for March 3, 2013.

Interest in marijuana has spiked more often than interest in hemp, although interest in hemp has experienced a more gradual increase in popularity in the past few years. The only spike in interest for hemp occurred at the beginning of February 2014, which correlated with the passage of the 2014 Farm Bill. By contrast, spikes in marijuana searches tend to be associated with elections in which marijuana was included as a ballot initiative. This suggests that the conversation about hemp has not been as heavily politicized as the conversation about marijuana.

Despite the apparent disconnect in voter interest between hemp and marijuana, advocates for the two crops appear to be working together in some states, while in other states the pro-hemp supporters generally do not want to be affiliated with the pro-marijuana supporters. It appears that some pro-marijuana supporters view federal hemp legalization as a means to get favorable federal legislation to legalize marijuana production nationally.[7]

[7] Representative Thomas Garrett (R-VA), who proposed the End the Marijuana Prohibition Act of 2017, is also in favor of the recent Industrial Hemp Farm Bill of 2018, proposed by Senator Mitch McConnell and others.

Figure 2. Google Searches of "Hemp" and "Marijuana" in the United States



Note: Data are normalized to a value of 1 for March 3, 2013.

Source: Google Trends, comparing search terms "marijuana" and "hemp" from March 3, 2013 to March 3, 2018 (https://trends.google.com/trends/explore?date=2013-03-03%202018-03-03&geo=US&q=hemp,marijuana).

Recently, the Food Demand Survey (Lusk 2017) asked a representative panel of Americans (n = 986), "Is there a difference between hemp and marijuana?" Results suggested that 34.4 percent of American consumers believe that hemp and marijuana are the same. Table 1 displays the results broken down by age, education, and political affiliation. Contrary to what might be expected, age was not a strong predictor of this information: 71.2 percent of people age 18 to 24 said there was a difference between hemp and marijuana, while 68.9 percent of people age 55 to 64 agreed. Similarly, there was only a small difference between the opinions of Democrats and Republicans, as 65.4 percent of Democrats successfully identified a difference, while 61.8 percent of Republicans also identified the difference between hemp and marijuana.

By contrast, education was strongly correlated with knowledge of a difference; only 54.1 percent of participants with a high school or GED education or less said there was a difference between hemp and marijuana, while more than 73 percent of participants with an advanced degree (masters or higher) correctly acknowledged the difference.

Table 1. Percentages of American Consumers Who Say There Is a Difference between Hemp and Marijuana

Is There a Difference between Hemp and Marijuana?			
	Yes (%)	No (%)	Number of observations
Total	65.62	34.38	986
Age			
18–24 years old	71.19	28.81	59
25–34 years old	57.14	42.86	147
35–44 years old	65.79	34.21	152
45–54 years old	70.00	30.00	190
55–64 years old	68.86	31.14	228
65–74 years old	63.64	36.36	176
75 years or older	55.88	44.12	34
Education			
High school/GED or less	54.05	45.95	185
Some College	69.42	30.58	242
2-Year Degree (Associates)	60.42	39.58	96
4-Year Degree (BA, BS)	64.85	35.15	239
Master's Degree	74.52	25.48	157
Professional Degree (PhD, JD, MD, etc.)	73.13	26.87	67
Political affiliation			
Democratic	65.36	34.64	407
Republican	61.76	38.24	272
Tea Party	63.64	36.36	11
Independent	69.35	30.65	261
Other (e.g., Green)	71.43	28.57	35

Source: Data collected and made publically available by the March 2018 Food Demand Survey at Oklahoma State University (Lusk 2017).

Respondents who indicated that there was a difference between hemp and marijuana were asked to qualitatively describe that difference in an open-ended format. Of the 647 participants who indicated a difference, only a limited number could accurately describe the difference. In fact, 14.5 percent of the accurate responses clarified with a variation of "I don't know" or "I'm not sure." Although more public opinion research is warranted, these results suggest that knowledge about hemp is not socioeconomically driven and that aversion to industrial hemp is likely to be nonpartisan. The introduction of recent hemp bills in the US Congress has been surprisingly bipartisan, as has important marijuana legislation such as the STATES Act, which was proposed by Senators Cory Gardner (R-CO) and Elizabeth Warren (D-MA).

