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There and Back Again: Regulation, Innovation, and Change in the Beer Industry

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THERE AND BACK AGAIN
REGULATION, INNOVATION, AND CHANGE
IN THE BEER INDUSTRY

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
Economics

by
Kathryn Marie Sauer
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Content

I present a concise history of brewing industry concentration from the late 1800s to the present. The economic history of beer in the United States provides an interesting study of the impact of regulation, market power, and innovation on industry. Prohibition, the subsequent growth of the leading macro brewers, and the recent emergence of import and small craft brewers have shaped the industry into what we know today. Upon their emergence, craft breweries exhibited a fervent growth in the West and Northeast regions of America, but have been slow to establish a presence in the Midwest and South. To put this into perspective, the two states that sandwich Colorado in population are Minnesota and South Carolina. As of 2017, Colorado boasts 284 craft breweries with Minnesota and South Carolina at just 105 and 36 breweries respectively (Brewers Association). The confluence of events and economic factors that are responsible for the gap between the South/Midwest and Northeast/West regions have received little attention in the literature. Regulatory burdens, restrictions on the sale of alcohol in the form of dry and semi-dry counties, religious ideals, and dominant cultural mores all contribute to this gap. For my empirical analysis, I sharpen my focus on the role that regulations have played in the organization of craft breweries across the states. I find that regulatory influences are significantly related to both production levels and number of craft brewers in the market, regardless of geographical region. This finding suggests that regional differences can be partially explained by different state regulations.

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Economic Impact of Beer Industry

Both the rise of beer industry concentration in the United States and the Craft beer renaissance can be studied in the context of regional differences. The primary aim of my study is understanding the role that regulations played in the strong disparate trends in the brewing market across the regions. A primary target of state regulations in the context of this industry have been vertical restraints in the distribution of beer. The impact of vertical restraints has been studied by many, as contract enforcement mechanisms in beer and other markets (Klein and Murphy, 1988), on sales (Klick and Wright, 2008), and on entry into the market (Burgdorf, 2015). Often the focus is on mandated exclusive territories (Rojas, 2012), and exclusive dealing's impact on competition (Sass, 2005), (Klick and Wright, 2008) and (Chen, 2014). Industry concentration and mergers have been comprehensively studied as well (Elzinga and Swisher, 2005) and (Iwasaki, Tremblay and Tremblay, 2005). The most thorough treatment of this issue is Victor and Carol Tremblay's 2005 book on the subject 2005, *The US brewing industry: Data and economic analysis*.

Culbertson and Bradford (1991) investigate interstate differences in the price of macro-producing beer, and Elzinga, Tremblay, and Tremblay (2015) map the spread of craft beer across the states and use a spatial production model to analyze location choices. Only one paper has investigated a root cause for regional differences. In "Why so Few Breweries in the South", Gohmann (2015) investigates the impact of cultural and

governmental institutions on brewers' entry as an explanation for the relative failure of the South to produce craft brewers.

Studies that examine the impact these factors have on regional differences are not easy to find. Early on, differences in regional beer markets were shaping the growth of the industry. The Northeast market benefitted from cities. Local brewers were able to grow to meet the large demand for beer in places like New York and Philadelphia, while small local breweries in the Midwest faced natural limits on growth as a result of the size of the city they operated in. Due to the development of production technologies that allowed for the transport of beer, a few of these brewers were able to ship their product to other markets and thus were able to avoid the local market limits on their production. They were known as shipping brewers, and the largest of them were eventually called the National brewers. Today Anheuser-Busch remains, although as of October 2016, they have merged with a number of international giants, becoming Anheuser-Busch InBev SA/NV which dominates the global beer market with an estimated 28% market share (Anheuser-Busch InBev Company Profile, 2016),(Brown, 2016).

The recent growth of craft brewers is just as interesting as the earlier growth of the national brewers. As of 2014, there are more craft beers per capita in the West and Northeast than in the South and Midwest. The factors that explain the region-centric nature of the craft beer market are less obvious. From Geographical Economics, we understand that firms in new industries tend to cluster and that certainly has happened here, but what are the other factors that contribute to and potentially drive these

differences in regional production? State by state it could be due to differences in religion, regulation, and size and number of cities.

My thesis examines if regulation has served as a barrier to entry of craft breweries. The next chapter provides a brief history of industry concentration and the main factors that caused it. The following chapter provides a review of various regulations found in the brewing industry. The last two chapters give the empirical model, results, and main findings.

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In the 30 years after the Civil War ended, the beer brewing industry grew significantly. Over this period the population doubled. That, combined with the influx of immigrants from beer drinking countries, Germany in particular, contributed to the early growth of the beer industry.¹ In this time period, per capita consumption grew by 340% (Stack, 2000). German lager became popular in particular, due to the preservation characteristic in hops. From 1860 to 1920 brewing emerged as a significant industry. Although market concentration was increasing, before 1920 regional brewers were still competitive with national brewers. In the 1870s, most brewers were local or regional because at the time transportation costs were quite high. Another important factor is that the market for beer was different depending on the size of the city.

Regional brewers in the northeast, specifically in New York and Pennsylvania, responded to the healthy demand for beer in the concentrated local markets. This allowed

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them to increase in size and production, a luxury many small local breweries did not have (Stack, 2000). A few brewers were able to branch out past their regional market due to a production advantage they had. They had access to the cheap ice in Milwaukee and deep, cold caves in Missouri and were therefore able to brew and store their product effectively and in large quantities. Storage capability meant they weren't confined to regional markets, and allowed them to produce at a large scale. These were known as shipping brewers: Pabst, Anheuser-Bush, Miller², and Schlitz³. To cover their transportation and advertising costs, they charged more in the areas they shipped to for their 'superior' products (Tremblay & Tremblay, p.137).

The first two big shipping breweries⁴ were Pabst and Anheuser Busch. Pabst (originally named the Best Brewing Company in Milwaukee) was founded in 1844 by Jacob Best and owned by his son, Phillip Best in 1860. Captain Pabst, Phillip's son in law, became a partner in 1862 and when Phillip retired in 1866 Pabst and Shandein (Phillip's other son in law) took over the company. The company was renamed Pabst after Shandein died, and became the country's largest brewer by 1880. Captain Pabst was an astute businessman and the company quickly became a leader in industry

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innovation (Tremblay & Tremblay, p.81; Stack, 2000). As early as 1878 they had a refrigeration system and used a pipeline to connect the brewery to the bottling house. In 1882 Pabst became the first brewery to produce one million barrels in one year, and in 1935 Pabst was the first brewery to sell beer in steel cans (Stack, 2000; Tremblay & Tremblay, p.82).

The most successful brewer in history, Anheuser Busch, was founded in 1857 in St. Louis, Missouri (after purchasing Bavarian Brewery and renaming it). Adolphus Busch, son in law of the founder, is recognized as being responsible for the early success of the company. Like Pabst, Anheuser Busch invested in innovative technologies: refrigerated railcars in 1877, use of the newly invented pasteurization process⁵, as well as incorporating merchandising techniques to promote their product (Tremblay & Tremblay, p.73). These companies pioneered the use of technology and scientific advancement to brew in large quantities, as well as retain quality while shipping their product. As you can see from Figure 1 in the Appendix, these two breweries in particular were leading industry concentration from 1877 to 1895, growing at a faster rate than the entire industry (Stack, 2000).

From 1895 to just before prohibition, the industry concentration changed. The national brewers weren't expanding at the same rate as before and lost market share, but the industry grew as a whole. There are two reasons for this. The national shipping

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brewers pioneered the use of technological advances early on, but the large regional brewers were able to catch up by adopting some of these methods as they bought new plants and equipment. A great example is refrigeration (or artificial cooling), which was huge for brewing, because it freed brewers from a dependence on natural ice. It is more reliable and allows for year round brewing, including the summer months. Another reason for stagnation is the temperance movement and locally owned saloons. Local breweries generally either owned or controlled saloons. This arrangement was mutually beneficial because the saloons could rely on the breweries for necessary investments and the brewers could ensure their product was sold by saloon owners. Even if the saloon was not owned by the brewery, it was common for saloons to sell one brewery's beer through exclusive dealing arrangements. Shipping breweries had invested in saloons to ensure their product was sold once they shipped it to another city. But the rise of the temperance movement hit some locations sooner than others, and it became more risky for shipping brewers to own saloons in many states. By 1910, 17% of the population lived in dry states and another 31% lived in local option counties/cities that restricted alcohol, usually through first prohibiting the sale of liquor (Stack, 2000).

