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Franchise Termination Laws, Craft Brewery Entry and Growth

by

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Abstract

This paper estimates how beer franchise laws and their interaction with restrictions on vertical integration between manufacturing and wholesaling impacted US craft brewers' entry and production decisions. The effects are identified by exploiting variation in policies across states and time between 1980 and 2016. I find that beer franchise laws significantly reduced craft brewery entry and growth, leading to lower levels of breweries and craft beer production. The effects are largest in states that place restrictions on brewery/wholesaler integration. The findings in this paper indicate that contract termination restrictions, which were legislated to protect wholesalers from upstream brewers, had the effect of encouraging opportunism from wholesalers and inhibited the growth of smaller firms in the industry.

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1 Introduction

Many US states impose restrictions on when firms can terminate franchise contracts in a variety of settings. Laws that restrict when a franchisor is legally allowed to terminate the contract of a downstream franchisee in franchised industries exist sixteen states (Murry and Newberry (2021)) and cover a wide variety of business types (Lafontaine and Blair (2008)). They also exist in specific industries such as gasoline, automobiles, and alcoholic beverages. These franchise laws are ostensibly passed with the intention of preventing upstream franchisors from acting opportunistically and appropriating rents from downstream franchisees by terminating franchise contracts after they have made costly investments in the business. However franchise laws could have the opposite effect and create incentives for opportunism by downstream franchisees. By removing or reducing the threat of termination for under-performance, franchise termination laws may result in under-performance and shirking by the franchisee once a contract is signed. The impact of franchise laws is a topic antitrust authorities have taken interest in and commented on recently.[1]

This paper empirically examines the effects of franchise termination regulations by investigating how franchise laws in the brewing industry impacted craft brewery entry and growth. These laws restrict the ability of a brewer to cancel, terminate, or fail to renew a contract with a wholesaler without "good cause." This is set against a background where a niche industry—craft beer—emerged over the time period studied. I explore the interaction these laws have with state restrictions on vertical integration between beer manufacturing and wholesaling. Beer franchise laws were implemented to provide wholesalers protections against dominant, upstream brewers, but they also applied to smaller, recent craft brewery entrants. Wholesaler trade groups argue beer franchise laws prevent large, upstream brewers from threatening termination of wholesale contracts for taking on new brewers, thus easing entry conditions and leading to growth of the craft brewing industry. However, economic theory on agency issues between upstream and downstream firms suggest that these laws could increase agency problems, leading to decreased profitability of entry and increased

[1]See for example, the joint statement by the FTC and DOJ on a recent bill in the California legislature that would have enacted beer franchise laws: https://web.archive.org/web/20200501040457/https://www.ftc.gov/system/files/documents/advocacy_documents/joint-comment-ftc-staff-doj-antitrust-division-staff-california-state-assembly-concerning-california/v200008_california_beer_distribution_advocacy_2020.pdf

cost of distribution, thus slowing growth.

To identify the effects on brewery entry and growth, I exploit variation in the timing of adoption of these laws across states. The heterogeneity in the implementation of policies across both states and time creates a quasi-experimental environment that allows a causal effect of these policies to be identified. I implement a difference in differences model using a unique state-by-year level dataset on the legislation of beer franchise and distribution laws across all fifty states and DC, brewery permits from 1984-2016, and craft beer production from 1980-2016. I find that passage of beer franchise laws in states that restrict brewers from distributing their products to retailers decreases net entry in those states by approximately 0.50 breweries per million people per year. The results on growth in craft beer production are similar: passage of beer franchise laws in states that restrict distribution by brewers reduce craft brewery growth by 0.20 barrels per hundred people per year. These estimates suggest that if no states had passed beer franchise laws, there would have been approximately 3000 more breweries in the US in 2016—43% higher than observed—and craft beer production volume would have been 24% higher. Results are consistent across a variety of robustness checks. While these are large effects, the results are specific to the craft brewing industry, which has historically made up a small portion of the overall US beer industry; this niche of the industry has grown rapidly in recent years and as of 2020 comprises over 23% of the US brewing industry by revenue.[2]

The findings suggest that beer franchise laws do not ease entry by preventing large brewers from coercing wholesalers into excluding access to markets for new breweries, but rather that the mandates increase the cost of entry and distribution and encourage opportunistic behavior from wholesalers. The finding that the effect is primarily in states with restrictions on brewery-distribution to retailers suggests that when breweries have alternatives to using an independent wholesaler, breweries utilize this option of self-distribution and avoid some of the negative impacts of beer franchise laws.

Several papers have examined the emergence of the craft brewing industry (Carroll and Swaminathan (2000); Elzinga, Tremblay, and Tremblay (2015); Gohmann (2015)). This paper is the first

[2] https://web.archive.org/web/20211030082829/https://www.brewersassociation.org/statistics-and-data/national-beer-stats/

to examine the impact that beer franchise laws had on the growth of the industry. This paper also contributes to a literature on vertical relationships. Given the ubiquity of regulations and use of vertical restraints in the brewing industry, it has been used frequently to study many different vertical relationship issues (see for example Culbertson and Bradford (1991); Sass and Saurman (1993, 1996); Slade (1998); Sass (2005); Rojas (2012); Chen (2014); Asker (2016); Burgdorf (2019, 2021a)). The findings of this paper also largely complement those of previous empirical studies on vertical restraints and public policies that restrict or mandate behavior along the vertical supply chain. Lafontaine and Slade (2008) summarize this literature and distinguish between "voluntary" and "mandated" vertical restraints, of which franchise termination laws and restrictions on vertical integration fall under mandated restraints. They report most studies on mandated restraints found the mandates reduce welfare; however, empirical research on the competitive effects of these policies remains unsettled. This research sheds light on this aspect by finding that beer franchise laws decrease both craft brewery entry and growth, and thus lead to less variety and consumer choice. These findings also have implications outside of the brewing industry. Many other industries face similar regulatory rules. Whitman (2003) describes franchise and distribution laws in the alcohol industry including wine and spirits. Smith (1982), Lafontaine and Morton (2010), and Murry (2018) examine the impact of automotive franchise laws, and Barron and Umbeck (1984), Vita (2000) and Blass and Carlton (2001) find gasoline divorcement legislation raise gasoline prices and substantially reduce consumer surplus. This work is also related to studies examining business format franchise arrangements and laws (Brickley, et al. (1991); Klick, et al. (2012); Murry and Newberry (2021)).

The rest of the paper proceeds as follows. In section 2, I provide details on the brewing industry and its regulatory structure; section 3 presents a theoretical framework; in section 4, I discuss the data; in section 5, I describe the empirical strategies used; section 6 discusses the main results and robustness checks; and section 7 concludes.

2 Background of the Brewing Industry

2.1 Craft Breweries

The US beer industry has seen remarkable changes over the past several decades. While being a relatively concentrated market, a new niche comprised of many firms has prominently emerged. Starting in the early 1980s, craft breweries began entering and producing beer products that were distinct from the products US brewers had traditionally produced.[3] This reversed a trend of consolidation and the decline in number of breweries that occurred before this period (see Horvath et. al (2001) and Tremblay, Iwasaki, and Tremblay (2005)). Rather than producing light lagers with adjunct ingredients such as corn and rice, as most US brewers had, craft brewers produced ales and lagers using traditional ingredients and were relatively small in size.[4] While there is no legal definition of a craft brewery, the Brewers Association defines a craft brewery as "Small," "Independent," and "Traditional," thereby excluding large breweries such as Anheuser-Busch, Miller, and Coors that historically dominated the market, and excludes breweries purchased or owned by large breweries.[5]

Almost the entirety of new brewery entrants in the US from the beginning of the craft brewing industry niche in the early 1980s onward were craft brewery entries. The Brewers Association reports that in 1980, 92 breweries in total were in operation in the US. By 2016, this was 5,780 breweries, of which only 67 were classified as non-craft.[6] Despite the large number of craft brewers, they have historically represented a small segment of the market. According to the Brewers Association in 1998, craft beer had a national 2.6% market share by volume. This was similar in 2005 with a 3.1% craft beer share by volume and 4.7% share by revenue. By 2016, this had risen to 12.3% by volume and 21.9% by revenue. So while the craft beer industry saw a large number of entrants and

[3] Anchor Brewing Company is often regarded as the first craft brewing company, after it was purchased by Fritz Maytag in 1965. Following that, New Albion, created in 1976 (closing in 1982) was the next, and Sierra Nevada's founding in 1980 is also often given credit as one of the first craft breweries.

[4] For an historical overview of the US brewing industry, including the craft beer industry, see Tremblay and Tremblay (2005), and see Hindy (2014) for a popular exposition on the emergence of the craft beer industry.

[5] Elzinga, Tremblay, and Tremblay (2015) point out that the Brewers Association's definition has changed: "In 2014, the craft brewers' trade group, the Brewers Association, changed its definition to include the limited use of adjuncts such as corn or rice in the brewing process. The new definition allowed firms like Yuengling and Straub to define themselves as craft brewers (Brewers Association, 2014)."

[6] `https://web.archive.org/web/20201205192633/https://www.brewersassociation.org/statistics-and-data/national-beer-stats/`

an increase in production over the period of this study, historically, they were a relatively small segment of the market. Entry into the craft beer industry, however, was not uniform across all states, as Figure 1 shows. Craft beer production similarly grew at different rates in different states.

2.2 Three-Tier System

The "three-tier system," as it is commonly called in the beer industry (and in wine and spirits), is a term referring to the separate tiers of the vertical supply chain: manufacturers, wholesalers or distributors, and retailers. The 21st Amendment repealing Prohibition has been interpreted as giving states the right to regulate alcohol, and each state has implemented its own set of regulations and licenses or permits for each tier. As such, there is not a common set of "three-tier" distribution laws across all states. Generally speaking, these laws place restrictions on vertical integration between the three tiers to varying degrees across states.

A motivating factor in establishing this system was the perceived abuses of the "tied-house" system, common prior to Prohibition, in which breweries were vertically integrated at the retail level or required bars and saloons to exclude purchases of other brands in order to purchase from them. After prohibition ended, states enacted laws that prohibited upstream brewer license holders from also acting as retailers with limited exceptions.[7] Some states also prohibited brewers from owning or having interests in wholesalers, whereas others did not. Further still, some states allowed brewers to distribute their own products directly to retailers.[8] Over time, some states passed limited distribution exceptions for small breweries and allowed small brewers to distribute a limited volume of beer to retailers.[9] While less restrictive than a complete ban, these laws still restrict

[7] A summary given by the California Supreme Court in California Beer Wholesalers Assn., Inc. v. Alcoholic Bev. etc. Appeals Bd. (1971) 5 C3d 402 reads, "Following repeal of the Eighteenth Amendment, the vast majority of states, including California, enacted alcoholic beverage control laws. These statutes sought to forestall the generation of such evils and excesses as intemperance and disorderly marketing conditions that had plagued the public and the alcoholic beverage industry prior to prohibition... By enacting prohibitions against "tied-house" arrangements, state legislatures aimed to prevent two particular dangers: the ability and potentiality of large firms to dominate local markets through vertical and horizontal integration ... and the excessive sales of alcoholic beverages produced by the overly aggressive marketing techniques of larger alcoholic beverage concerns."

[8] For example, the brewery license in Virginia in 1933 stated it "shall authorize the licensees to manufacture beer and to sell and deliver or ship the same...to persons licensed under the provisions of this chapter to sell the same at wholesale or retail for the purpose of resale..." This was amended in 1993 to remove the provision allowing sales to retailers.

[9] For example, Arizona's microbrewery license caps sales to retailers at 3,000 barrels (Arizona Revised Statutes §4-205.08).

self-distribution by brewers to those under specified production sizes and often place even further limits on allowed distribution amounts.