In the Food Demand Survey, more than 22 percent of the sample alluded to the idea that marijuana and hemp come from the same plant but have different uses. For example, one participant explained, "Hemp is the entire plant. Marijuana is the leaf." Some 10 percent of the responders who said there is a difference between hemp and marijuana used the term "fiber" to describe hemp, though many were confused as to whether that fiber is a part of the "marijuana plant" or if hemp is another plant entirely. As noted, this is not the case, as marijuana and hemp are two fundamentally different varieties of the *Cannabis sativa* plant species. Even those who seemed to be well informed were somewhat confused on the agronomic differences. One response claimed, "Hemp is a legal part of the cannabis plant and marijuana is the part of the cannabis plant that contains THC and is psychoactive." These survey results suggest that there is a substantial bit of misinformation and confusion regarding the differences between hemp and marijuana. At the core of those differences was the notion that hemp was legal and marijuana was not. This statement is only partially true; hemp possession is legal but hemp *production* is not legal.

Reduced Switching Costs

Switching costs are tightly connected to uncertainty reduction; for example, there might be concern regarding how well federal agents can distinguish between hemp and marijuana. While it is true that an untrained eye might have difficulty observing a visible difference between hemp and marijuana, the notion of growing marijuana hidden in hemp fields would be irrational for hemp growers. This is because hemp and marijuana are bred for contradictory purposes, so cross-pollination of the two varieties would be disastrous from a quality-control perspective. That is, planting marijuana in hemp fields would reduce the fiber and seed potential of the planted hemp and the potency of the planted marijuana. In fact, medical marijuana growers and hemp growers prefer to locate miles apart (Kaden 2016). Because the two crops are generally grown separate from one another, the key question for trained drug enforcement officers is not whether they can tell the difference between hemp and marijuana *plants*, but rather between hemp and marijuana *fields*. The two plants might be difficult to tell apart for an untrained eye, which would explain why there are so many location requirements for hemp fields (for example, disclosing GPS locations of fields). But much of the economic value of hemp versus marijuana comes from different portions of the plant. The most valued portion of the marijuana plant is the flowering "bud," while the fibers and seeds of hemp are most valued. As such, marijuana fields can be visibly distinguished from hemp fields by the presence of buds. Additionally, there are simple methods for testing the difference between hemp and marijuana.

Relative to the global marketplace, production in the United States lags behind. This is partially because of the infrastructure development necessary to process hemp—a necessity that constrains the competitiveness of US producers. The crop must be cost competitive with other competing inputs such as synthetic or other natural fibers, alternative oils, and other health

supplements and medical compounds to be a long-term viable crop. Regardless of the regulatory framework, the degree of competition from other domestic and international growers is likely to be stiff if the crop is commercialized across the United States. With the majority of states pursuing hemp production, coupled with a dozen or so global competitors, a legitimate concern becomes whether supply increases might quickly exhaust the current market, leading to lower farm prices, increased price volatility, and lower net returns for hemp growers. In addition, the economic outcome hinges critically on downstream regulatory decisions made by the FDA regarding hemp products. Many companies selling CBD products are marketing them as nutraceuticals to minimize FDA involvement, since the FDA does not require the same safety evaluation for nutraceuticals as it does for drugs (Long 2018).

Because of limited data availability, potential demand for industrial hemp has remained understudied, with most demand studies having been commissioned by industry interest groups. As noted, consumer and voter misperceptions abound for this infant crop, often creating possible marketing issues. In an effort to solve these unanswered questions, most states have their respective land grant universities researching various aspects of the industrial hemp market. Universities such as Virginia Tech (Korth 2017) and the University of Kentucky (Robbins 2013) are conducting ongoing research on the agronomic issues likely to confront the crop's production.

Since the cultivation of industrial hemp is strictly regulated, supply chains are broken or nonexistent in the United States. Additionally, regulatory constraints have stunted technological advances in harvesting equipment. The structure of the hemp crop leads to breakdowns and combustion in harvesting equipment—notably, the tough fibers "wind around moving parts" (Thayer and Burley 2017). Furthermore, monitoring, security, and registration costs may be significant. For example, the Minnesota Department of Agriculture's "Industrial Hemp Report"

looked at regulatory costs of Canadian industrial hemp production to estimate costs in the state. This report stated, "Overall, MDA estimates that roughly $600,000 annually would be required to provide basic industrial hemp regulation and THC testing." However, the estimate "does not take into account the fiscal impact for country sheriffs, state patrol, and local law enforcement crime laboratories, many of which are currently involved in controlled substance testing within their jurisdictions" (Cortilet 2010).