A singular event in the United States beer industry was alcohol prohibition (1920-1933) which prohibited the manufacture, transportation, and sale of alcohol. Prohibition wiped out the beer industry, and left a series of regulatory obstacles in its wake. Only the strongest firms survived prohibition. In the year 1880, there were 2,156 total breweries in the United States. Just before prohibition there were 1,179 breweries, but by 1934 that number had dropped to 756, and by 1983 only 49 breweries were left (Gohmann, 2015).

After prohibition, the beer industry resumed production, but it was forever changed. National brewers had not closed their facilities, instead they had invested in trucks and bottling methods while selling near beer⁶, malt syrups⁷, and soda (Tremblay & Tremblay, p.73). They were prepared for the repeal. Their rivals, the regional brewers, weren't as well positioned and thus, came back at an immediate disadvantage. Most local and regional breweries had been forced to close and develop other businesses (Stack, 2000). Therefore they did not have the capital or infrastructure to restart their breweries to the degree the national brewers did. So even though many of the small breweries that existed before prohibition started producing again they faced numerous obstacles. Between 1935 and 1940, 10% of breweries failed (Elzinga et al. 2015). The new regulatory environment accelerated industry concentration. In fact, during prohibition Anheuser-Busch employees worked with prohibition repeal advocates and disillusioned temperance movement activists to draft the eventual post-prohibition legal environment that would govern the brewing industry. This legislation made it impossible for brewers to own saloons, and thus tied-houses were no longer legal. They advocated for this because it became ill advised for national shipping brewers to own saloons in every market they sold to, and by breaking the ties between the manufacturer and the retailer, they could reduce competition from tied houses (Stack, 2000). Market share of the national brewers kept growing, eventually leaving the regional brewers far behind.

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The national brewers became the suppliers of beer to the armed forces in WWII, a large population of potential post war customers. This may have formed a brand loyalty, and gained them free advertising in the process (Tremblay & Tremblay, p.137). When televisions became common in households around the 1950s, there was a huge opportunity in advertising. The beer industry as a whole spent more (\$/barrel) on TV commercials from 1950-1960 than any other decade before 2000 (Tremblay & Tremblay, p.53).

Tremblay and Tremblay argue that in 1950, there were there were 350 firms in an industry that could efficiently support 829 firms. But by 1960, 175 firms were competing in a market that couldn't support more than 88. This marks the beginning of what they call the war of attrition among brewers. Brewers had few strategic options. They could expand internally and come out with new products, merge with a competitor that produced a similar product, find a profitable market niche, or exit. A failing brewer would drastically cut investment in all departments except direct labor and materials in order to squeeze the last bit of profit out before exiting. The mass exit of firms was a direct consequence of the increase of the MES relative to the size of the market (Tremblay & Tremblay, p.47). Many failing breweries were dropping their prices before they exited the market, creating tough price competition for new brewers. This war of attrition benefited the national companies such as Anheuser-Busch. "Anheuser-Busch is the largest and most profitable brewer in the U.S. and the only macro brewer to experience continued growth in market share from 1970-2003" (Iwasaki, Tremblay & Tremblay 2005). See Figures 2 and 3.

The antitrust division of the Department of Justice greeted the structure of the beer industry post WWII with great suspicion. (Elzinga & Swisher, 2005). In an attempt to protect small competitors and impede the rising industry concentration, the courts took a strong anti-merger position. Two Supreme Court cases brought by the U.S. government over the issue are noteworthy; U.S. v. Pabst Brewing Co. and U.S. v. Falstaff. Both the Pabst/Blatz and Falstaff/Narragansett mergers were ultimately blocked by the anti-trust decisions of the Supreme Court. On the ruling against Pabst, Elzinga and Swisher state that:

“The Court concluded its analysis by noting that the government was under no duty to prove that the trend toward concentration in the beer industry was the result of mergers, as opposed to, for example, less efficient firms being unable to compete and exiting the market.”

In the case of U.S. v. Falstaff, they had an especially difficult time pinning down the relevant geographic market. Today it is likely that neither of these mergers would have been challenged as they would not increase the Herfindahl-Hirschman index (HHI) past 1000 in their markets. (Elzinga and Swisher, 2005). Another issue with anti-trust enforcement was that the courts failed to account for the case of the failing firm. Cases where a firm on the brink of failure is allowed to merge with another firm provided that the merger itself is the least anti-competitive option available. Considering the number of failing firms in this industry at that time, the lack of consideration in this department is significant. Ironically, Anheuser Busch likely benefitted from anti-trust law during the 1950 through the 1960s. The U.S. anti-trust division was particularly concerned with high industry concentration during this time period, and they successfully blocked numerous potential mergers. Some of these potential mergers were from big breweries that would

have otherwise stood a chance at competing with Anheuser Busch. In doing this, the courts may have ensured the continued concentration of the market at higher levels than otherwise. The denial of these mergers was based on the knowledge at the time which underestimated MES and misunderstood the role that mergers had played in this industry (Iwasaki, Tremblay & Tremblay, 2005). The 1960s marked a time of strict enforcement of antitrust law that lacked a sophisticated economic analysis on market concentration and competitive effects. This was eased up during de-regulation of the late 1970s and early 1980s. The Merger Guidelines published in 1983 did a lot to bring an economic analysis to anti-trust, focusing on consumer welfare and giving a clear definition of relevant product and geographic markets. It provided that low market shares and industry concentration is not a significant basis for challenging a merger (Elzinga and Swisher, 2005). The industry shakeout of this time may have been less severe than it was had more mergers been allowed.

During the war of attrition in the 1970s among the premium and regional brewers, imported beers entered the market. What drove this new development? The argument Tremblay and Tremblay present in *The US Brewing Industry* is that a shift in demand for lighter beers initially drove macro dark beer producers out of business. During this time, Miller's light beer became very popular and Anheuser-Bush re-formulated their popular super-premium Michelob to have a lighter taste. Tremblay & Tremblay argue that a void in the market was created for heartier beers, and that imports swooped in to fill part of the void. The imports already produced good quality darker beers in their homelands, and enough of it to reach scale efficiency. However, transportation costs did make them more

expensive. After the 1970s, the market shares of imports increased, and domestic specialty or micro-breweries began to appear after 1980. There were 8 craft brewers in 1980, 269 in 1990, and 1,469 by 2000 and 1,756 in 2010 and 2,374 in 2012 (Elzinga et al. 2015). See Figure 4. As of 2015 there were 5,234 craft breweries (Brewers Association). The market share of imports grew from 0.04% post-prohibition, then 0.11% in 1950, and now the United States imports more beer than any other country in the world. Craft beer began to increase in market share from 1990s-2000s. In recent years the rise of imports and the craft beer revolutions are slowly reversing the industry concentration of the early post-war period (Tremblay & Tremblay, p.133).

Concentration of the industry was due in large part to cost advantages of the large brewers. Anheuser-Bush had a competitive advantage in the 1950s. They had state-of-the-art plants in strategic locations and successfully marketed some of the most popular beers. National Ads attracted consumers, national brewers built new and more efficient plants, some small brewers survived in niche markets, but most lost market share and responded by cutting their price. Tough price competition deterred entry and few small firms survived. American beer was a good example of a natural oligopoly. With new technologies, economies of scope induce firms to expand product lines and increase mergers of similar products. It is important to note that mergers are not a cause of industry concentration, but a byproduct. Mergers were usually horizontal and indicative of a failing business, but not always (Tremblay & Tremblay, p.45). In fact today you see many craft breweries being bought out by big beer.

Technological Change and Investment in Brewing

In the late 1800s, breweries were enjoying the benefits of new advancements in technology. Refrigeration, pasteurization, and the ability to bottle their product were the most notable advancements (Stack, 2000). As soon as prohibition was enacted breweries were immediately faced with a decision. They had to consider what to do with their plants and equipment, and act based on their expectations as to how permanent prohibition would actually be. Many regional brewers decided to divest all brewing equipment, taking an immediate loss. An alternative option was to produce something else with their equipment. The leading pre-prohibition shipping brewers (Busch, Pabst, Schlitz, and Blatz) sold their saloons and began to produce a malt beverage containing less than half a percent of alcohol (near beer) (Krebs and Orthwein 165). This allowed them to keep their brewing staff active, which would later turn out to be an advantage. Brewers could also produce malt syrup, which everyone knew was for homebrewing and not for cookies as they advertised. The national brewers also increased their inventory of trucks and bottling equipment for their soft drinks, 'near beer' and ginger ale. In the 1920s, the American Can Company provided cans for Busch. They would later pioneer beer cans in 1935 (Conny, 1990).