2.3 Beer Franchise Termination Laws

Beer franchise laws place restrictions on when a brewer is allowed to cancel, terminate, or fail to renew a contract with a wholesaler. Almost all states have beer franchise laws. See Table 1 for the years states passed beer franchise laws.[10] Virginia's Beer Franchise Act is representative of the type of restrictions these laws place on termination of contracts. Virginia's Code of statutes § 4.1-505 titled "Cancellation" reads

> *Notwithstanding the terms, provisions or conditions of any agreement, no brewery shall unilaterally amend, cancel, terminate or refuse to continue to renew any agreement, or unilaterally cause a wholesaler to resign from an agreement, unless the brewery has first complied with § 4.1-506 and good cause exists for amendment, termination, cancellation, nonrenewal, noncontinuation or causing a resignation. Good cause shall not include the sale or purchase of a brewery.*

"Good cause" typically includes things that could be considered gross violations of the distribution contract such as selling outside a designated sales territory, or blatant disregard for the storage and shipment of the product that could lead to spoilage or other product quality problems. Further, most laws require that prior notice, commonly of 90 days, must be given before termination or nonrenewal of a contract occurs. If the wholesaler corrects the perceived grievance within that time period, termination or nonrenewal is voided. The burden of proof is placed on the brewery to show

[10] Additionally, sixteen states have laws restricting termination of franchisees in franchised industries generally. Although the relationship between breweries and wholesalers are not business-format franchises, some of these state level franchise laws may apply to very large contracts in a limited extent. For example, in Wisconsin, prior to 2004, Wisconsin's "Fair Dealership Law" governed termination restrictions between wholesalers and brewers if the brand in the contract represented at least 15% of the wholesaler's business. However, as Kurtz and Clements (2014) describe, very few, if any brewery/wholesaler relationships are likely to fit state franchise definitions and thus would not be likely to fall under these franchise laws since, "[i]n a typical distributorship arrangement, the distributor operates an independent business under its own trade name and purchases and resells the supplier's products according to its own procedures, not according to the supplier's system or prescribed marketing plan. Customers generally do not associate a supplier's trademark with the distributor's business, and it is unlikely that the distributor pays a fee to sell the supplier's products."

"good cause" for termination exists, which can be prohibitively costly.[11] Further, beer franchise laws supersede contracts between brewers and wholesalers, so that contractual provisions which provide grounds for termination are not considered valid if they conflict with the beer franchise laws.

Beer franchise laws were passed first in the 1960s and 1970s and coincided with an increase in upstream concentration. The laws were intended to give protection to wholesalers from potential opportunistic acts from brewers. As Blair and Lafontaine (2005) point out, franchisees (which would correspond to wholesalers in the brewing industry) have often "complained that they do not reap the benefit of their hard work because once they make a market profitable, the franchisor behaves opportunistically and simply terminates or does not renew their contract. The franchisor then presumably appropriates the profits of the outlet either by operating the outlet directly, or by selling it to a new franchisee..." Similar arguments are made by wholesalers in the brewing industry. For example, one state beer wholesale trade group claims, "[b]eer franchise laws prevent suppliers from unfairly and without justification usurping a distributor's substantial investment in a brand. Distributors make substantial financial, marketing, and advertising commitments. Distributors make long-term legal commitments: facility build-outs, multi-year lease and equipment agreements, and labor and employment agreements. Beer franchise laws prevent a supplier from usurping that distributor's investment by prohibiting the brewer from terminating distribution rights for arbitrary or capricious reasons."[12] However, economic theory on the impact of beer franchise laws yields contrasting predictions. I explore this in the next section.

3 Theoretical Framework

The impact of beer franchise laws are theoretically ambiguous and could either hamper or foster growth of an emerging niche market such as craft brewers. Theories that focus on agency problems between upstream and downstream firms predict franchise laws will decrease entry and growth (see

[11] Costly legal battles that Brooklyn Brewery and Dogfish Head Brewery have had with distributors are discussed in a NY Times Op-ed here: https://web.archive.org/web/20140330070205/https://www.nytimes.com/2014/03/30/opinion/sunday/free-craft-beer.html.

[12] https://web.archive.org/web/20200601144526/https://mnbwa.com/government-affairs/beer-franchise-laws/

Lafontaine and Slade (2007) for a summary of this literature). This literature emphasizes moral hazard problems over effort and investments once a contract is signed, and it studies mechanisms and organizational forms that can align incentives. Klein (1995) characterizes franchise laws by stating, "[t]he effect of these provisions is to increase the franchisee's ability to not perform without being terminated." Broadly, these theories predict that beer franchise termination laws give wholesalers leeway to under-perform once a wholesale contract is signed, as a brewer must have "good cause" to terminate the contract. This would thus increase the cost of distribution to brewers and reduce the profitability of entry, leading to lower entry and growth in an emerging niche industry such as craft beer.

In a similar vein and with an application to the brewing industry, Klein and Murphy (1988) model a setting where an upstream firm imposes some set of vertical restraints that provide a stream of quasi-rents to dealers who perform well. This aligns incentives upstream and downstream firms and can be efficiency enhancing. They describe how Coors was successful in ensuring wholesaler investment in their products by assigning exclusive territories and resale price maintenance. Through these vertical practices, the incentives to free ride on other wholesalers investments was diminished, downstream wholesaler services increased, and a more efficient outcome was achieved. Their model however, is based on a setting, as they put it, "by which active manufacturer monitoring and the threat of manufacturer termination assures dealer performance." When beer franchise laws are passed, this limits the ability of beer manufacturers to privately enforce wholesaler performance, and under these models would increase the cost of ensuring performance.[13] Empirical work on franchise termination laws is somewhat sparse, but it has generally found support for the agency theory hypotheses (see Brickley, Dark, and Weisbach (1991); Klick, Kobayashi, and Ribstein (2012); Murry (2018); Murry and Newberry (2021)).

[13]This is illustrated well by the troubles Bell's Brewery, based in Kalamazoo, Michigan, had with state beer franchise laws. In 2006, Bell's Brewery's Chicago wholesaler was owned by National Wine and Spirits (NWS). NWS planned to sell the rights to distribute Bell's brands to another wholesaler. Bell's opposed the sale, as they worried their brands would be ignored by the subsequent wholesaler. Rather than engaging in a costly legal battle trying to end the wholesale contract, Bell's pulled distribution of their beer out of the entire state of Illinois, despite Illinois comprising over 10% of Bell's sales. Exiting the entire state was one of the few provisions in which they could legally end their contract with NWS. Bell's returned distribution to Illinois and Chicago nearly two years later, only after NWS lost their wholesale license and the right to sue. See "Bell's Brings Beer Back to Area." Chicago Tribune, August 1, 2008, `https://www.chicagotribune.com/news/ct-xpm-2008-08-01-0807310746-story.html`.

Alternatively, beer franchise laws could ease entry of new brewers by preventing large brewers from threatening to terminate wholesale contracts if wholesalers accept new brewers. This is precisely the sort of argument the National Beer Wholesaler's Association uses when supporting these laws. They directly claim that without these protections, craft brewery and growth would be severely diminished: "Beer franchise laws prohibit brewers from terminating distributors for taking on new brands. Beer franchise laws inhibit forced consolidation and termination without cause. Combined with three-tier requirements, franchise laws prohibit vertical integration of the brewing, distribution and retail tiers, preventing monopolies,"[14] and that without beer franchise laws "[r]ather than the craft beer explosion we are experiencing today we would likely see a far more restricted and far less diverse beer market, ruled by the largest and most powerful brewers."[15]

The argument put forward by beer wholesalers is similar to a model by Asker and Bar-Isaac (2014) who show how vertical practices by an upstream firm can be used to prevent entry. In their model, there is one incumbent manufacturer and a potential entrant upstream, and many retailers downstream. The entrant must be accommodated by a downstream firm in order to enter (much like states that require brewers to use an independent wholesaler). The incumbent transfers a stream of quasi-rents to downstream firms through some vertical practice, which increases the downstream firms' profits. The upstream incumbent employs the threat of ending this stream of quasi-rents if entry occurs. An exclusionary equilibrium in which entry does not occur can be sustained if the stream of rents the incumbent pays downstream firms is greater than what the potential entrant is willing to pay a downstream firm to gain accommodation. This model suggests that franchise laws that restrict termination could *increase* entry, by limiting the ability of the upstream firm threatening to end a contract if entry occurs.[16]

The US brewing industry thus gives a setting to distinguish between the potential anti- or pro-

[14] `https://web.archive.org/web/20200920181411/https://www.nbwa.org/government/benefits-of-beer-franchise-laws`

[15] `https://web.archive.org/web/20151002053852/https://www.nbwa.org/news/benefits-beer-franchise-laws-video`

[16] While the exclusionary equilibria in their model are sustained by a threat only to end the vertical practice, akin to the NBWA's argument, the equilibria could be sustained by a threat to terminate the entire contract. Further, some beer franchise laws prohibit unilateral *amendments* of contracts in addition to termination of the entire contract (see Virginia Code of statutes § 4.1-505, quoted above, e.g.), and would thus remove the threat of terminating a vertical practice in addition to outright termination.

competitive effects of beer franchise laws, as the staggered adoption across states and time creates a quasi-experimental setting.[17] If beer franchise laws ease entry, as groups such as the NBWA argue, those states that pass beer franchise laws will see increased brewery entry and craft brewer growth compared to states without such protections. However if, as agency theories predict, these laws protect wholesalers' ability to under-perform, this would lead to lower entry and growth in states that pass beer franchise laws compared to those without.

4 Data

This study utilizes multiple unique sources of data. Data on brewery permit counts are used to create the measure of entry, and were obtained from the Alcohol and Tobacco Tax and Trade Bureau (TTB). The TTB permit data consist of a count of active brewery locations at the state by year level for each US state and DC from 1984-2016.[18] The TTB permit count does not identify individual brewers or the type or size of breweries, and each brewery is counted equally regardless of whether it is a craft brewer or a large, national brand which produces millions of barrels annually. However, over this time period in the US, virtually all new entrants were craft brewers as noted above, and thus these data can be used to construct a measure of net entry that corresponds to craft brewery entry.

Data on craft beer production measured in barrels come from Elzinga, Tremblay, and Tremblay (2015), supplemented with additional data from the Brewers Association and spans from 1980-2016. A barrel of beer is equivalent to 31 gallons. The data taken from Elzinga, Tremblay, and Tremblay (2015) are a panel of craft beer production at the state by year level for all US states and DC from 1980-2012. The sources for their data include *Brewers Digest*, *Brewery Directory* and *The New*

[17] Burgdorf (2021b) also shows that incorporating services into such vertical theories of exclusion can decrease foreclosure and suggests that quasi-experimental settings created by public policies can be a useful test of their impact.

[18] Years prior to 1984 were not available. The count may include breweries that have registered as active but have not started brewing yet, and counts locations rather than business entities. As a result, this count differs slightly from other sources, for example, by the Brewers Association. State-year observations with zero brewery permits were identified in the data, as were all observations with three or greater permits, but observations with either one or two brewery permits were censored. A yearly national permit count was also included in the data, so the total number of breweries in censored states could be calculated. For those censored observations, I replaced the missing observation with the average of total missing permits in censored states. As a result these observations were between one and two.

Brewer. They define craft brewers to "include brewpubs, microbreweries and craft regionals but do not include contract brewers, national brewers and large regional brewers that were in existence before 1965." The Brewers Association publishes the results of a yearly survey of craft breweries on annual production in *The New Brewer*. For later years in Elzinga, Tremblay, and Tremblay, this is the source of their craft production measure. I obtained production data from the Brewers Association for years 2013-2016 and appended these to their data.

The craft beer production data do not account for volume produced in-state and sold across state lines, or volumes produced out-of-state and sold in-state. As such, these data do not perfectly correlate with the volume of craft beer sales subject to beer franchise laws. I am unaware of any sources of craft beer sales at the state level over the time frame studied.