Increased Switching Benefits

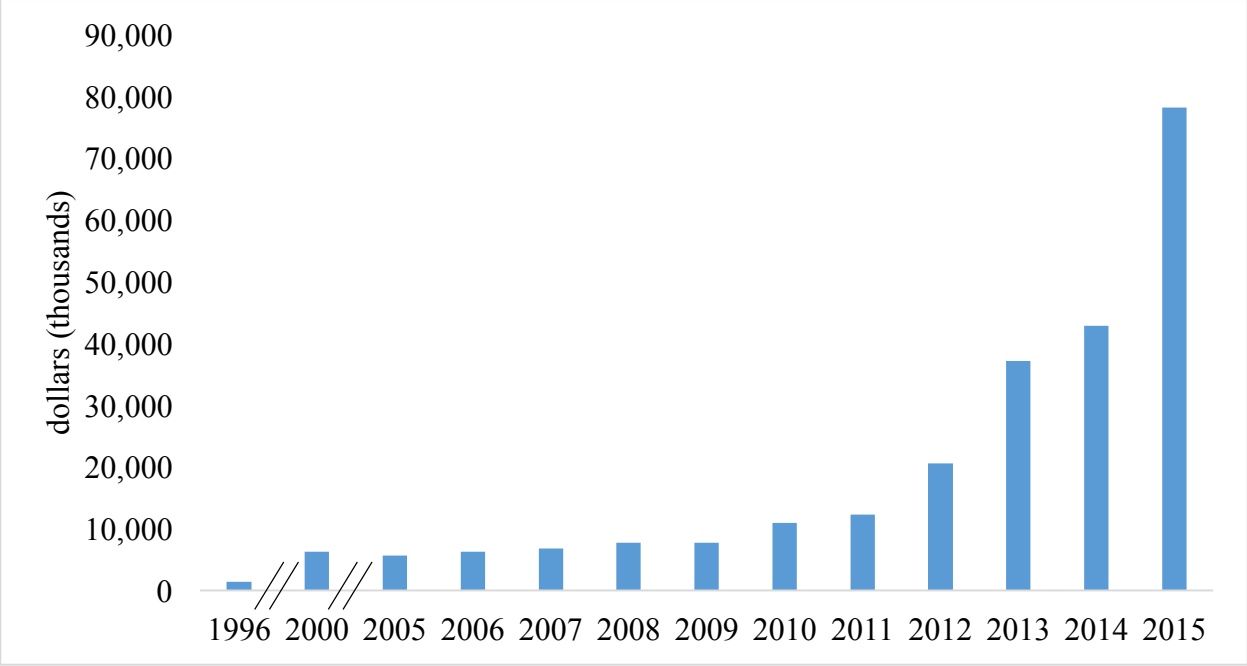
US sales of hemp consumer products have increased. The past few decades have witnessed increased interest and usage in the commodity, with annual market growth achieving double digits (Stansbury 2017). Hemp products with growing markets range from personal care products such as soaps and shampoos to CBD products used to address health problems such as anxiety, sore muscles, and seizures. Advocates for hemp production argue that it is a more sustainable method for producing fiber (Finnan and Styles 2013; Ingrao et al. 2015), although world hemp fiber market demand has declined since the 1960s. Hemp also has potential to become an important crop for producing biofuels (Das et al. 2017).

To date, this growing demand has been satisfied by imported hemp, which has increased significantly. Figure 3 displays this growth pattern.[8] In 2000, the total dollar value of hemp products imported reached $6,297,000. By 2015, those imports had increased by a factor of approximately 12—totaling approximately $78,117,000. This exponential growth pattern suggests that the total dollar value of the hemp market is likely to increase further, although

[8] These import estimates should be considered a lower bound, as not all finished products with hemp inputs are accounted for. As an example, T-shirts with a hemp blend are imported but can be listed as simply "T-shirts" without disclosing hemp.

global hemp fiber production has decreased significantly since the 1960s. Over the same period, there has been significant growth in the production of hemp seed (Robbins et al. 2013). The primary competition for US hemp growers is likely to come from Canada since the United States is Canada's largest hemp customer (Fortenbery 2014). Growers in Canada have been commercially producing industrial hemp since 1998 (Serecon Management Consulting 2012). In contrast to the barriers to growth experienced by US hemp growers, the federal government of Canada has even provided grants and no-interest loans to the hemp industry.

Figure 3. Total Value of US Imports of Selected Hemp Products, 1996–2015, in 1,000 USD



Note: There is a gap of years between 1996 and 2000 and between 2000 and 2005. The years 1996 and 2000 are included to emphasize the steady level of the US Imports value.

Source: Compiled by the Congressional Research Service using data from the US International Trade Commission; see Renee Johnson, "Hemp as an Agricultural Commodity" (CRS Report RL32725, Congressional Research Service, Washington, DC, 2018), table 1.