The end of prohibition, in 1933, came with many new laws attached. Breweries could no longer own bars or saloons, and were now required to distribute their product through a wholesaler. Many small breweries could not reopen and be profitable, and many that tried didn't last. From 1935-1940 the total number of breweries fell by 10%. This meant that the shipping brewers were facing less competition from their former

rivals while having a leg up on investment in new technologies (*United States Brewers Almanac*, 1956).

As refrigeration technology advanced after WWII, brewers were able to retain quality while shipping their beer longer distances. In addition, people could now store beer in cans at their homes. By 1940, 72% of Americans had refrigerators in their homes (Stack, 2000). Following the depression, American consumers' preferences shifted towards that of dependable and storable goods. Preserved, brand name items were growing in popularity due to the convenience and security they afforded. A cold, prepackaged, consistent product is exactly what the National brewers were able to provide (Stack, 2000). National brewers restarted their expansion after prohibition. The advent of canning machines and refrigeration contributed to the expansion of national brewers over regional ones. Beer is generally sold either packaged or as draught beer. In 1935, 30% of total sales went to packaged (bottles and cans), with the remaining 70% to draught beer. By 1940, they were about equal at 52% and 48%, respectively. By 1955, 78% of beer sold was packaged and only 22% was draught (1979 United States Brewing Association, 20). This decline in draught beer is indicative of the decline in regional brewers and the growth of the national brewers and their packaged product. Transportation costs decreased, but the national brewers maintained the premium price on the beer they sold.

The growth of national brewers was made possible by the emergence of scale economies and technological innovation which increased the minimum efficient scale for brewers. Technological advancement increased the efficient scale in brewing in a few

ways. For one, beer could be packaged at a much faster rate than before, six times faster to be exact, making large scale production more efficient (Tremblay & Tremblay, p.32). In the 1950s, 330,000 barrels of beer were required to operate an efficient canning line compared with 2 million in the late 1980s. That means that beer was packaged at a rate of 2,000 12oz cans per minute (Tremblay & Tremblay, p.32). Much of the brewing process became automated, reducing the labor costs of the firm as capital became more productive. A great example of this is the Schlitz plant built in 1970 in Memphis, TN. When compared with the company's older 1954 Los Angeles plant, the 1970 plant had 45% less labor costs, and 4% less per unit cost (Keithahan, 1978). The emergence of scale economies helps explain the industry concentration, most notably from 1950-1980. In 1950, minimum scale efficiency required only 100 thousand barrels a year to reach, but by 1980 it jumped to 16 million barrels a year. (Tremblay & Tremblay, p.46).

The money saved using multi-plant operation is also responsible for the increase in the efficient scale of the brewery and in part, for the growth of the first tier (super-premium) breweries. One important input in the brewing process is water, obviously. So when water treatment plants and their scale advanced, it allowed breweries to produce in large volumes in any part of the country without worrying about fluctuations in water quality affecting their standard of taste (Tremblay & Tremblay, 2005). As William Coors famously said, "you could make Coors from swamp⁸ water and it would taste exactly the

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same” (Brymer et al., Business Insider, 2016). Sherer et al (1975) found that firms with 3 or 4 plants gained cost advantages due to savings in marketing, investment flexibility, and risk management. In the 1990s, industry experts stated that the efficient number of plants was 5 or 6 and as of 2004, only Anheuser Busch and Miller had as many.

Anheuser Busch (now a subsidiary of InBev), currently owns 12 breweries in the US (AB InBev, 2012).

Technological change certainly drove the industry concentration, but it can’t explain it entirely. If you look at this question in the context of scale efficiency you will notice that in 2000, Miller was more than twice the size required for minimum scale efficiency while Anheuser-Bush was operating at 5 times MES. An Anheuser-Bush executive stated that TV ads in the 1950s were partially responsible for their success relative to the rest of the industry (Tremblay & Tremblay, 2005). If this view is correct, TV advertising helped kill the regional brewer, at least for a little period of time.

National beers took advantage of the new marketing tool during the period that one could argue was at its most influential in terms of advertising. The big players in the industry were already on the track to having a very large market share, but they also took advantage of an opportunity that others couldn’t. Television was one of the reasons that the national brewers grew, and the regional brewers began to decline. Advertising is much like a capital investment, effectively increasing the scale in an industry which

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already has large fixed cost (Tremblay & Tremblay) (Iwasaki, Tremblay and Tremblay, 2005).

Emergence of Craft Brewers:

Beginning in the late 1970s, there was an increased emphasis in producing light beer by the big breweries, while simultaneously there was an increase in imported beer sales. Light macro beer had a 4% market share in 1984, 22% in 1985, and 43% in 2000. The concentration of the market on light beer was a decision by the big brewers. They bet on what people liked, but in doing so, they left a portion of the market unfulfilled. As mentioned earlier, the war of attrition in the 1970s combined with an increase in disposable income, left an opening for more variety in the beer market⁹. This niche was filled initially by the import brands, but later by the microbreweries. Craft beer and imports provided darker and more diverse beer than the macro sector. The rise of microbreweries and local brewpub establishments mark a return to the quality and enjoyment of beer pre-prohibition. According to Choi & Stack, pre-prohibition beer was as varied and as good as craft beer today. Most craft brewers adhere to Germany's Reinheitsgebot¹⁰, or purity law, which limits ingredients to barley, malt, water, and hops. This means they don't use corn, rice adjuncts, or sugar in brewing. Many also use malted

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wheat, malted rye, fruit, herbs, and spices for distinct flavors. As a result, the flavor is judged to be by many as darker, heartier, and more flavorful in contrast with the paler, lighter flavors of mass produced beer. (Tremblay & Tremblay, p.116). These high quality products reflect European brewing styles. The first craft brewer of today, Fritz Maytag even brought back old recipes not seen since pre-prohibition.

Elzinga, et al. consider Fritz Maytag to be the man to thank for the craft beer renaissance. In a sense he founded it, by being the first to try to create the quality of traditional beer and imports. He bought the failing Anchor Steam Brewing Company in 1965. Aside from brewing traditional porters, holiday beers, and the first wheat beer since prohibition, he brewed the first IPA (Elzinga, et al.,2015). According to Bart Watson, chief economist for the Brewers Association, the IPA is the most popular style of craft beer to date. Its' popularity exploded from 2008 to 2015, accounting for 27% of craft beer sales in 2015 (Brewers Association). Maytag and other early brewers were responsible for the seeding of craft beer, but the demand took roots from three authors. Charles Papazion, Fred Eckhardt and Michael Jackson all wrote books and magazines on homebrewing that reached a wide audience. Their contributions inspired homebrewing and sparked an interest among people.

Initially, the home-brewing/microbrewery movement took off in California in the 1980's and moved along the West Coast. From San Francisco to Seattle, breweries were opening up shop. Two very successful craft breweries began in this time and place. Sierra Nevada, founded in 1980 in Chico, CA, and Redhook founded in Seattle in 1981 became so successful that they grew to regional brewery status. The number of firms

slowly grew from 1977-1986 (Tremblay & Tremblay, p.116). Aiding this growth were two legal changes in the late 1970s. In 1977, the government cut federal excise taxes from \$9 to \$7 a barrel for firms that produce less than two million barrels in a year¹¹. In 1978, the Cranston act made home-brewing legal. This allowed brewers to experiment freely. Although the craft brewery movement did not catch its wind until around 1985, for the following decade they experienced a period of rapid growth at a rate of more than 16% per year.

The 1990s were a time of economic prosperity. It is known that in that time, the demand for locally produced goods increased and microbreweries emphasized the local aspect of their product, capitalizing on that trend. A few microbreweries grew into successful regional brewers. Sierra Nevada, Boston Beer Company, New Belgium, Anchor Brewing, Harpoon, and others all broke past the microbrewery level of production. These regional specialty brewers accounted for nearly 60% of the craft beer market as of 2001. Sierra Nevada and Boston Brewing Company, the two largest, had a combined share of 27% (Tremblay & Tremblay, p.120).

The Macro brewers took notice of the rise in craft brewers, and they responded in several ways. Busch and Miller both used financial incentive programs to form exclusive dealing contracts with wholesalers. Distributors had to exclusively carry their products, including their own personal brands of specialty beer. They also bought partial interests

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in several craft breweries giving these preferred access to distribution networks. In the mid-1990s, Anheuser Busch bought partial interests in Redhook and Widmer Brothers, while Miller bought partial interest in Celis and Shipyard. Today, successful craft breweries are being bought out by Anheuser Busch InBev. They acquired Goose Island in 2011, and since then have acquired Blue Point Brewing, Elysian Brewing, Golden Road and Breckenridge Brewery (Snyder, 2016; Kell, 2016). This practice is not confined to the US, either. Busch is buying up craft beer brands in the U.K., Mexico, Colombia, Brazil, and Canada (Snyder, 2016). This affords the craft brewers bought out, far reaching distribution networks and huge plants to brew their beer on a much larger scale.