4.1 Franchise Laws

The treatment variable in this study is the presence of beer franchise laws. Legislative history on the passage date of beer franchise laws in all 50 states and DC was obtained through original, legislative research; this was cross-checked for accuracy with several year's editions of the Modern Brewery Age Blue Book. Table 1 shows the passage years of beer franchise laws. These dates of passage are used to create the main treatment variable. While the laws across states are generally remarkably similar, some caveats exist. Colorado, Oklahoma, Rhode Island, and Washington have limited applicability of laws—Colorado allows termination without good cause provided a notice is given to all wholesalers. Oklahoma beer franchise laws apply only to "low-point" beer (less than 3.2% by weight), and craft brewers tend to produce beer with higher alcohol content. Rhode Island beer franchise laws only apply to breweries located outside of Rhode Island; brewers of any size located in the state are exempt. Washington initially exempted brewers producing under 50 thousand barrels, and later increased this to 200 thousand barrels, which is much higher than most craft brewery production levels. As such, none of these states were coded as beer franchise states in the main analysis. Arkansas and Nevada also have limited exemptions to beer franchise laws that only applies to small brewers. These exemptions were passed after the states' beer franchise laws were first enacted. Additional details on these caveats and robustness tests exploring alternative

coding based on the applicability of state laws is discussed and explored fully in Appendix A. Using both more stringent and more relaxed rules for coding beer franchise laws, results remain stable and are similar qualitatively and quantitatively to those of the main text discussed below.

While the stated legislative intent is likely an incomplete metric for the actual reason laws are passed, I also examined the stated purposes or intent of laws when written in the statute. When stated, the legislative purpose almost always includes references to protecting competition, but also explicitly states a goal is protecting wholesaler interests from upstream brewer demands and protecting the "three-tier system." Phrases such as "To maintain stability and healthy competition in the beer industry in this state," and "To promote and maintain a sound, stable and viable 3-tier system of distribution of beer to the public" are nearly identical in Alabama, Arkansas, Louisiana, Iowa, Michigan, and Mississippi's legislative intent and purpose sections as enacted. A stated purpose of "Assuring that the beer wholesaler is free to manage its business enterprise," or nearly identical language, is present in Iowa, Florida, Kansas, Rhode Island, Texas, Washington, and Wyoming.

Examining the three most recent beer franchise laws, New Jersey's legislation, effective in 2006, fits this narrative and in part states the purpose is to "to maintain the three-tier distribution system" and "protect beer wholesalers from unreasonable demands and requirements by brewers." Wisconsin and Kentucky both passed beer franchise laws in 2004. Kentucky's legislative intent stated the act was necessary to "Provide an orderly three (3) tier system for the distribution and sale of quality malt beverages in the Commonwealth of Kentucky." Wisconsin's bill did not include a legislative intent, but records of proceedings indicate the goal was to protect wholesalers' distribution rights.[19] Thus, the stated intent of beer franchise laws is surprisingly consistent: to protect wholesalers from upstream brewers with perceived higher bargaining power. These laws, however, do not distinguish between large brewers and small craft brewers, even though the latter are unlikely to exert pressure on wholesalers.[20]

[19] Analysis by the Wisconsin Legislative Reference Bureau stated, "This bill provides beer wholesalers with certain protections of distribution rights in addition to those afforded under the [Wisconsin Fair Dealership Law]. With limited exceptions, the bill provides wholesalers with compensable and perpetual rights to the brands of beer they currently distribute within the territory of current distribution." https://web.archive.org/web/20211029195040/https://docs.legis.wisconsin.gov/2003/related/proposals/sb489

[20] Some exceptions exist, as a few states indicate temperance is a goal. Maryland and Montana explicitly state

4.2 Distribution Laws

I also collected data to classify states based on their distribution laws. As discussed above, while all states regulate three distinct tiers of manufacturers, wholesalers, and retailers, there is variation in the implementation of these laws. I define "three-tier" states as those that ban brewers from selling to retailers, and thus require the use of an independent wholesaler, and those that place volume restrictions on brewery sales to retailers. Though not a common vernacular in the industry, I define "two-tier" as states whose brewery permits or licenses include provisions that allow brewers to distribute their own beer without limits to retailers. This occurs when a state's brewery permit specifically states that brewers can distribute their products to retailers,[21] or if brewers are specifically permitted to obtain a wholesaler's permit in addition to the brewery permit.[22]

While many states have passed laws that allow a limited amount of "self-distribution" to retailers under a specified threshold by small brewers, I do not incorporate this for two reasons: first, it is likely that these laws are passed endogenously to the growth of craft breweries in that state, whereas those states that did not pass exceptions specific to small brewers date back before craft brewers began to enter. Second, these exceptions still place a limit on the amount a brewer can distribute, and may act as a disincentive to growth. For example, New Hampshire restricts brewery self-distribution to five thousand barrels per year, provided a brewer produces less than fifteen thousand barrels annually.[23]

In classifying distribution regimes, I began by utilizing the Brewers Association's coding of state

promoting temperance is a purpose of beer franchise laws. Rhode Island and New Jersey state encouraging moderate and responsible use is a goal.

[21]For example, Connecticut's brewery permit allows brewers to sell to retailers, as CT Gen Stat § 30-16(b) states, "A manufacturer permit for beer shall allow the manufacture of beer and the storage, bottling *and wholesale distribution* and sale of beer manufactured or bottled on the premises of the permittee" (emphasis added).

[22]New York's brewery license specifies brewers are permitted to apply for "a license to sell beer brewed by him at wholesale at premises other than those designated in the brewery license and the provisions of this article relative to wholesaler's licenses shall apply so far as applicable to such application."(Alcoholic Beverage Control (ABC) Chapter 3-B, Article 4 §51. "Brewer's license"')

[23]New Hampshire Title XIII, § 178:12 IV.(b) states "A holder of a beverage manufacturer license who manufactures 15,000 barrels or less during its licensing period may elect to distribute its beverages directly to retail licensees and/or to distribute its beverages pursuant to RSA 180, provided that total in-state direct retail sales do not exceed 5,000 barrels." Other states have similar restrictions. Montana, for example allows breweries that brew less than 60 thousand barrels per year to distribute up to 10 thousand barrels, subject to the restriction that "individual deliveries, other than draught beer, are limited to the case equivalent of 8 barrels a day to each licensed retailer." (see § 16-3-214 of Montana Code.)

laws and regulations regarding self-distribution.[24] According to this, 15 states categorically did not allow brewery sales to retailers.[25] As these states did not permit brewery distribution of any kind, they are classified as three-tier states. For these remaining 36 states, I searched legislative histories of brewery and beer wholesaler licensing laws. Eighteen of these states only allow limited volumes of brewery sales to retailers and are classified as "three-tier" states, for a total of 33 states classified as "three-tier." The remaining eighteen states did not restrict brewers from selling to retailers, and are thus classified as "two-tier" states.[26]

5 Empirical Strategy

The variation in passage of beer franchise laws across states and time creates a quasi-experimental setting. I exploit this variation to identify the effects of beer franchise laws on craft brewery entry and growth by estimating a difference in differences model. I test the validity of this model by testing for the presence of differential pre-trends in the outcomes of interest in a time-disaggregated model described below. The baseline model I estimate via ordinary least squares is

$$Y_{st} = \beta Franchise_{st} + \mathbf{X_{st}}\delta + \varphi_s + \varphi_t + \varepsilon_{st} \tag{1}$$

where Y_{st} will take the value of either: (i) the net number of brewery entrants per million people, defined by

$$Entry_{st} = \frac{Breweries_{st} - Breweries_{st-1}}{Population_{st}/1,000,000}$$

[24] Available via the Internet Archive here: `https://web.archive.org/web/20140520141648/http://www.brewersassociation.org/pages/government-affairs/self-distribution-laws`

[25] These are Alabama, Delaware, DC, Florida, Georgia, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Missouri, Nebraska, Nevada, South Carolina, and South Dakota.

[26] These states are Alaska, California, Colorado, Connecticut, Hawaii, Iowa, Massachusetts, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Washington, West Virginia, and Wisconsin. Two caveats exist: In 2011, Wisconsin passed Assembly Bill 40, which restricted brewery distribution to retailers to brewers producing less than 300 thousand barrels. In 2013, Ohio passed Senate Bill 48 which restricted brewers producing over 31 million barrels from distributing beer, grandfathering in any existing wholesaling operations. Both of these changes are towards the end of the sample, and neither state had restricted brewery sales to retailers prior. Additionally, the volume restrictions are much higher than other states or craft brewer volumes. Ohio's threshold of brewers producing 31 million barrels affects only the largest breweries, and *no* craft brewers in the US; Wisconsin's threshold of 300 thousand is also well over the size of all but a handful of the largest craft brewers across the US, and thus are unlikely to affect any entrants. As such, these two states were coded as two-tier states.

where $Breweries_{st}$ is the count of brewery permits from the TTB in state s in year t, or (ii) the value of the growth in craft beer production, defined by

$$Growth_{st} = \frac{Production_{st} - Production_{st-1}}{Population_{st}/100}$$

where $Production_{st}$ is craft beer production, measured in barrels, in state s in year t. Dividing by population scales the estimated treatment effect by the size of the market. The measure of craft beer production is noisy, as the definition of craft beer has changed over time, survey responses were not always consistent, and as craft brewer acquisitions altered the production measure as recorded by the Brewers Association.[27] As such, I exclude any year with a large change in production defined as greater than 10 barrels per hundred people in absolute value, which excludes 13 observations.

$Franchise_{st}$ is a dummy variable for treatment and is equal to 1 if state s had beer franchise laws present in year t. In this specification β is the difference in differences estimator and measures the impact that the passage of beer franchise laws had compared to states that did not experience changes in beer franchise laws. $\mathbf{X_{st}}$ are control variables discussed below; φ_s are state fixed effects that control for persistent differences in entry and growth across states, and φ_t are year fixed effects that control for nationwide shocks in entry and growth. ε_{st} is an idiosyncratic error term. All regressions' standard errors are clustered at the state level to allow for serial correlation in the error term within states.

To account for the potential interaction between distribution and beer franchise laws, I estimate a modified model that includes these interactions as follows below.

$$Y_{st} = \beta_1 ThreeTier_s \times Franchise_{st} + \beta_2 TwoTier_s \times Franchise_{st} + \mathbf{X_{st}}\delta + \varphi_s + \varphi_t + \varepsilon_{st} \qquad (2)$$

$ThreeTier_s$ and $TwoTier_s$ are dummy variables indicating whether a state is classified as a three-tier or two-tier distribution state, respectively, as defined above. Here β_1 represents the impact of beer franchise laws in three-tier regimes, and β_2 represents the impact of beer franchise laws in

[27] For example, production by a relatively large craft brewery, Magic Hat Brewing located in Vermont fell under ownership of Independent Brewers United, then North American Breweries, and was acquired in 2012 by Florida Ice and Farm Company. This acquisition led to their classification outside of craft beer by the Brewers Association for some years.

two-tier regimes.

Several other controls that may be related to brewery entry and growth are included in the analysis. I include state-year-level economic and demographic control variables to account for effects of compositional changes within a state over time. They include beer excise taxes obtained from the Beer Institute, median age of state population from the Census, personal income per capita from BEA, and unemployment rate from BLS. I also include alcohol consumption control variables from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) in some specifications.

Spatial correlation appears to be important as seen in Figure 2, which suggests regional correlation in the number of breweries per capita. Specifically, the Northeast and Pacific Northwest have high breweries per capita, whereas a cluster of the South has relatively low breweries per capita. This pattern in craft brewery production per capita, presented in Figure 3, does not appear in the same way. To account for this potential spatial correlation I include controls for the number of breweries per capita and production per capita in directly neighboring states[28] when estimating equations 1 and 2 with the dependent variable of entry and growth, respectively, to account for potential spillover effects from other states. I also include the population weighted average of neighboring states with beer franchise laws. This partially controls for differences in regional trends, which appear to be important. To further address potential regional effects, I also estimate specifications which include Census region specific linear time trends. Table 2 shows summary statistics for states that passed beer franchise laws and those that did not.