Despite this promise of growth, the modern US hemp market is relatively small, and some agronomists express skepticism regarding the crop's long-term potential (Cherney and

Small 2016). Hemp generated an estimated $688 million market in 2016, with 24 percent coming from personal care products, 19 percent from food products, 19 percent from hemp CBD products, 18 percent from industrial applications, 14 percent from consumer textiles, and 4 percent from supplements (Stansbury 2017). By comparison, US cotton markets are worth an estimated $5.8 billion (National Agricultural Statistics Service 2016).

In recent decades, this growth rate can be largely attributed to hemp seed (Robbins et al. 2013), which can be used in food products such as granola and margarine, personal hygiene products such as soap and shampoo, and technical products such as varnishes and solvents (Johnson 2018). Industrial hemp seeds can also be used for nutritional purposes, as they are a good source of protein, Omega-3, and Omega-6 (Mead 2017). This demand for hemp seeds is likely to increase, but because of the nascent nature of this market, potential demand for industrial hemp has remained understudied, with most demand studies having been commissioned by industry interest groups. Re-establishing agricultural supply chains will require growers to address issues regarding processing and manufacturing. Even with investments in processing capabilities, many growers may find it prohibitively expensive to purchase the necessary harvesting equipment (Thayer and Burley 2017).

Looking toward the future, CBD oil, which is considered to offer a variety of medical benefits, will likely be a major growth area (Johnson 2016). The list of potential medical benefits of CBD is long, and medical interest in CBD has recently increased dramatically. CBD shows promise for treatment of many ailments, including inflammatory bowel diseases (Esposito et al. 2013), treatment-resistant epilepsy (Devinsky et al. 2016), inflammation (Burstein 2015), and even schizophrenia (Osborne, Solowij, and Weston-Green 2017).

Conclusion

This paper suggests that the federal government effectively regulated industrial hemp out of existence because of its connection to its intoxicating counterpart. Our findings suggest that the current legal status of hemp is rooted in regulatory path dependence. Despite this historic path, favorable changes in political uncertainty, switching costs, and switching benefits make hemp an ideal candidate for deregulation and increased research funding. Though there has been an explosion in the number of registered acres of US industrial hemp, federal regulations still represent one of the most substantial constraints on growth in the industry. A few states have taken unique directions in their hemp regulations. As it did in the case of psychoactive cannabis markets, Colorado has set the pace for growth in this market, although states such as Kentucky and Oregon are close behind. US producers are likely to confront issues with economies of scale, as many countries across the globe have been growing and marketing hemp for decades, making many of their supply chains inherently more efficient.

State and national governments are already crafting policy responses to key questions regarding the agricultural production value of industrial hemp. One of the most important proposed regulatory changes is the Hemp Farming Act (HFA) of 2018 (S. 2667), which would remove hemp from the Schedule 1 controlled substances list and treat it as an ordinary agricultural commodity. Additionally, the HFA would allow states to become the primary regulators of hemp, permit researchers to apply for competitive USDA grants, and allow hemp farmers to apply for federal crop insurance (McConnell 2018). This regulatory shift has bipartisan support; S. 2667 was proposed in the Senate by Mitch McConnell (R-KY), with Ron Wyden (D-OR) and Jeff Merkley (D-OR) as cosponsors. Similarly, the corresponding House bill (H.R. 5485) was proposed by James Comer (R-KY) and cosponsored by Jared Polis (D-CO).

The HFA has been incorporated into the 2018 Farm Bill discussions, though the Farm Bill has not passed because of opposition to work requirements for food-stamp recipients (Traxler 2018). Other federal provisions have passed through the appropriations process, although they are likely to have less influence on hemp production. These additional proposals include the Hemp Water Rights Act, the Hemp Banking Act, and the Hemp History Week Amendment(s) (S. Res. 532). Additionally, the Agriculture, Food and Drug Administration, Rural Development, and Related Agencies Appropriations Act (Budget Act) also assisted universities participating in hemp research by mandating that federal funds may not be used to obstruct the "transportation, processing, sale, or use of industrial hemp within or outside the state in which the industrial hemp is grown or cultivated" (Kight 2018).

Ultimately, there are limitations to understanding the growth potential of this market prior to the expansion of legal production rights. While we have provided some key regulatory and entrepreneurial case studies, a systematic empirical evaluation is needed to determine the potential for growth in the industrial hemp market. This article suggests that future hemp growers will benefit from a twofold approach from government agencies. We recommend that the government pursue deregulation while simultaneously funding relevant agronomic and economic research. Regulatory constraints have prevented the development of a robust breeding program, severely limiting what we know and what we can do with industrial hemp. This rudimentary knowledge of plant biology must be addressed if producers are going to expand toward an efficient production of hemp.

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