As well as investing in craft beer, large brewers tried to grab more of the market by making their own craft beer under a different name. These cases were called “phantom” brewers, and they benefited from the large distribution networks that their silent owners had amassed over the years. There were several phantom beers created in the 1990s, but the most notable and only successful one, Blue Moon, has done very well indeed. Blue Moon was created by Coors, but advertised as a craft beer. It is likely that many of their customer base didn’t even know this, because they specifically designed the beer cans and bottles without the mention of Coors on them at all.

The initial growth phase of the microbrewers came to an end in the late 1990s, a period of industry shakeout. The number of breweries decreased by 10% from 1998-2000. Distribution bottlenecks were a direct result of the tremendous growth in the earlier period. Brands struggled to gain customer loyalty because many of the craft beers at this time were similar. They were similar in product characteristics, often named after

animals and with fruity undertones. Many new brewers had not worked out the kinks in product quality and consistency. (Tremblay & Tremblay, p.130). New brewers depend on word of mouth to get their products off the ground but restaurants and bars could only have so many new craft beers on tap (Tremblay & Tremblay, p.130; Brewers Association). Tremblay and Tremblay state in their 2005 book that the growth of the market in the 90s enticed entrepreneurs until it couldn't support them all. People saw the success of the microbreweries and flooded the market. This wave of entry was lagged due to the time consuming and expensive nature of building plants and buying equipment and perfecting the product. There was too much entry, which created a mass exit (Tremblay & Tremblay, p.132). One struggle that craft beer finds in the market is the much higher cost of production. Imports and macro brewers have an established popular product that is already produced in multiple plants. Craft brewers use more expensive inputs and brew in small batches. This means that they cannot reach similar scale efficiencies, because the less beer you produce, the higher the cost per unit.

Craft beer has since recovered from this shakeout. From 1995 to 2012, craft beer's share of the overall market went from 2% to 6.4% (imports were at 13.3%). Economic prosperity and increases in personal income affect consumer demand for both variety and locally produced goods (Elzinga, 2015). From 2012 to today, craft beer has nearly doubled their market share to 11% (Kell, 2016).

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This chapter discusses the vertical relations between producers and retailers in the beer industry. These relationships have been subject to significant and varied focus of regulators over time and across states. Economists have developed theoretical models of vertical restraints which apply to the context of the beer market. These models highlight pro-competitive and anti-competitive aspects of vertical restraints. The ebb and flow of regulations in this area over time reflects different emphasis on these aspects.

In the days before prohibition, restrictions on alcohol were nothing like they were after. At the time, a prevalent feature of distribution was the vertically integrated nature of saloons and breweries. Retailers were often ‘tied to’ the upstream distillery or brewery. Leases, mortgages, and other financial incentives accompanied exclusive contracts that forbid retailers from selling a rival’s product. These bars and pubs operated under exclusive contracts with a specific brewer and often outright owned by the brewer (Stack, 2000).

Apparently this form of business was “too successful.” The impetus for political action behind prohibition was, in part, the prior success of sales tactics of alcohol marketing and producers. The amount of consumption this led to was regarded by the prohibitionists as harmful to society as a whole. It comes as no surprise that when prohibition ended the same people would try to keep this form of distribution from happening again.

When prohibition was repealed in 1933, the market could not return to its prior form of organization. Although alcohol was once again legal, there were strings attached.

The states were soon able to and continued to heavily regulate the alcohol industry (Smith & Yandle 79). Tied houses were no longer allowed, so states adopted one of two options. They chose to operate either as license or control states. In control states, the state acts as the distributor. License states allow private retailers to operate, although they were required to follow the three-tiered system where brewing, distribution, and retailing were separated. Most states are now license states (Smith, 2002), and some states are now opting to allow self-distribution.

Three-Tiered Distribution:

The regulatory environment post prohibition was designed specifically to break up vertical integration in the brewing industry. The most straightforward way they did this was by separating the brewing and distributing of beer. The subsequent distribution system is composed of three tiers. The first tier is the brewer, the middle tier is the wholesaler or distributor, and the final tier is the retail outlet or bar (Clements & Kurtz, 2014). Thirty-two states currently follow a three tiered system of production, distribution, and retail. It was originally designed to limit the ‘immoral marketing tactics’ of pre-prohibition, discourage the proliferation of breweries, and urge people to drink moderately (Clements & Kurtz, 2014). As of today, the consumption of alcohol is widely accepted; the intentions of keeping the system have shifted. It is still in place today due to the large tax revenues it collects (it collected as much as \$255 million in Georgia 2000), as well as the “Bootleggers and Baptists” relative interests are aligned with its survival (Yandle & Smith, 82; Smith, 2002). Its’ role in today’s world is a

debated issue. In this system the top tier is the brewer, the middle tier is the distributor or wholesaler, and the bottom tier is the retailer.

Over time, states made two-tiered distribution legal, but this change in regulation did not occur evenly throughout the country. As of 2013, self-distribution is allowed in only 6% of the South, and 33% of the Midwest allow breweries this option. Many brewers would prefer self-distribution. It allows them to have more control over how their beer is marketed and how well it is stored and transported, among other things. Barrel cap laws play a small role in this. If a brewery produces over a certain amount of barrels in a year, they must apply for a different type of permit, the cap and the fee associated with the permit changes vary depending on the state. It appears that most barrel cap laws are not a barrier to growth. Once the brewery has outgrown their permit, they get a new one, often at a higher yet relatively insignificant cost. However in 6 states, the barrel cap law pertains specifically to the point at which self-distribution allowed. Exceed 25,000bbls in North Carolina and you must go through a wholesaler. Tennessee has the same barrel cap as NC and after exceeding it, the right to self-distribute is revoked. Texas has a cap at 40,000BBLs a year, West Virginia's cap is 10,000BBLs and Wisconsin's cap is at 300,000. In Oregon, this applies to brewpubs with a 5,000BBL cap. North Carolina is currently proposing a bill to increase self-distribution allowance from 25,000BBLs to 100,000BBLs. The current barrel cap law means that a brewery can self-distribute only if they sell less than 25,000BBLs a year. Once they exceed 25,000, they have to go through a wholesaler. This means that brewers would lose some degree of control over that segment of their business. It is in a sense a cap on

growth as well as barrels. If the bill gets passed, then brewers would be free to grow without losing this control. Sometimes going through an independent wholesaler would be more beneficial as well, but the option needs to be there. Another legal regulatory obstacle is the licensing of alcohol distribution which is divided into license states (32) and control states (18). Although the basic tiered structure is the same, license states operate by forcing businesses to acquire licensing for each of the three tiers. Control states take on the role of distributor or retailer so that they may exert tight control over the promotions and sale of alcohol.

Exclusive Territories:

There is an obvious principal agent problem at play here. To mitigate this issue, upstream firms can issue exclusive dealing contracts, resale price maintenance, or exclusive territories on wholesalers (Rojas, 2012). Because the contract between a brewer and distributor is not a sufficient mechanism for promotional effort, exclusive territories and exclusive dealing clauses can alleviate the situation. Culbertson and Bradford (1991), as well as Sass and Saurman (1993) find states with mandatory exclusive territories produce more beer at a higher price. Rojas (2012) finds an increase in sales and minimal price impact of the law change to mandatory exclusive territories. Brewers are free to adopt exclusive territories in states that do not mandate them¹² (Klick and Wright, 2008). If empirical analysis shows that mandated exclusive territories are beneficial to both the number of brewers and total production, then why aren't more brewers adopting this into their contracts with their distributor? This suggests that laws

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mandating exclusive territories could be capturing some transaction costs between a manufacturer and distributor. Contracts with wholesalers heavily favor them over brewers. Because the power is in their (wholesaler) hands, the brewer might not be able to have exclusive territories written into the contract. Rojas (2012) argues that federal anti-trust law could crack down on exclusive territories as a vertical restraint policy, but not in states that mandate exclusive territories. This regulation serves as a protection against the government.

The implication here is that exclusive territories are likely desired in states that do not mandate the practice, but the fear of punishment keeps both parties from adopting the policy.

The combination of exclusive dealing and exclusive territories is similar to the pre-prohibition tied houses, although not nearly as common. Exclusive dealing when combined with exclusive territories can be a useful way for brewers to avoid dealer free-riding, reducing incentive conflicts between manufacturers and their distributors, yet there has not been much empirical evidence to back this up (Klein and Murphy, 1988; Klick and Wright).