5.1 Interpretation and Identification

The two theories of vertical behavior yield opposite predictions on the sign of the β coefficients. If incumbent brewers act anti-competitively by threatening downstream wholesalers with termination for accommodating new entrants, we would expect that the passage of beer franchise laws would result in more entrants and more growth in the craft brewing industry; thus we would estimate positive β coefficients. If, on the other hand, beer franchise laws give protections to downstream wholesalers to act opportunistically and under-perform, this would decrease the profitability of entry

[28] For the non-continental states, I count Washington as a neighbor of Alaska, and California as a neighbor of Hawaii.

and raise the cost of production, and thus we would estimate negative β coefficients. Additionally if the latter theory is correct, the impact of beer franchise laws would be larger in three-tier states that limit brewer's ability to distribute beer themselves compared to two-tier states where brewers are free to distribute beer to retailers themselves, and thus avoid the use of wholesalers when beer franchise laws are present. In this case, in equation 2, we would expect a negative coefficient on β_1, larger in magnitude than β_2.

Identification of the model as causal depends on the passage of beer franchise laws being exogenous to the craft brewing industry. I argue that this is likely true. The first states to pass franchise termination restrictions did so beginning in the 1960s and 1970s well before craft breweries existed. Until recently there were very few trade groups that focused on the interests of craft brewers. The Brewers Association, a national trade group, did not form until 2005, and many states did not have brewers guilds until more recently. Additionally, craft beer was historically a small portion of the brewing industry—prior to 2005, craft beer represented less than 5% of the industry by revenue, and did not pass 10% until 2010. Thus it is likely craft brewers did not have much political influence compared to the wholesaler industry. Additionally, as discussed in section 2.2, beer franchise laws were passed with a consistent stated goal of protecting wholesaler interests, as noted in legislative intent, and coincided with increasing concentration in beer manufacturers.[29] Hence the intent does not seem related to small, craft brewers.

5.2 Causality and Timing of Law Impacts

To test the parallel trends assumption necessary for identification in the difference in differences model, I modify equations 1 and 2 and test for differences in pre-trends which threaten the validity of the above empirical strategy. Similar to the specification in Autor (2003), the models are modified

[29]Even state laws that do not explicitly express legislative intent have been interpreted similarly by the courts. In Arneson Distributing Co. v. Miller Brewing Co., 117 F. Supp. 2d 905 (D. Minn. 2000), it was noted that while Minnesota's "Beer Brewers and Wholesalers Act" does not contain a statement of purpose "that, among its provisions, the statute prohibited brewers from fixing wholesale prices, coercing wholesalers to accept delivery of unordered products, or discriminating among wholesalers." Further, the ruling notes that a previous conclusion was reached in "Rex Distributing Co., Inc. v. Miller Brewing Co., Inc." where the ruling stated, "the chief purpose of dual distribution prohibitions like this one is to prevent brewers from coercing beer wholesalers into violating the liquor regulatory laws by threatening to deprive them of their distribution rights."

to the following equations

$$Y_{st} = \sum_{k=-l}^{m} \beta_k \mathbb{I}(t - T_s = k) + \mathbf{X_{st}}\delta + \varphi_s + \varphi_t + \varepsilon_{st} \tag{3}$$

$$Y_{st} = \sum_{k=-l}^{m} \beta_{1k} \mathbb{I}(t - T_s = k) \times ThreeTier_s + \sum_{k=-l}^{m} \beta_{2k} \mathbb{I}(t - T_s = k) \times TwoTier_s \tag{4}$$
$$+ \mathbf{X_{st}}\delta + \varphi_s + \varphi_t + \varepsilon_{st}$$

where the franchise treatment variables from above are replaced with an indicator term, $\mathbb{I}(t - T_s = k)$, equal to 1 when the state's observation year t is k periods relative to that state's year of franchise law passage, T_s. The panel is relatively long, with volatility in entry and growth, so I estimate this model with two year periods, estimating a model with 1-2 years, 3-4 years, and 5-6 years prior to franchise law passage in the pre-period, and 0-1 years, 2-3 years, 4-5 years, and 6+ years in the post-period. The baseline period is specified to be $k > 6$.[30] If the pre-treatment coefficient estimates are significantly different from zero, it would cast doubt on the causality of the results, while the post-treatment estimates can identify timing of the effects.

6 Results

Table 3 presents results of estimation of equation 1 and 2 with entry as the dependent variable, and Table 4 presents results with growth as the dependent variable. Results show a significant decrease in entry and a significant decrease in growth in three-tier states. Estimation of equation 1 finds beer franchise laws reduces brewery entry by in 0.340 per million people per year. Mean entry over this time period was 0.95 breweries per million people, so this represents a large effect.[31] Further, this is driven by a reduction of entry in three-tier states which restrict brewery distribution, as the estimate of β_1, the coefficient on $Franchise \times ThreeTier$, in equation 2 ranges from -0.451 to -0.612. The effect of beer franchise laws in two-tier states on entry is also estimated to be negative, but lacks statistical significance. The impacts on growth are similar. Estimates from equation

[30] Results are similar considering only two pre-treatment indicators, with a baseline period of $k > 4$.

[31] Entry increased over the time period. Prior to 2000, mean entry across all states was 0.70 breweries per million. Post 2000, this was 1.17.

1 show no significant or sizable impact of beer franchise laws, but estimates of equation 2 find significant negative impacts, as estimates of β_1, the coefficient on $Franchise \times ThreeTier$, ranges from -0.169 to -0.204. This too, is a large effect. Mean growth of craft beer production over this time period was 0.25 barrels per hundred people.[32] The effect of beer franchise laws on growth in two-tier states, while estimated to be positive, is not statistically significant in any specification.

As noted, these are large effects. To frame this, I consider a counterfactual in which no states passed beer franchise laws, holding all else equal. I use the estimates of equation 2 as reported in column (5) of Tables 3 and 4 to calculate the cumulative effect these laws had on the total number of breweries and craft beer production, respectively. I sum the impact on entry and growth over each year a state had beer franchise laws and, given the estimates of β_1 and β_2, I calculate the net effect this is estimated to have on the total number of breweries and craft beer production by the end of the sample in 2016. Results show that if no states had passed beer franchise laws, by 2016 there would have been 3,057 more breweries operating in the US (95% CI: [555, 5,559]), which is 43% higher than the observed baseline of 7,190 breweries permitted by the TTB. On craft production, I estimate that by 2016, without beer franchise laws, craft production would have been 5.9 million barrels higher (95% CI: [-6.2, 18.0]). While this estimate is noisier, in 2016, craft beer production was 24.7 million barrels, so the point estimate suggests that there would have been 24% higher production in the absence of beer franchise laws.

The findings are thus consistent with agency theories that posit beer franchise laws give protection to wholesalers to act opportunistically and under-perform. Once a contract is signed with a wholesaler, brewers, especially small brewers, have extremely limited options if a wholesaler is under-performing. Further, the fact that the effect is driven by states that restrict brewery distribution is economically intuitive as the effects of signing a contract with a distributor whose interests do not align with the brewer's can be very costly if it is difficult to terminate. The ability to self-distribute gives brewers the ability to bypass being locked in a costly contract, whereas a brewer required to use a distributor from the outset does not have this option. These results are contrary to the predictions of the theory that beer franchise laws facilitate market access for new

[32]Growth of craft beer production increased over the time period, as well. Prior to 2000, mean growth across all states was 0.08 barrels per hundred people. Post 2000, this was 0.43.

brewers by preventing anti-competitive vertical behavior by existing, large brewers.

The results from estimating equations (3) and (4) lend credibility to the difference in differences approach, and estimates of equation (4) are presented in Tables 5 and 6.[33] Figure 4 plots coefficient estimates from column (4) of Tables 5 and 6, and shows: (i) no evidence of differential pre-trends, (ii) a reduction in entry and growth in three-tier states, and (iii) little effect of beer franchise laws in two-tier states. In all specifications, no pre-treatment coefficient estimates are statistically significantly different from zero, indicating prior to franchise law passage, treated and untreated states had similar trends. Additionally, in three-tier states, the post-treatment coefficient estimates are similar to or slightly larger than the estimates in Tables 3 and 4, indicating that the effect on entry is similar or slightly larger in the long run. Post-treatment coefficient estimates for 6+ years post-beer franchise laws are significant at the 5% level for entry and growth in all specifications, except on entry with spatial controls in columns (3) and (4). However, the estimate is larger in the long run than those estimated in Table 3. Similar to the main estimates above, in two-tier states, almost no statistically significant effects are found in either pre- or post-treatment periods—only two estimates of coefficients on post-treatment indicators are statistically significant at the 5% and 10% level in column (1) in Table 5, and suggest a decrease in entry. Additionally, the long run impact on growth in two-tier states is estimated to be close to zero, indicating the statistically insignificant, but positive point estimates on $Franchise \times TwoTier$ in Table 4 are at best temporary.

These results largely give support to the parallel trend assumption and a causal, significant impact of the laws. Namely, they show that beer franchise laws had a large, negative impact on craft brewery entry and growth in states that imposed restrictions on brewery distribution leading to lower levels of breweries and output per capita. This effect is largely not present in two-tier states.

[33] To economize on space, I do not report results from estimating equation (3), without the distribution regime interaction term. Examining pre-trends, no coefficients on pre-treatment indicators are statistically significant with entry as the dependent variable, and only one coefficient on pre-treatment indicators is statistically significant at the 10% level with growth as the dependent variable.

6.1 Robustness and Alternative Specifications

To establish the robustness of the results above, I explore further robustness checks here and in Appendix A. I take three approaches: First, I re-estimate the model within distribution regimes and estimate equation 1 separately for three- and two-tier states. Second, I explore alternative coding of state beer franchise laws. Third, I test the robustness of statistical inference using the randomization inference techniques of MacKinnon and Webb (2020).

The first set of robustness checks re-estimate equation 1 *within* the two-tier and three-tier distribution regimes. While this reduces power by limiting the sample size and number of treatments within the regime, it limits the control group to those states that had similar distribution regimes, which may be desirable. Table 7 shows these results. While not as precise, the results have similar point estimates to those of the main text: There is a significant decrease in entry and growth in three-tier distribution regimes associated with the passage of beer franchise laws. While the point estimates are negative on entry and positive on growth in two-tier distribution regimes, neither are statistically significant.

Next, I examine alternative classifications of state beer franchise laws, and test sensitivity to the coding of the main results. These alternative specifications are discussed fully in Appendix A. Results are similar to that of the main text, and any deviations are as expected. Lastly, the estimates using randomization inference techniques of MacKinnon and Webb (2020) suggest results are robust to alternative inferential techniques compared to clustering standard errors at the state level. These results are fully discussed in Appendix A.

7 Conclusion

This study empirically examined the impact of beer franchise laws and their interaction with state beer distribution laws on craft brewery entry and growth. I find that beer franchise termination laws decreased both. These effects are driven by states that restrict brewers from distributing their beer to retailers. While beer franchise laws were legislated to shield wholesalers from large brewers, the findings of the study suggest they had the effect of encouraging opportunism by wholesalers

and increasing the cost of brewing, thus inhibiting the growth of the craft brewing industry. I reject the hypothesis that beer franchise laws ease entry and encouraged growth of the craft beer industry by preventing large brewers upstream from inducing exclusion downstream. It is possible that beer franchise laws also restrict entry into the wholesaling tier, as the restrictions on termination and non-renewal of distribution contracts with existing wholesalers make it difficult for a potential wholesaler entrant to obtain beer volume to distribute. This paper does not test this hypothesis, and it is a question left for future research.

Similar restrictions to the ones studied here are present in industries other than brewing. The wine and spirits industries are governed by franchise termination and three-tier laws. The petroleum and automotive industry are subject to similar state regulations, where "good cause" is necessary to cancel or fail to renew a contract between a manufacturer and a downstream firm, and the industries are subject to divorcement legislation that restricts vertical integration. Many states explicitly banned the method of direct sales Tesla employed to bypass dealerships.[34] Lastly, the franchise business model is very common, and this study examines laws similar to those that many states have for business-format franchises.

The findings here also further the literature on the empirical impacts of vertical restraints, and expand the conclusion of Lafontaine and Slade (2008, p. 409) that, "when restraints and contract limitations are imposed on manufacturers via government intervention, often in response to dealer pressure due to perceptions of uneven bargaining power between manufacturers and dealers, the effect is typically to reduce consumer well-being as prices increase and service levels fall." The results here suggest another mechanism of harm is that these restrictions may hinder the emergence of a niche industry.

[34]See for example, West Virginia Senate Bill 453 (2015) which prohibited this practice. This is a stance the FTC has recently urged against in letters to state representatives. See https://web.archive.org/web/20140810081452/https://www.ftc.gov/system/files/documents/advocacy_documents/ftc-staff-comment-missouri-house-representatives-regarding-house-bill-1124-which-would-expand/140515mo-autoadvocacy.pdf and https://web.archive.org/web/20140809090018/https://www.ftc.gov/system/files/documents/advocacy_documents/ftc-staff-comment-new-jersey-general-assembly-regarding-assembly-bills-2986-3096-3041-3216-which/140516nj-autoadvocacy.pdf

References

Asker, John. "Diagnosing foreclosure due to exclusive dealing." The Journal of Industrial Economics 64, no. 3 (2016): 375-410.

Asker, John, and Heski Bar-Isaac. "Raising Retailers' Profits: On Vertical Practices and the Exclusion of Rivals." The American Economic Review 104, no. 2 (2014): 672-686.

Autor, David H. "Outsourcing at will: The contribution of unjust dismissal doctrine to the growth of employment outsourcing." Journal of labor economics 21, no. 1 (2003): 1-42.

Barron, John M., and John R. Umbeck. "The effects of different contractual arrangements: The case of retail gasoline markets." The Journal of Law and Economics 27, no. 2 (1984): 313-328.

Blair, Roger D., and Francine Lafontaine. "The economics of franchising." Cambridge University Press, 2005.

Blass, Asher A. and Dennis W. Carlton. "The Choice of Organizational Form in Gasoline Retailing and the Cost of Laws That Limit That Choice." Journal of Law and Economics Vol. 44, No. 2 (October 2001), pp. 511-524

Brickley, James A., Frederick H. Dark, and Michael S. Weisbach. "The economic effects of franchise termination laws." Journal of Law and Economics (1991): 101-132.

Burgdorf, Jacob. "Impact of mandated exclusive territories in the US brewing industry: Evidence from scanner level data." International Journal of Industrial Organization 63 (2019): 376-416

Burgdorf, Jacob. "Exclusive Territories and Efficiency: Evidence From the Brewing Industry." Working paper. Available at SSRN 3392405 (2021a).

Burgdorf, Jacob. "The strategic impact of voluntary vs. mandated vertical restraints and termination restrictions on exclusion of rivals." Journal of Regulatory Economics 59, no. 1 (2021b): 94-107.

Conley, Timothy G., and Christopher R. Taber. "Inference with "difference in differences" with a small number of policy changes." The Review of Economics and Statistics 93, no. 1 (2011): 113-125.

Carroll, Glenn R., and Anand Swaminathan. "Why the Microbrewery Movement? Organizational Dynamics of Resource Partitioning in the US Brewing Industry." American Journal of Sociology 106, no. 3 (2000): 715-762.

Chen, Chia-Wen. "Estimating the foreclosure effect of exclusive dealing: Evidence from the entry of specialty beer producers." International Journal of Industrial Organization 37 (2014): 47-64.

Culbertson, Patton W., and David Bradford. "The price of beer: Some evidence from interstate comparisons." International Journal of Industrial Organization 9, no. 2 (1991): 275-289.

Elzinga, Kenneth G., Carol Horton Tremblay, and Victor J. Tremblay. "Craft beer in the United States: History, numbers, and geography." Journal of Wine Economics 10, no. 03 (2015): 242-274.

Fisher, R.A., "The Design of Experiments" Oliver and Boyd (1935)

Gohmann, Stephan F. "Why Are There so Few Breweries in the South?" Entrepreneurship Theory and Practice (2015)

Hindy, Steve. The Craft Beer Revolution: How a Band of Microbrewers Is Transforming the World's Favorite Drink. Macmillan, 2014.

Horvath, Michael, Fabiano Schivardi, and Michael Woywode. "On industry life-cycles: delay, entry, and shakeout in beer brewing." International Journal of Industrial Organization 19, no. 7 (2001): 1023-1052.

Klein, Benjamin. "The economics of franchise contracts." Journal of Corporate Finance 2, no. 1 (1995): 9-37.

Klein, Benjamin, and Kevin M. Murphy. "Vertical restraints as contract enforcement mechanisms." Journal of Law and Economics (1988): 265-297.

Klick, Jonathan, Bruce H. Kobayashi, and Larry E. Ribstein. "The Effect of Contract Regulation on Franchising." Journal of Institutional and Theoretical Economics JITE 168, no. 1 (2012): 38-53.

Kurtz, Barry and Bryan H. Clements "Beer Distribution Law as Compared to Traditional Franchise Law" Franchise Law Journal Vol. 33, no. 3 (2014): 397-409.

Lafontaine, Francine, and Roger D. Blair. "The evolution of franchising and franchise contracts: Evidence from the United States." Entrepreneurial Business Law Journal 3 (2008): 381.

Lafontaine, Francine, and Fiona Scott Morton. "Markets: state franchise laws, dealer terminations, and the auto crisis." The Journal of Economic Perspectives (2010): 233-250.

Lafontaine, Francine, and Margaret Slade. "Vertical integration and firm boundaries: The evidence." Journal of Economic literature 45, no. 3 (2007): 629-685.

Lafontaine, Francine, and Margaret Slade. "Exclusive contracts and vertical restraints: Empirical evidence and public policy." Handbook of antitrust economics 1 (2008): 391-414.

MacKinnon, James G., and Matthew D. Webb. "Randomization inference for difference-in-differences with few treated clusters." Journal of Econometrics 218, no. 2 (2020): 435-450.

Murry, Charles. "The effect of retail competition on relationship-specific investments: evidence from new car advertising." International Journal of Industrial Organization 59 (2018): 253-281.

Murry, Charles, and Peter Newberry. "Franchise Contract Regulations and Local Market Structure." Journal of Law and Economics (2021), forthcoming.

Rojas, Christian. "The Effect of Mandated Exclusive Territories in the US Brewing Industry." The BE Journal of Economic Analysis and Policy 12, no. 1 (2012).

Sass, Tim R. "The competitive effects of exclusive dealing: Evidence from the US beer industry." International Journal of industrial Organization 23, no. 3 (2005): 203-225.

Sass, Tim R., and David S. Saurman. "Mandated exclusive territories and economic efficiency: An empirical analysis of the malt-beverage industry." Journal of Law and Economics (1993): 153.

Sass, Tim R., and David S. Saurman. "Efficiency effects of exclusive territories: Evidence from the Indiana beer market." Economic Inquiry 34, no. 3 (1996): 597-615.

Slade, Margaret E. "Beer and the Tie: Did Divestiture of Brewer-owned Public Houses Lead to Higher Beer Prices?" The Economic Journal 108, no. 448 (1998): 565-602.

Smith, Richard L. "Franchise regulation: An economic analysis of state restrictions on automobile distribution." Journal of Law and Economics 25 (1982): 125.

Tremblay, Victor J., Natsuko Iwasaki, and Carol Horton Tremblay. "The dynamics of industry concentration for US micro and macro brewers." Review of Industrial Organization 26, no. 3 (2005): 307-324.

Tremblay, Victor J., and Carol Horton Tremblay. The US brewing industry: Data and economic analysis. MIT Press, 2005.

Vita, Michael G. "Regulatory restrictions on vertical integration and control: The competitive impact of gasoline divorcement policies." Journal of Regulatory Economics 18, no. 3 (2000): 217-233.

Whitman, Douglas Glen. Strange Brew: Alcohol and Government Monopoly. Independent Institute, 2003.

Table 1: Beer Franchise Law Passage Summary

State	Franchise	State	Franchise
Alabama	1988	Montana	1974
Alaska		Nebraska	1978
Arizona	1974	Nevada	1973
Arkansas	1991	New Hampshire	1981
California		New Jersey	2006
Colorado	2007*	New Mexico	1981
Connecticut	1971	New York	1996
Delaware	1981	North Carolina	1965
DC		North Dakota	1981
Florida	1987	Ohio	1974
Georgia	1965	Oklahoma	2009*
Hawaii		Oregon	1989
Idaho	1977	Pennsylvania	1980
Illinois	1982	Rhode Island	1982*
Indiana	1973	South Carolina	1974
Iowa	1995	South Dakota	1990
Kansas	1979	Tennessee	1990
Kentucky	2004	Texas	1981
Louisiana	1993	Utah	1998
Maine	1979	Vermont	1976
Maryland	1974	Virginia	1978
Massachusetts	1973	Washington	1984*
Michigan	1984	West Virginia	1971
Minnesota	1977	Wisconsin	2004
Mississippi	1995	Wyoming	1996
Missouri	1975		

Source: Collected by author.

Notes: States with asterisks have some form of beer franchise laws, but allow brewers to terminate wholesale without good cause for reasons that vary by state. As such, in the main analysis these states were not coded as beer franchise states. The explanations for each are given below. Alternative coding is tested in Appendix A.

∗ Colorado: A weaker form of beer franchise laws were passed in Colorado in 2007, requiring cause for termination of a contract with 60 days allowance for the wholesaler to remedy, but the law allows for termination *without* "good cause" provided a 90 day notice is given to the wholesaler and "all other wholesalers in all other states who have entered into the same distribution agreement with the supplier" (Colo. Rev. Stat. §§ 12-47-406.3 (3)). The hypothesis tested in this article is regarding the restriction on the ability to cancel and this law only delays by 90 days, and does not prohibit cancellation.

∗ Oklahoma: Oklahoma has different regulations on "low-point beer" (less than 3.2% alcohol by weight) and stronger beer; this includes beer franchise laws that apply only to "low-point beer." Since almost all craft brands in Oklahoma (and the US) are not "low-point beer," this law would not apply.

∗ Rhode Island: Rhode Island passed beer franchise laws in 1982, but they never applied to breweries of any type, regardless of size, so long as they were located within Rhode Island.

∗ Washington: Washington's beer franchise laws were passed in 1984 and originally exempted brewers who produce under 50,000 barrels. This increased to 200,000 barrels in 2009; most craft brewers produce much less than either limit.

Table 2: Summary statistics

	Beer Franchise States			Never Beer Franchise		
Variable	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Entry[a]	0.91	2.01	1376	1.12	2.37	256
Growth[b]	0.24	2.11	1548	0.32	1.30	288
Franchise	0.86	0.34	1548	0	0	288
Two-tier	0.26	0.44	1548	0.88	0.33	288
Three-tier	0.74	0.44	1548	0.13	0.33	288
Beer Excise Tax [c]	7.01	5.04	1548	9.99	9.81	288
Median Age[d]	34.93	3.29	1548	34.14	2.68	288
Personal Income	27.56	12.16	1548	31.43	13.78	288
Unemployment Rate	5.94	2.11	1548	6.46	2.01	288
Beer/cap[e]	23.02	4.23	1548	22.61	3.17	288
Wine/cap[e]	1.98	1.06	1548	3.11	1.39	288
Spirits/cap[e]	1.56	0.6	1548	1.87	0.85	288
Neighboring Breweries/cap[f]	6.67	7.2	1419	9.80	10.71	264
Neighboring Production/cap[g]	2.20	3.43	1548	3.26	4.74	288
Neighboring Franchise %	0.75	0.29	1548	0.64	0.40	288

[a] entering breweries per million people; [b] craft beer production growth in barrels per hundred people; [c] dollars per barrel; [d] median age in years of state population; [e] gallons per capita; [f] breweries per million people; [g] craft barrels per hundred people

Data covers period 1980-2016. Brewery permit data begin 1984. Columns under beer franchise states include all years for states that passed beer franchise laws by the end of the sample. Columns under never beer franchise represent states that did not pass beer franchise laws.