Klein and Murphy investigate vertical restraints theories in various industries with an emphasis on the FTC Coors case. Coors was accused of having unfair termination provisions by the FTC. They could terminate a contract with their wholesaler with notice of 5 days or within 30 days without a notice. Coors's product was unique in that it was not pasteurized. This meant a significant drop in product quality could occur if the beer was not refrigerated. Because of this Coors had a vested interest monitoring their

distribution process. They used both exclusive territories and resale price maintenance to ensure their product maintained quality throughout the distribution process and that retail stores would rotate and refrigerate their product appropriately. Resale price maintenance staved off retail free riders (consumers are more likely to blame the manufacturer for poor quality than a retailer) (Klein and Murphy, 1988).

Exclusive Dealing:

There are two schools of thought on exclusive dealing, with limited empirical evidence to resolve the issue. By aligning the interests of the wholesaler with the brewer and preventing free riding of the wholesaler on promotions of the product, exclusive dealing contracts may lead to greater output at reduced prices (Klick & Wright, 2008). The costs of the effort the distributor put in to make sure the retailer is always stocked with your beer, have nice looking displays, or tailoring marketing to local consumers; are borne entirely by the distributor. The benefits of this go entirely to the beer producer. This leads to an inefficient, low level of investment in promotion by the distributor, (what the neo-prohibitionists may have in mind). And on top of that, the wholesaler/distributor might be selling several brands of beer, and this type of investment in one brand could reduce sales of the others (Klick & Wright, 2008) (Klein and Murphy, 1988).

Therefore, exclusive dealing in this context can be pro-competitive. But other issues come along with these exclusive dealing contracts. Exclusive dealing is alleged to have anti-competitive aspects. It could deprive rivals of the opportunity to compete for customers. This would make prices higher and selection smaller for the consumer (Klick & Wright, 2008). In 1997, after Anheuser Busch launched exclusive dealing contracts

with their distributors, microbreweries complained that their products were being dropped (Chen, 2014). Chen (2014) estimates the foreclosure effects of exclusive dealing on microbreweries and finds that exclusive dealing contracts between distributors and Anheuser Busch raise the fixed cost for specialty brewers in the affected area. Anheuser-Busch, Miller, and Coors all used exclusive dealing contracts with their distributors (Sass, 2005). Sass finds the use of exclusive dealing contracts increases total sales (his sample of breweries are the industry giants). He finds that exclusive dealing by Anheuser-Busch distributors increases their sales, but does not have a significant effect on the prices of rivals.

In order to identify the competitive effects of various vertical restraint policies, Klick and Wright compare states where certain policies are prohibited with states where these policies are either allowed or mandated. An argument for exclusive dealing contracts and exclusive territories can be made in the case of franchise laws. A contractual agreement between a manufacturer and distributor alone will not be sufficient to assure an optimal level of performance on the distribution side. These contracts are incomplete, it would be too costly, or impossible to detail every level of expected performance on the side of the distributor. One key feature of these contracts is the threat of termination due to underperformance (Klick and Wright, 2008). This key feature is weak in the context of beer franchise laws.

Franchise Laws:

Perhaps the most egregious burden on breweries are the termination clauses in beer franchise contracts. Typical contracts are built to protect the distributor at the

expense of the brewer. It is prevalent enough that it has become a joke common among craft brewers.

“Do you know what the difference is between your marriage and the contract with your distributor?”

“If you’re unhappy, at least you can get out of your marriage.” (Aubuchon, 2016)

When these laws were created, the distributor was a small operation compared with big beer. Now, things have changed. Big Beer still has the lions’ share of the market, but the total number of breweries is increasing thanks to craft beer. These laws put small brewers in a tough situation. The brewer has to have to have ‘good cause’ to terminate a contract with a distributor, and the definition of good cause is usually made at the state level. This makes it very hard for breweries to have flexibility in distribution of their product. (Clements & Kurtz, 2014; Klick & Wright, 2008). Proving that you have ‘good’ or ‘just cause’ to terminate a contract is a difficult and tedious bureaucratic process (Klick & Wright, 2008). If good cause is found, then the brewer typically has to file a written notice between 60 and 90 days to the wholesaler they are trying to terminate. Then, the wholesaler must be given an opportunity to solve the issue they are accused of, and if they do (or even if they simply give a plan to fix the problem) the termination is rendered ineffective. This is called a ‘notice and cure’ requirement. These can be waved under special circumstances, if the wholesaler is found guilty to a serious crime, defaults on payments or loses their license, etc. (Brewers Association, 2015).

Wholesalers on the other hand, can sell the rights to distribute at any point without the consent of the manufacturer (Klick & Wright, 2008)¹³.

The way the laws are usually written leaves brewers at the whim of the distributors. It is a system that could be taken advantage of in every situation it is present. Beer franchise laws make termination of these contracts very difficult for the brewer. Without “just cause” the brewer is helpless, and even with just cause, a wholesaler can often correct their mistake or simply draft a plan to correct their mistake. On top of all of this, the wholesalers typically have the right to sell their right to distribute a supplier’s beer without the consent of the brewer. One provision that is typical of these laws is exclusive territories. Evidence suggests that this addition will offset some of the less fair franchise laws.

Three restrictive policies Klick and Wright examine are prohibitions on exclusive dealing contracts between brewers and wholesalers, mandated exclusive territories, and harsh termination restrictions over the period 1980-2000. They find that the mandated exclusive territory effect is positive and significant, but not statistically different between states with 3 tiered and two tiered distribution. They also find that termination restrictions have a negative and significant impact on beer sales. They also find that states that prohibit exclusive dealing contracts have a positive and significant effect on

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beer sales. Sass only tested the impact of exclusive dealing with in the big breweries. It is likely that big breweries are more able to negotiate exclusive dealing clauses into their contracts than the small brewers, and so where exclusive dealing occurs, the small brewers would be negatively impacted. Klick and Wright argue that the negative coefficient on exclusive dealing is because small breweries just starting out are under-represented because there are less wholesalers than there would have been. They do not directly test this theory.

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Empirical Strategy:

The emergence of craft beer marked a new form of competition in the industry. The effects of regulation and their implication for regional market differences on craft brewers in particular, deserve special attention.

This section provides an empirical model which examines the factors leading to or inhibiting the growth of small brewers in the market. The data I use is pooled annually from 1984-2013 across all 50 states and the District of Columbia. I chose the quantity (in 10,000 bbls) produced by brewers under a 'certain threshold'¹⁴ for my dependent variable. This method examines production by state as a function of several regulatory and economic factors to see if regulations influence production and entry into the market. Burgdorf (2015) studied the number of entrants focusing on the difference between the absence of production (a non-entity) and positive output when a new brewer enters the

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market. In my analysis I incorporate growth on the extended margin where small brewers can increase production given that market conditions and regulatory constraints allow. I follow the methodology of Elzinga, Tremblay, and Tremblay (2015) by using the Tobit model to estimate production levels by states as a function of regulatory and economic influences. Additionally, I incorporate regional dummies in my analysis and use three specific state level regulations and interactions of these regulations. I run two nearly identical Tobit models, but for the purpose of comparison I add regional dummies to the second model. If the economic and regulation coefficients are not affected, I know the regional dummies are not highly collinear with regulations. I also use a number of interaction terms to investigate whether combinations of different regulation have a stronger effect than the single regulations alone.

Estimation Model:

Following the lead of Elzinga, Tremblay, and Tremblay I use a Tobit¹⁵ model to estimate the following equations:

Equation 1:

$$\text{Prod}_{it} = B_0 + B_1 \text{ pop} + B_2 \text{ unemp} + B_3 \text{ pctblack} + B_4 \text{ rgdpcap} + B_5 \text{ realtax} + B_6 \text{ winecap} + B_7 \text{ spiritcap} + B_8 \text{ dryratio} + B_9 \text{ exterr} + B_{10} \text{ fran} + B_{11} \text{ threetier} + B_{12} \text{ exfran} + B_{13} \text{ threex} + B_{14} \text{ threefran} + B_{15} \text{ threeexfran} + \text{const}$$

Equation 2:

$$\text{Prod}_{it} = B_0 + B_1 \text{ pop} + B_2 \text{ unemp} + B_3 \text{ pctblack} + B_4 \text{ rgdpcap} + B_5 \text{ realtax} + B_6 \text{ winecap} + B_7 \text{ spiritcap} + B_8 \text{ dryratio} + B_9 \text{ exterr} + B_{10} \text{ fran} + B_{11} \text{ threetier} + B_{12} \text{ exfran} + B_{13} \text{ threex} + B_{14} \text{ threefran} + B_{15} \text{ threeexfran} + B_{16} \text{ South} + B_{17} \text{ Midwest} + B_{18} \text{ West} + \text{const}^{16}$$

¹⁵ <http://www.stata.com/manuals14/xtobit.pdf>

¹⁶ <http://www.stata.com/manuals14/xtobit.pdf>

$Prod_{it}$ is the total output in 10,000 31-gallon barrels in state i and year t .