Table 3: Impact of Franchise Laws on Entry

	(1)	(2)	(3)	(4)	(5)
Franchise	-0.340**				
	(0.13)				
Franchise×		-0.451***	-0.612***	-0.470**	-0.495**
ThreeTier		(0.13)	(0.16)	(0.20)	(0.22)
Franchise×		-0.172	-0.166	-0.161	-0.259
TwoTier		(0.24)	(0.23)	(0.24)	(0.24)
Neighboring Breweries/cap				0.096***	0.086**
				(0.02)	(0.04)
Neighboring Franchise %				0.149	0.072
				(0.27)	(0.28)
State & Year FE	Y	Y	Y	Y	Y
Alcohol consumption	N	N	Y	Y	Y
Regional linear trends	N	N	N	N	Y
R^2	0.506	0.506	0.511	0.528	0.530
N	1632	1632	1632	1632	1632

Note: Table 3 presents the results of a linear model with the number of entering breweries per million people as the dependent variable in columns (1)-(5). All regressions include controls for beer excise tax rate, median age, income per capita, and unemployment. Alcohol consumption controls include beer, wine, and spirits per capita. Robust standard errors, clustered at the state level, are in parentheses where *, **, *** denote significant at 10%, 5%, and 1% levels, respectively.

Table 4: Impact of Franchise Laws on Growth

	(1)	(2)	(3)	(4)	(5)
Franchise	-0.064				
	(0.10)				
Franchise×		-0.181***	-0.169***	-0.185***	-0.204**
ThreeTier		(0.06)	(0.06)	(0.06)	(0.08)
Franchise×		0.147	0.171	0.179	0.213
TwoTier		(0.22)	(0.22)	(0.23)	(0.22)
Neighboring Production/cap				0.002	0.000
				(0.02)	(0.02)
Neighboring Franchise %				0.225	0.272
				(0.19)	(0.18)
State & Year FE	Y	Y	Y	Y	Y
Alcohol consumption	N	N	Y	Y	Y
Regional linear trends	N	N	N	N	Y
R^2	0.183	0.184	0.185	0.186	0.188
N	1823	1823	1823	1823	1823

Note: Table 4 presents the results of a linear model with growth in craft beer production per capita, measured in barrels per hundred people, as the dependent variable in columns (1)-(5). All regressions include controls for beer excise tax rate, median age, income per capita, and unemployment. Alcohol consumption controls include beer, wine, and spirits per capita. Robust standard errors, clustered at the state level, are in parentheses where *, **, *** denote significant at 10%, 5%, and 1% levels, respectively.

Table 5: Impact of Franchise Laws on Craft Entry; models with leads and lags

	(1)	(2)	(3)	(4)
ThreeTier×				
5-6 yrs pre-*Fran*	-0.228	-0.222	-0.303	-0.338
	(0.15)	(0.15)	(0.25)	(0.28)
3-4 yrs pre-*Fran*	0.003	0.006	-0.125	-0.176
	(0.24)	(0.24)	(0.35)	(0.39)
1-2 yrs pre-*Fran*	0.261	0.199	0.019	-0.044
	(0.53)	(0.58)	(0.55)	(0.60)
0-1 yrs post-*Fran*	0.139	-0.014	-0.158	-0.239
	(0.45)	(0.51)	(0.43)	(0.48)
2-3 yrs post-*Fran*	-0.492	-0.696**	-0.778*	-0.892*
	(0.30)	(0.31)	(0.45)	(0.51)
4-5 yrs post-*Fran*	-0.487**	-0.662**	-0.669	-0.791
	(0.24)	(0.27)	(0.42)	(0.49)
6+ yrs post-*Fran*	-0.498**	-0.678**	-0.550	-0.603
	(0.24)	(0.30)	(0.36)	(0.44)
TwoTier×				
5-6 yrs pre-*Fran*	0.353	0.433	0.562	0.558
	(0.31)	(0.33)	(0.34)	(0.38)
3-4 yrs pre-*Fran*	-0.029	0.074	0.210	0.236
	(0.29)	(0.29)	(0.26)	(0.29)
1-2 yrs pre-*Fran*	-0.197	-0.080	0.059	0.063
	(0.23)	(0.24)	(0.22)	(0.29)
0-1 yrs post-*Fran*	-0.551*	-0.410	-0.266	-0.275
	(0.33)	(0.36)	(0.33)	(0.38)
2-3 yrs post-*Fran*	-0.394**	-0.290	-0.134	-0.159
	(0.20)	(0.21)	(0.19)	(0.25)
4-5 yrs post-*Fran*	-0.075	0.006	0.029	0.027
	(0.24)	(0.30)	(0.35)	(0.37)
6+ yrs post-*Fran*	-0.083	-0.055	0.031	-0.103
	(0.31)	(0.29)	(0.30)	(0.36)
State & Year FE	Y	Y	Y	Y
Alcohol consumption	N	Y	Y	Y
Spatial controls	N	N	Y	Y
Regional linear trends	N	N	N	Y

Note: Table 5 presents the results of a linear model with the number of entering breweries per million people as the dependent variable in columns (1)-(5). All regressions include controls for beer excise tax rate, median age, income per capita, and unemployment. Alcohol consumption controls include beer, wine, and spirits per capita. Robust standard errors, clustered at the state level, are in parentheses where *, **, *** denote significant at 10%, 5%, and 1% levels, respectively.

Table 6: Impact of Franchise Laws on growth; models with leads and lags

	(1)	(2)	(3)	(4)
ThreeTier×				
5-6 yrs pre-*Fran*	-0.061	-0.058	-0.048	-0.067
	(0.06)	(0.05)	(0.06)	(0.06)
3-4 yrs pre-*Fran*	-0.111	-0.110	-0.105	-0.130
	(0.08)	(0.08)	(0.08)	(0.08)
1-2 yrs pre-*Fran*	-0.096	-0.098	-0.105	-0.142
	(0.08)	(0.08)	(0.09)	(0.10)
0-1 yrs post-*Fran*	-0.217***	-0.207**	-0.221**	-0.271**
	(0.08)	(0.08)	(0.09)	(0.11)
2-3 yrs post-*Fran*	-0.132	-0.124	-0.150	-0.201
	(0.10)	(0.10)	(0.11)	(0.12)
4-5 yrs post-*Fran*	-0.240**	-0.224**	-0.240**	-0.289**
	(0.09)	(0.09)	(0.10)	(0.12)
6+ yrs post-*Fran*	-0.288**	-0.280**	-0.291**	-0.315**
	(0.11)	(0.11)	(0.12)	(0.13)
TwoTier×				
5-6 yrs pre-*Fran*	0.380	0.377	0.359	0.410
	(0.57)	(0.57)	(0.58)	(0.57)
3-4 yrs pre-*Fran*	-0.861	-0.863	-0.879	-0.824
	(0.55)	(0.55)	(0.55)	(0.55)
1-2 yrs pre-*Fran*	-0.112	-0.110	-0.119	-0.062
	(0.14)	(0.14)	(0.15)	(0.15)
0-1 yrs post-*Fran*	0.259	0.266	0.266	0.332
	(0.44)	(0.44)	(0.45)	(0.45)
2-3 yrs post-*Fran*	0.037	0.048	0.051	0.112
	(0.17)	(0.18)	(0.19)	(0.20)
4-5 yrs post-*Fran*	0.145	0.161	0.164	0.226
	(0.24)	(0.24)	(0.25)	(0.26)
6+ yrs post-*Fran*	-0.016	0.004	0.009	0.058
	(0.21)	(0.21)	(0.22)	(0.23)
State & Year FE	Y	Y	Y	Y
Alcohol consumption	N	Y	Y	Y
Spatial controls	N	N	Y	Y
Regional linear trends	N	N	N	Y

Note: Table 6 presents the results of a linear model with growth in craft beer production per capita, measured in barrels per hundred people, as the dependent variable in columns (1)-(5). All regressions include controls for beer excise tax rate, median age, income per capita, and unemployment. Alcohol consumption controls include beer, wine, and spirits per capita. Robust standard errors, clustered at the state level, are in parentheses where *, **, *** denote significant at 10%, 5%, and 1% levels, respectively.

Table 7: Impact of Franchise Laws, within distribution regime

	(1)	(2)	(3)	(4)
Panel (a): Dep. Variable: Entry, Three-tier states				
Franchise	-0.309*	-0.434**	-0.366*	-0.376
	(0.17)	(0.18)	(0.20)	(0.24)
N	1056	1056	1056	1056
Panel (b): Dep. Variable: Growth, Three-tier states				
Franchise	-0.145**	-0.126**	-0.144**	-0.182*
	(0.06)	(0.06)	(0.06)	(0.09)
N	1184	1184	1184	1184
Panel (c): Dep. Variable: Entry, Two-tier states				
Franchise	-0.238	-0.428	-0.404	-0.297
	(0.27)	(0.29)	(0.35)	(0.31)
N	576	576	576	576
Panel (d): Dep. Variable: Growth, Two-tier states				
Franchise	0.154	0.165	0.154	0.161
	(0.25)	(0.25)	(0.27)	(0.26)
N	639	639	639	639
State & Year FE	Y	Y	Y	Y
Alcohol consumption	N	Y	Y	Y
Spatial controls	N	N	Y	Y
Regional linear trends	N	N	N	Y

Note: Table 7 presents the results of estimating equation 1 limiting the sample to three-tier and two-tier distribution regimes. In panels (a) and (c) the dependent variable is the number of entering breweries per million people, and in panels (b) and (c) the dependent variable is growth in craft beer production per capita, measured in barrels per hundred people. All regressions include controls for beer excise tax rate, median age, income per capita, and unemployment. Alcohol consumption controls include beer, wine, and spirits per capita. Robust standard errors, clustered at the state level, are in parentheses where *, **, *** denote significant at 10%, 5%, and 1% levels, respectively.

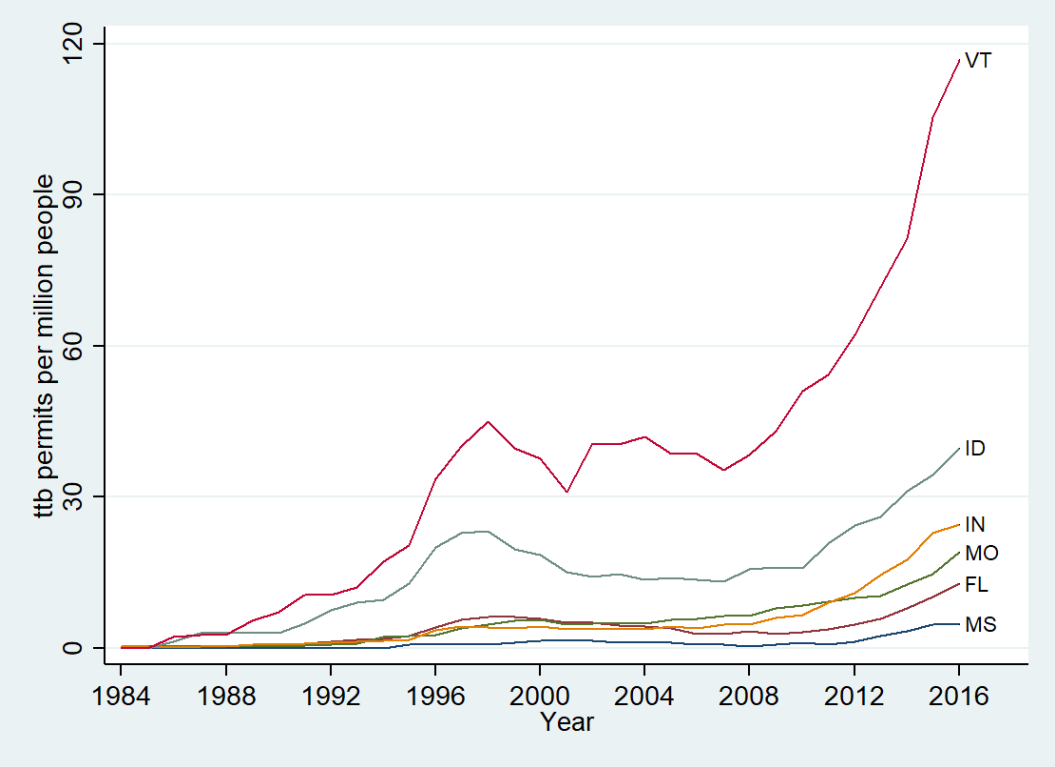


Figure 1: Number of breweries per million in selected states (1984-2016)
Vermont had the highest breweries per capita in 2016 with 116.9 per million people, whereas Mississippi had the least with 4.7 per million people. Idaho, Indiana, Missouri, and Florida were ranked 11^{th}, 21^{st}, 31^{st}, and 41^{st}, respectively.

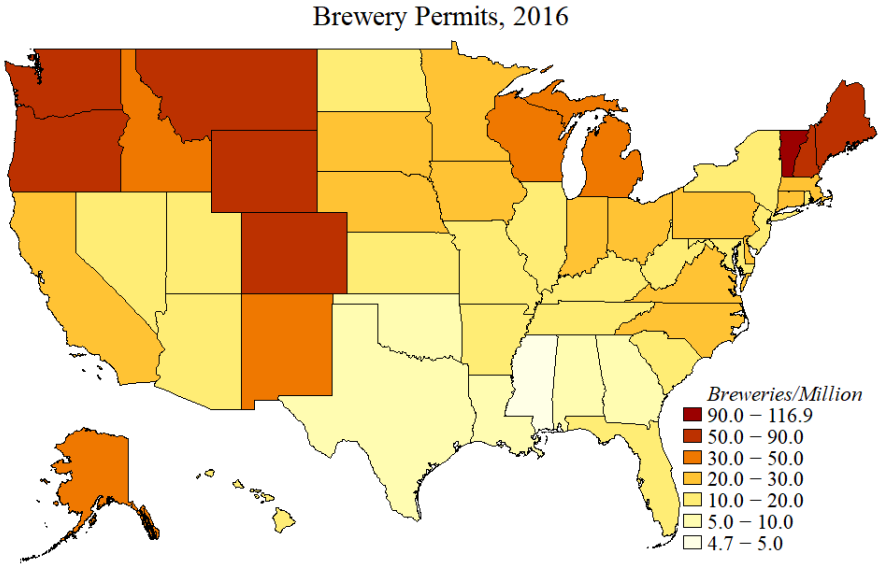


Figure 2: Number of breweries per million people by state, 2016

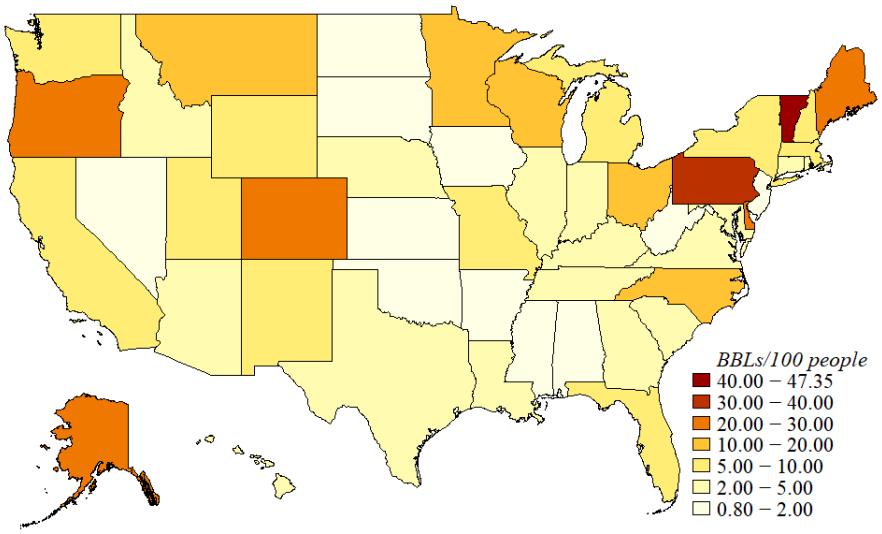
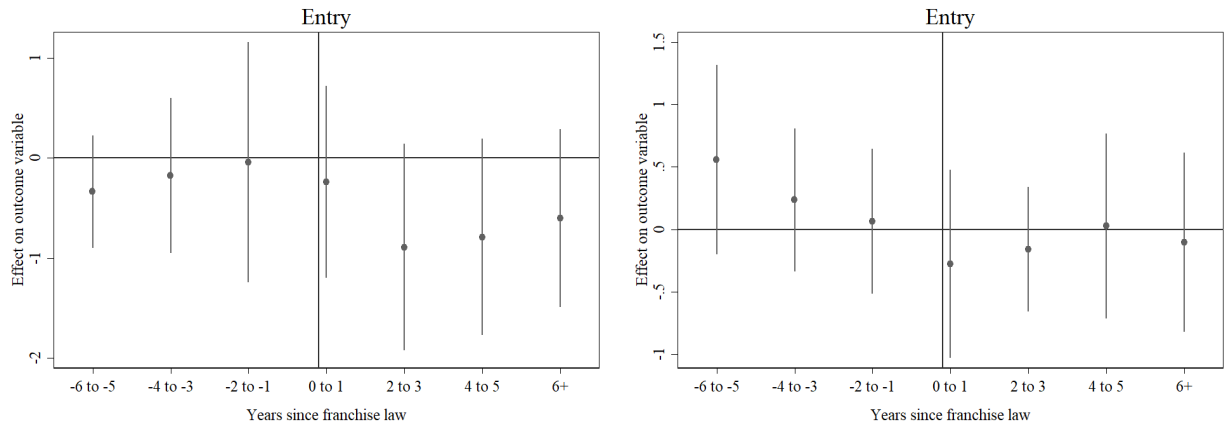
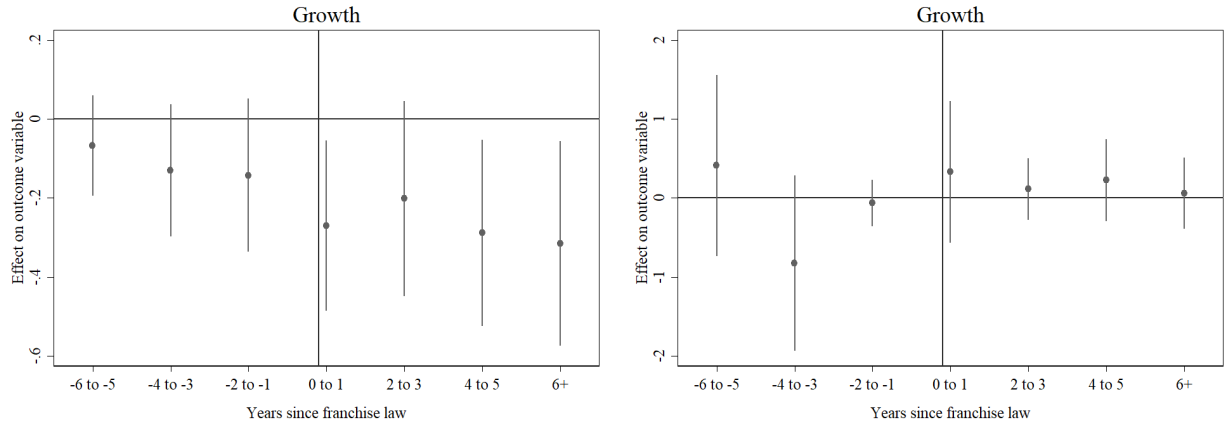


Figure 3: Barrels of craft beer production per hundred people by state, 2016



(a) Three-Tier States

(b) Two-Tier States



(c) Three-Tier States

(d) Two-Tier States

Figure 4: Event Studies. Note: Figure 4 plots coefficient estimates and 95% confidence intervals from estimates of equation (4), and correspond to column (4) in Tables 5 and 6. The base period is specified to be $k > 6$ years prior to passage of beer franchise laws.

Appendix A

Alternative Coding of Franchise Laws

This appendix tests the robustness of the results by examining alternative classifications of state franchise laws and alternative methods for inference.

First, I test the robustness of the results regarding the coding of franchise laws. In particular I examine robustness with varying coding for five states that arguably could be coded differently than the main text: Arkansas, Colorado, Nevada, Oklahoma, and Washington. I test four sets of alternative franchise law coding here: the first two sets take a more stringent set of coding and takes states that were not coded as having franchise laws, due to limited applicability, and recodes them as beer franchise states. The last two alternatives take a less restrictive view of what is classified as a state having beer franchise laws.

The first set of tests implement a more stringent coding rule than the main analysis, and codes states that had provisions that allowed brewers to cancel without cause and recodes them as beer franchise states. Specifically, Washington passed beer franchise laws in 1984, but exempted breweries producing less than 50 thousand barrels per year, and later raised the exemption to 200 thousand barrels. Oklahoma passed franchise laws in 2009, but only for "low-point beer," which applies to beer less than 3.2% alcohol by weight (lower than most craft brands) and thus was not coded as having franchise laws in the main analysis. Colorado passed beer franchise laws in 2007, but they did not apply to brewers producing less than 9,677 barrels per year. They also included a provision that allowed for termination without good cause so long as 90 days notice was given, with copies sent to "all other wholesalers in all other states who have entered into the same distribution agreement with the supplier" (Colo. Rev. Stat. §§ 12-47-406.3 (3)). While brewers thus have the ability to cancel without "good cause," it is possible this second provision may act as a possible deterrent to cancellation. To test robustness against coding these state alternatively to the main results, I first code Washington and Oklahoma as franchise-states beginning the year of passage, and in a second test, I also recode Colorado similarly.

The second set of tests implement a more relaxed coding rule, and codes states that limit the applicability of beer franchise laws as non-beer franchise states. I test two states that passed exemptions: Arkansas and Nevada. In 2009, Arkansas passed the "Arkansas Small Brewery Act," which created a new class of licenses for small breweries. As part of this bill, any breweries that produced less than 30 thousand barrels and sold at least 35% of its production in Arkansas were exempted from the Arkansas beer franchise laws. This exemption was later reduced to breweries producing less than 15 thousand barrels. Due to the restrictive limits on exemption, the main analysis coded Arkansas as a beer franchise state from initial passage in 1991 to the end of the sample. Nevada also passed an exemption to the state's beer franchise laws for suppliers that sold less than 2,500 barrels annually in 1995. This was later reduced to 2,000 barrels; this is highly restrictive and applies only to very small suppliers. As such, in the main analysis Nevada was coded as having franchise laws since originally passed in 1973. To test robustness of results with these exemptions, I first recode Arkansas as having no beer franchise laws from 2009 onwards. The last also recodes Nevada as having no beer franchise laws from 1995 onwards.

Tables A1 and A2 report results of reestimating equations 1 and 2 with the alternative coding described above, with dependent variables of entry and growth, respectively. The results are similar to the results in the main text, and any deviations fit expectations. Panels (a) and (b) of Table A1 and A2, show results with the more stringent coding of beer franchise laws. The impact of

franchise laws on entry is estimated to be slightly larger than in the main results in panel (a) and in particular, the impact in two-tier states is larger and significant at the 10% level in column 5, driven by Oklahoma's recoding. The impact on growth is similar to the main analysis. Panel (b) shows similar size estimates of the impact of franchise laws for production, and they show similar size estimates for entry in three-tier states, but not in two-tier states. While statistically insignificant, the point estimates of β_2 are now positive, rather than negative. If Colorado is appropriately classified as a non-beer franchise state, these results are unsurprising, as Colorado is a two-tier state and had a large number of entrants post 2007.