Descriptions for each variable and expected signs are shown in the Appendix.

I aim to address the relationship between regulation and production in the craft beer market from 1983-2013. The regulations I investigate are exclusive territories, franchise laws, and the outlawing of self-distribution. I also include the ratio of the population of each state that lives in an area where alcohol is completely restricted. Franchise laws refer to the specific beer franchise laws that many states have, which include difficult contract termination restrictions between the brewer and distributor. I expect the sign to be negative in all iterations. Klick and Wright (2008) investigated these termination restrictions on beer sales and found negative and significant results. Mandated exclusive territories include all states that require by law exclusive territory agreements between the brewer and wholesaler. The literature is divided on subject of the competitive effects of exclusive territories, but Rojas (2012) Klick and Wright (2008) find that mandated exclusive territories increase beer sales. I expect this variable to increase production and have a positive and significant impact. Two-tier refers to states that allow self-distribution. With the intention of easier interpretation of the interaction dummies, I use Three-tier to refer to states that outlaw self-distribution. The literature is unanimous on the anti-competitiveness aspect of three-tiered distribution. I expect this impact to be negative.

Data:

The primary data set analyzed in this paper was provided by Burgdorf (2016). His data was obtained via a request to the Alcohol and Tobacco Tax and Trade Bureau (TTB). The TTB keep a record of active brewery permits in every state from the years 1983-2013. These permits do not distinguish the size or type of brewery, however. Nevertheless, according to the Brewers Association, in 2013, 98% of the 2,917 breweries were considered a craft brewery, so trends in this variable should be largely accurate. The data set includes dummy variables for franchise laws, two-tiered distribution, and mandated exclusive territories, all consistent over the time period¹⁷. These variables were collected by Dr. Burgdorf himself from state statutes. To the full data set I added dummy variables that separated the country into four regions; Northeast, Midwest, South, and West. I used what is commonly referred to as the Mason Dixon line to divide the states into their regions. States south of the line are coded as South, States above Pennsylvania and New Jersey are coded as Northeast. States western of NM, CO, WY, Montana are coded as West, and the rest of the states are coded as Midwest. Alaska and Hawaii are also considered West. I also added variables for dry counties. Many states still have dry or semi-dry towns and municipalities which would obviously affect the demand for breweries in those areas. I define the term semi-dry to capture the population who have limited access on certain kinds of alcohol, or the selling of alcohol in either retail stores or bars. A dry county is defined as a county, which prohibits the sale of alcohol entirely.

¹⁷ The data set includes dummy variables for franchise laws, two-tiered distribution, and mandated exclusive territories, all consistent over the time period¹⁷. These variables were collected by Dr. Burgdorf himself from state statutes. To the full data set I added dummy variables that separated the country into four regions; Northeast, Midwest, South, and West. I used what is commonly referred to as the Mason Dixon line to divide the states into their regions. States south of the line are coded as South, States above Pennsylvania and New Jersey are coded as Northeast. States western of NM, CO, WY, Montana are coded as West, and the rest of the states are coded as Midwest. Alaska and Hawaii are also considered West. I also added variables for dry counties. Many states still have dry or semi-dry towns and municipalities which would obviously affect the demand for breweries in those areas. I define the term semi-dry to capture the population who have limited access on certain kinds of alcohol, or the selling of alcohol in either retail stores or bars. A dry county is defined as a county, which prohibits the sale of alcohol entirely.

Semi-dry areas are more common, but the ways that alcohol is restricted varies between counties and states. For example, some areas restrict just liquor, some restrict liquor to only be sold by the glass, and others outlaw bars entirely and a “restricted” county includes both dry and semi-dry counties¹⁸. I used the 2014 report from the National Alcoholic Beverage Control Association (NABCA) as my guide. For every state they filled out a chart answering questions like:

“How does your state define a "wet county" in the context of alcohol availability and what is any relevant state law on alcohol availability? Please identify by name the counties in your state that are defined as wet. Since what date (or for how long a period of time) has each of the counties you identified been defined as wet? How does your state define a "dry county" in the context of alcohol availability and what is any relevant state law on alcohol availability? Please identify by name the counties or municipalities in your state that are defined as dry. Since what date (or for how long a period of time) has each of the counties you identified been defined as dry? Does the state or locality determine whether or not a county is "wet" or "dry" in the context of alcohol availability?”

I gathered population data from the U.S. Census Bureau for every township or city that was identified as alcohol restrictive in the year 2013. The total population of people that live in an area where alcohol is restricted is 7.16 million or 2.26%. It comes as no surprise that 94.14% of these people live in either the Midwest or the South. The Midwest accounts for 13.93% and the South for 80.21%. The Northeast and West split the remaining 5.86% fairly evenly, the North with 3.38% and West with 2.47%.

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Results:

I first estimate a Tobit model with regulation dummies. Table (2) gives the estimation results. Columns (1) (2) and (3) provide the baseline economic factors and each of my three regulation dummy variables separately. All coefficients for the baseline economic factors have the expected sign except unemployment¹⁹. State GDP per capita is positive and significant across the board, while excise taxes are negative and significant in every case. The coefficient estimate for excise taxes (realtax) is -.421 in column (2). This means that with a one-dollar increase in taxes per barrel, we would expect 4,420 fewer barrels produced in that state and year, on average. Column (1) gives the baseline regulations with the mandated exclusive territories variable. The coefficient is 9.032 and significant at the 1% level. All else equal, a state with mandated exclusive territories is expected to have 90,320 more barrels produced that year by small brewers, on average. The variable franchise laws was negative in most regressions but not statistically significant in any. I had expected this variable to have a significant negative impact so this was somewhat surprising. The coefficient on three-tier is always negative as expected, and significant at the 1% level in columns (3) & (4). When all three regulations are included in column (4) the results don't change in magnitude of coefficients in any appreciable way.

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Columns 5-8 of Table 2 include interactions of the regulatory variables. The coefficients for exclusive territories are uniformly positive in all specifications. Interestingly, the combination of exclusive territories with franchise termination restrictions is negative in all cases, and statistically significant in columns 5 and 8. Similarly, the estimated combination of exclusive territories and three-tiered distribution is negative and statistically significant at the 1% level in every case. This was especially interesting because I was expecting it to go the other way. Klick and Wright (2008) examine a similar regression where the dependent variable is beer sales, but they get the opposite results. The estimates interaction of all three regulatory variables is positive and significant, however.

Table (3) gives the estimation results of equation 2. Regional dummies have the signs and magnitudes I expected. There does not seem to be any notable differences in the economic and regulatory factors between these tables indicating that regulations and regions are not perfectly collinear. Regional effects exist but even controlling for these effects, the regulatory effects remain the same in terms of magnitude and statistical significance. As we can see from Figure 12, some laws and combinations of laws are more common in the South/Midwest as well as the West/Northeast. However, because there is enough variation state by state within regions, I can confidently say that the regulations are influencing regional differences in production, and not simply picking up on other regional differences that influence craft beer production.

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With an influx of German immigrants after the Civil War, came an increased focus on brewing. Locally owned breweries were popping up all over the Northeast and upper Midwest. This story begins here, with the local and regional brewers of the 1870s. The national brewers and regional brewers were competitive up until prohibition, but industry concentration was beginning to take root. Prohibition and the regulations thereafter, created an environment that favored the shipping brewers. Canning, at home refrigeration, pasteurization, and advertisements helped grow the market shares of the leading national brewers. With improvements in technology, much of the brewing process became automated and the use of multiple plants reduced costs as well. These firms could reach scale efficiency and the capital investment required to keep up with them grew larger.

With the increasing concentration, beers became lighter bodied in flavor and more adjuncts were used in their brewing formulas. The market became full of a homogenous product. This left an opening that imports and craft beer were able to fill. Local microbreweries and brewpubs grew in popularity, offering unique flavors of draught beer in small batches. In the past thirty years, craft beer has been growing, deconstructing and changing the dynamics of industry concentration.

The spread of craft beer and its prominence began initially has mostly been in the Northeast and West regions. In this thesis, I investigate the role of one factor, state regulation, to assess if it had potentially been slowing growth in this market. Regulation in the beer industry is a hotly debated topic among economists. I find that three-tiered

distribution and the interaction of exclusive territories and three-tiered distribution have strong negative effects on beer production of small brewers, significant at the 1% level. Somewhat surprisingly, I do not find evidence that franchise laws negatively influence production. Although regional differences remain, overall I find that state regulations in the beer industry are a meaningful deterrant to growth in craft brewing across states.

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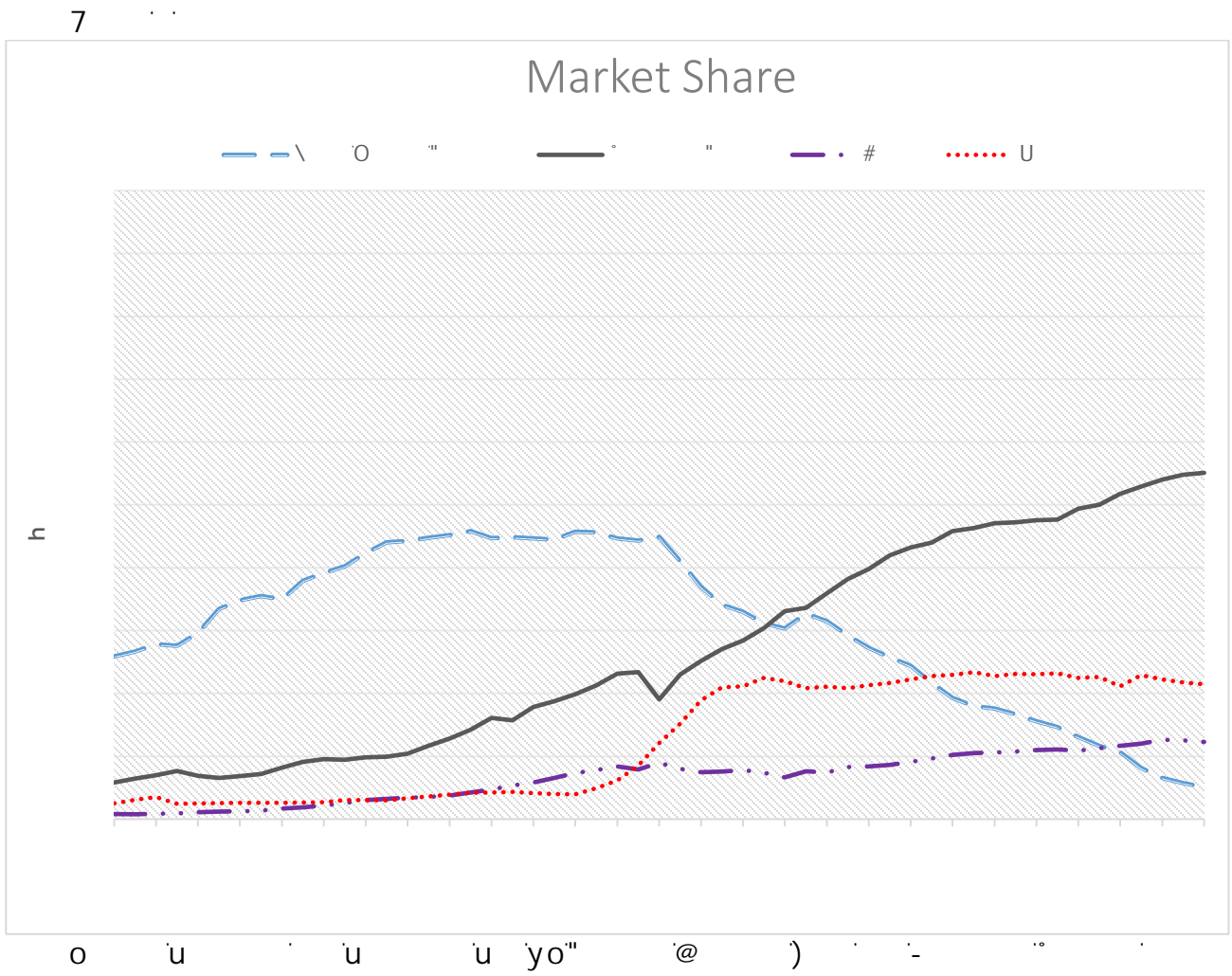
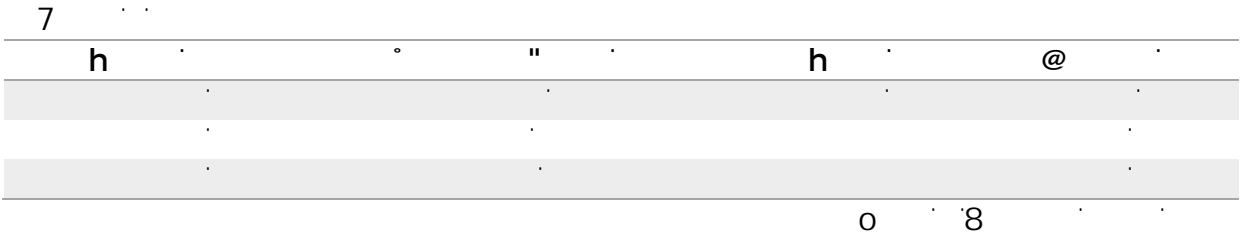
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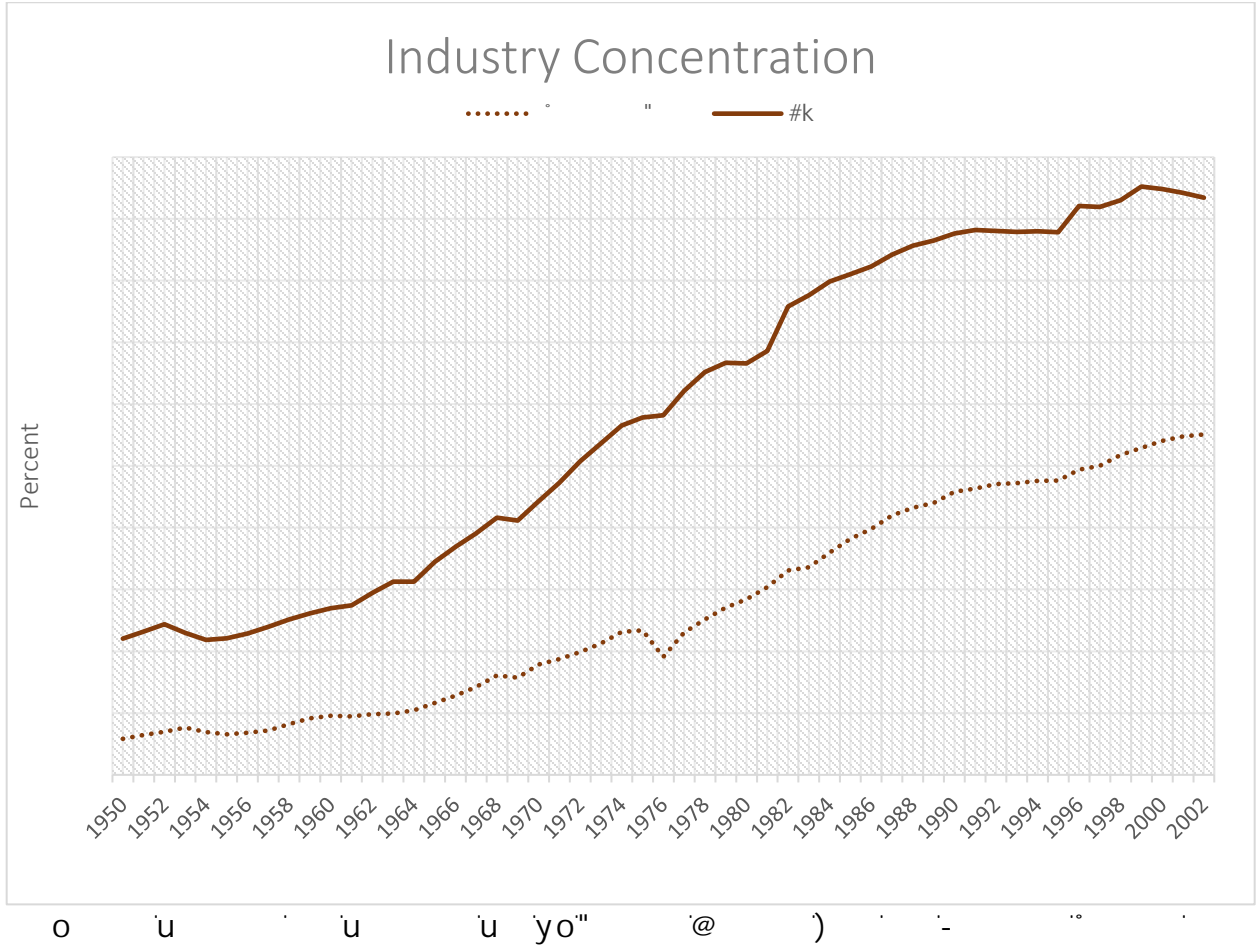
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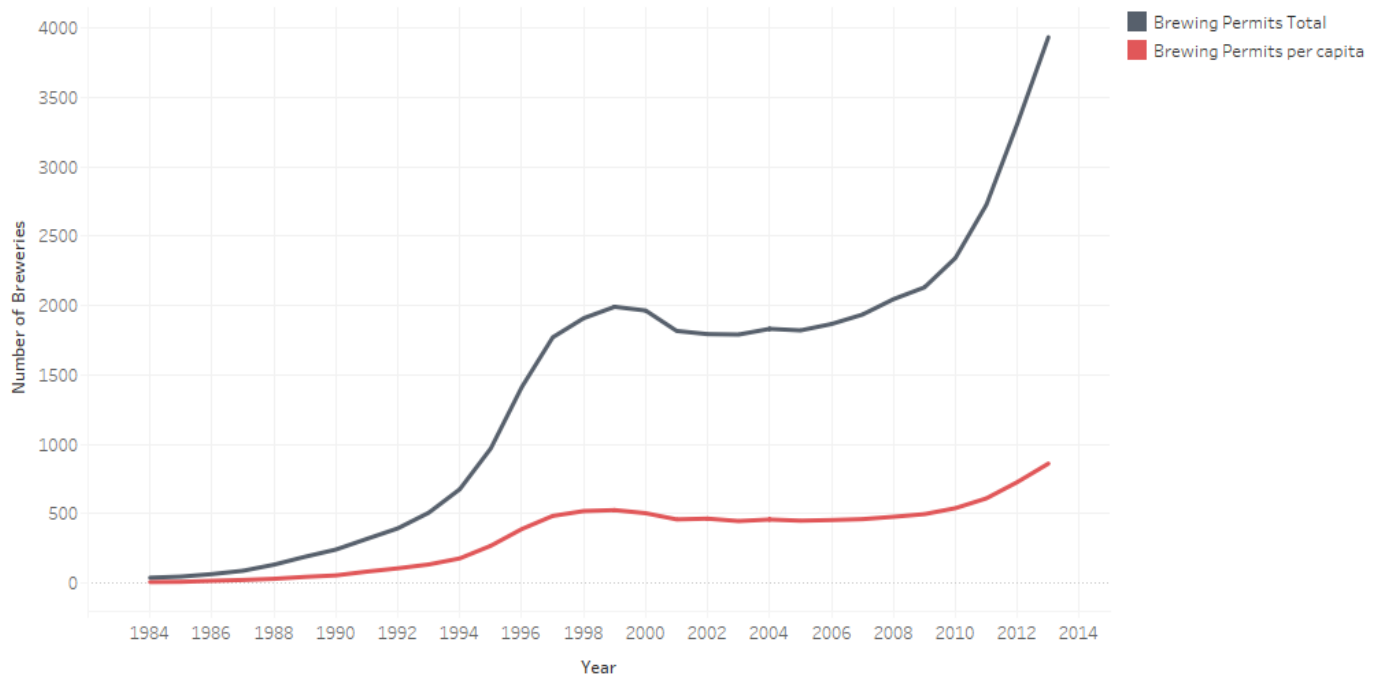
US Census Bureau <https://www.census.gov/topics/population.html>