Panels (c) and (d) of Table A1 and A2 show results with the less restrictive codings of beer franchise laws. The hypothesis that beer franchise laws restrict entry and growth predicts that these exemptions would have a less negative impact than laws without exemptions, but that they would still have a negative impact compared to having no-franchise laws. If true, coding these states as having no franchise laws would result in attenuated estimates of the impact of franchise laws. In particular, recoding Nevada as a non-beer franchise law state post 1995, would attenuate the results more than recoding Arkansas alone, since the cap for exemption in Nevada is very low. This is indeed what we observe, and in general, panels (c) and (d) show somewhat more attenuated results than in panel (a) and (b). Nevertheless, the results still show a negative, statistically significant, and sizable decrease in entry in panel (c) and (d) in Table A1, similar to the main results. The results on growth are also similar with the exception that panel (d) in Table A2, shows somewhat smaller and less precise estimates of β_1. The results are thus largely robust to reasonable alternative codings of franchise laws. Further, they may suggest that states that pass only limited exceptions to existing franchise laws will not see a sizable change in craft brewery entry and growth.

Randomization Inference

Another potential concern is the robustness of the inference. Conley and Taber (2011) show that in a setting with a small number of treated clusters, while the difference in differences estimator is unbiased, it is inconsistent, as the estimator converges to the true value as the number of treated groups increases. They show in such a setting clustered standard errors may perform poorly and over-reject the null. Here, there are 17 states that enacted franchise laws since post 1981 and 15 post 1985; this may be a sufficiently high number of treated groups, but I test the robustness of the results by using the coefficient (RI-β) and t-statistic (RI-t) based randomization inference method described in MacKinnon and Webb (2020), which is similar to Conley and Taber (2011). Their work builds off of randomization inference techniques, first proposed by Fisher (1935). The RI-β method consists of estimating regressions using placebo treatment variables and generating a large number of placebo difference in differences estimates, β_r^*, with $r = 1, ..., S$ to form an empirical distribution of the difference in differences estimator under the null. For these tests, I estimate an analog of equations 1 and 2 a total of S times with placebo treatment variables given by

$$Y_{st} = \beta_r^* Franchise_{st}^* + \mathbf{X_{st}}\delta + \varphi_s + \varphi_t + \varepsilon_{st} \quad \text{(A1)}$$

$$Y_{st} = \beta_{r1}^* Franchise_{st}^* \times ThreeTier_s + \beta_{r2}^* Franchise_{st}^* \times TwoTier_s + \mathbf{X_{st}}\delta + \varphi_s + \varphi_t + \varepsilon_{st} \quad \text{(A2)}$$

where $Franchise_{st}^*$ indicates a randomly assigned placebo beer franchise dummy. Inference proceeds by examining where the actual difference in differences estimate, $\hat{\beta}$, falls in this empirical distribution. If $\hat{\beta}$ falls sufficiently far in the tails of the estimated distribution, the null of $\beta = 0$

can be rejected. Specifically, for S placebo estimates, a two-sided p-value is calculated by

$$p_{RI-\beta} = \frac{1}{S}\sum_{r=1}^{S} \mathbb{I}(|\beta_r^*| > |\hat{\beta}|) \tag{A3}$$

The number of possible placebo regressions here is infeasibly large.[35] Instead of estimating all possible placebo assignments, I take each actual treatment date and randomly assign it to a state without replacement. I then estimate equation A1 and obtain a placebo estimate, β_r^*. I perform this procedure 1000 times to form an empirical distribution of β and calculate p-values given by equation A3.

MacKinnon and Webb (2020) also point out that this procedure can be done with other test statistics, and suggest that this procedure with t-statistics, which they refer to as "t statistic randomization inference" (RI-t), has favorable properties when clusters are heterogeneous. For each of the regressions $r = 1, ..., S$ above, I also calculate t-statistics, t_r^*, for the null hypothesis that $\beta_r^* = 0$ corresponding to equation A1 by dividing the estimated placebo coefficient, β_r^*, by its cluster-robust standard error. I then calculate a similar p-value to that above, given by

$$p_{RI-t} = \frac{1}{S}\sum_{r=1}^{S} \mathbb{I}(|t_r^*| > |t_\beta|) \tag{A4}$$

where t_β corresponds to the t-statistic on the null hypothesis that the actual difference in difference parameter, β, is equal to 0, calculated by dividing $\hat{\beta}$ by its cluster-robust standard error.

The results from randomization inference equations A3 and A4 are presented in Table A3. The columns correspond to those of Tables 3 and 4. Similar to the results in these tables, they largely support a statistically significant effect of beer franchise laws in three-tier states, although the RI-β p-values are somewhat less robust than the RI-t p-values in panel (b) corresponding to growth as the dependent variable. This may not be a surprise as MacKinnon and Webb (2020) note that RI-β may perform poorly when clusters are heterogeneous, where the RI-t performs better.[36]

[35] Since there are 50 states and DC, and either 15 or 17 law changes depending on data availability, there are either ${}_{51}C_{15} - 1 = 3.19 \times 10^{12}$ or ${}_{51}C_{17} - 1 = 1.48 \times 10^{13}$ possible placebo combinations.

[36] In particular, in Appendix C, they find that heteroskedasticity can result in severe under-rejection by the RI-β procedure when treated units have lower variance than control units. They postulate that "This might occur, for example, if treatment caused individual outcomes to become ... less variable," which seems likely here, as beer franchise laws are estimated to push entry and growth *towards zero*, and the growth variable is volatile. The RI-t procedure exhibited the same properties, but improves much faster than the RI-β procedure as the number of treated clusters increases.

Table A1: Impact of Franchise Laws on Entry, alternative franchise law coding

	(1)	(2)	(3)	(4)	(5)
Panel (a): Recode Washington and Oklahoma					
Franchise	-0.426***				
	(0.14)				
Franchise×		-0.469***	-0.635***	-0.490**	-0.515**
ThreeTier		(0.14)	(0.16)	(0.21)	(0.22)
Franchise×		-0.371	-0.384	-0.345	-0.442*
TwoTier		(0.26)	(0.26)	(0.25)	(0.25)
Panel (b): Recode Washington, Oklahoma, and Colorado					
Franchise	-0.158				
	(0.26)				
Franchise×		-0.427***	-0.586***	-0.437**	-0.478**
ThreeTier		(0.13)	(0.16)	(0.20)	(0.22)
Franchise×		0.140	0.140	0.227	0.130
TwoTier		(0.49)	(0.50)	(0.52)	(0.51)
Panel (c): Recode Arkansas					
Franchise	-0.273**				
	(0.13)				
Franchise×		-0.341**	-0.491***	-0.418**	-0.435**
ThreeTier		(0.15)	(0.17)	(0.19)	(0.21)
Franchise×		-0.159	-0.152	-0.154	-0.255
TwoTier		(0.24)	(0.24)	(0.24)	(0.24)
Panel (d): Recode Arkansas and Nevada					
Franchise	-0.249**				
	(0.12)				
Franchise×		-0.299**	-0.549***	-0.428**	-0.437**
ThreeTier		(0.13)	(0.18)	(0.18)	(0.20)
Franchise×		-0.151	-0.157	-0.155	-0.255
TwoTier		(0.25)	(0.24)	(0.24)	(0.25)
State & Year FE	Y	Y	Y	Y	Y
Alcohol consumption	N	N	Y	Y	Y
Spatial controls	N	N	N	Y	Y
Regional linear trends	N	N	N	N	Y

Note: Table A1 presents the results of a linear model with the number of entering breweries per million people as the dependent variable in columns (1)-(5). All regressions include controls for beer excise tax rate, median age, income per capita, and unemployment. Alcohol consumption controls include beer, wine, and spirits per capita. Robust standard errors, clustered at the state level, are in parentheses where *, **, *** denote significant at 10%, 5%, and 1% levels, respectively.

Table A2: Impact of Franchise Laws on Growth, alternative franchise law coding

	(1)	(2)	(3)	(4)	(5)
Panel (a): Recode Washington and Oklahoma					
Franchise	-0.062				
	(0.09)				
Franchise×		-0.180***	-0.167***	-0.183***	-0.199**
ThreeTier		(0.06)	(0.06)	(0.06)	(0.08)
Franchise×		0.111	0.136	0.140	0.161
TwoTier		(0.18)	(0.18)	(0.19)	(0.18)
Panel (b): Recode Washington and Oklahoma and Colorado					
Franchise	-0.015				
	(0.09)				
Franchise×		-0.171***	-0.158**	-0.173***	-0.191**
ThreeTier		(0.06)	(0.06)	(0.06)	(0.08)
Franchise×		0.185	0.209	0.215	0.218
TwoTier		(0.17)	(0.17)	(0.17)	(0.16)
Panel (c): Recode Arkansas					
Franchise	-0.044				
	(0.09)				
Franchise×		-0.147**	-0.135**	-0.150**	-0.168**
ThreeTier		(0.06)	(0.06)	(0.07)	(0.08)
Franchise×		0.152	0.176	0.184	0.216
TwoTier		(0.22)	(0.22)	(0.23)	(0.22)
Panel (d): Recode Arkansas and Nevada					
Franchise	-0.029				
	(0.08)				
Franchise×		-0.113*	-0.108*	-0.121*	-0.129
ThreeTier		(0.06)	(0.06)	(0.06)	(0.08)
Franchise×		0.158	0.179	0.187	0.218
TwoTier		(0.22)	(0.22)	(0.23)	(0.22)
State & Year FE	Y	Y	Y	Y	Y
Alcohol consumption	N	N	Y	Y	Y
Spatial controls	N	N	N	Y	Y
Regional linear trends	N	N	N	N	Y

Note: Table A2 presents the results of a linear model with growth in craft beer production per capita, measured in barrels per hundred people, as the dependent variable in columns (1)-(5). All regressions include controls for beer excise tax rate, median age, income per capita, and unemployment. Alcohol consumption controls include beer, wine, and spirits per capita. Robust standard errors, clustered at the state level, are in parentheses where *, **, *** denote significant at 10%, 5%, and 1% levels, respectively.

Table A3: Randomization Inference p-values

	(1)	(2)	(3)	(4)	(5)
Panel (a): Entry					
$p_{RI-\beta}$: $Franchise$	0.103				
p_{RI-t} : $Franchise$	0.023				
$p_{RI-\beta}$: $Franchise \times ThreeTier$		0.033	0.007	0.055	0.045
p_{RI-t} : $Franchise \times ThreeTier$		0.005	0.001	0.050	0.054
$p_{RI-\beta}$: $Franchise \times TwoTier$		0.615	0.654	0.596	0.416
p_{RI-t} : $Franchise \times TwoTier$		0.545	0.573	0.605	0.360
Panel (b): Growth					
$p_{RI-\beta}$: $Franchise$	0.546				
p_{RI-t} : $Franchise$	0.561				
$p_{RI-\beta}$: $Franchise \times ThreeTier$		0.073	0.114	0.115	0.069
p_{RI-t} : $Franchise \times ThreeTier$		0.029	0.034	0.008	0.016
$p_{RI-\beta}$: $Franchise \times TwoTier$		0.456	0.381	0.329	0.254
p_{RI-t} : $Franchise \times TwoTier$		0.600	0.534	0.510	0.380
State & Year FE	Y	Y	Y	Y	Y
Alcohol consumption	N	N	Y	Y	Y
Spatial controls	N	N	N	Y	Y
Regional linear trends	N	N	N	N	Y

Note: Table A3 presents the results estimating placebo regressions of equations A1 and A2. The p-values reported correspond to equations A3 and A4, the percentage of placebo estimates greater in absolute value than the estimates from the actual treatment in Tables 3 and 4. A total of 1000 placebo regressions were estimated for each entry. Controls included in the RI-β and RI-t procedure correspond to those in the same columns of Tables 3 and 4.