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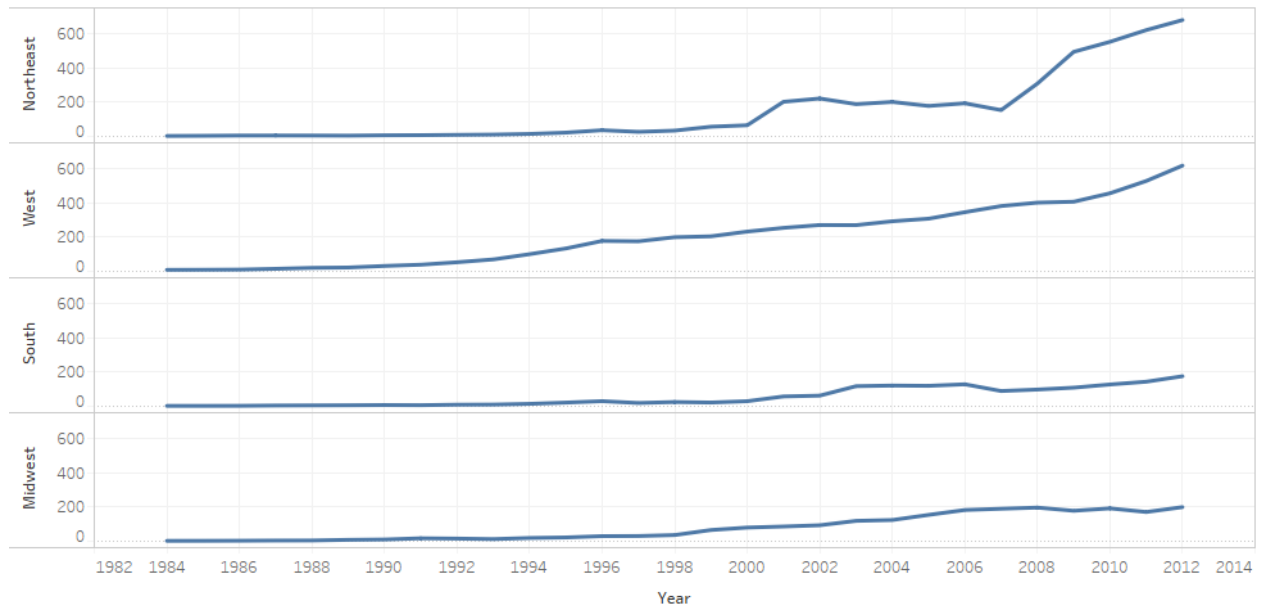


Industry Growth



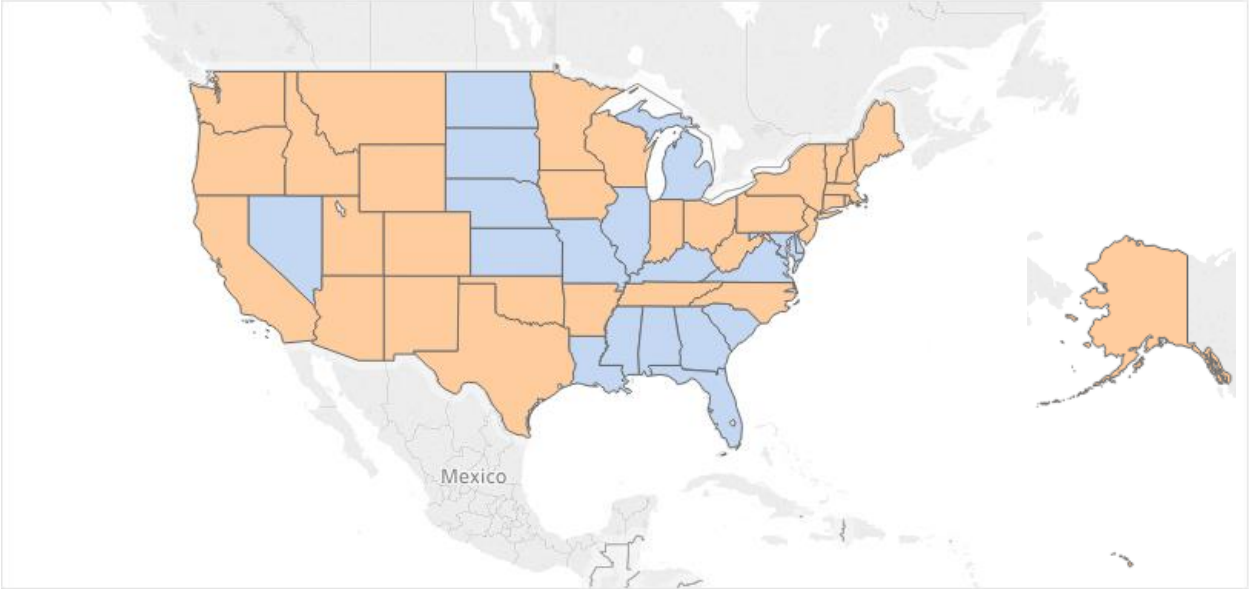
7

Craft Brewery production over time and across regions



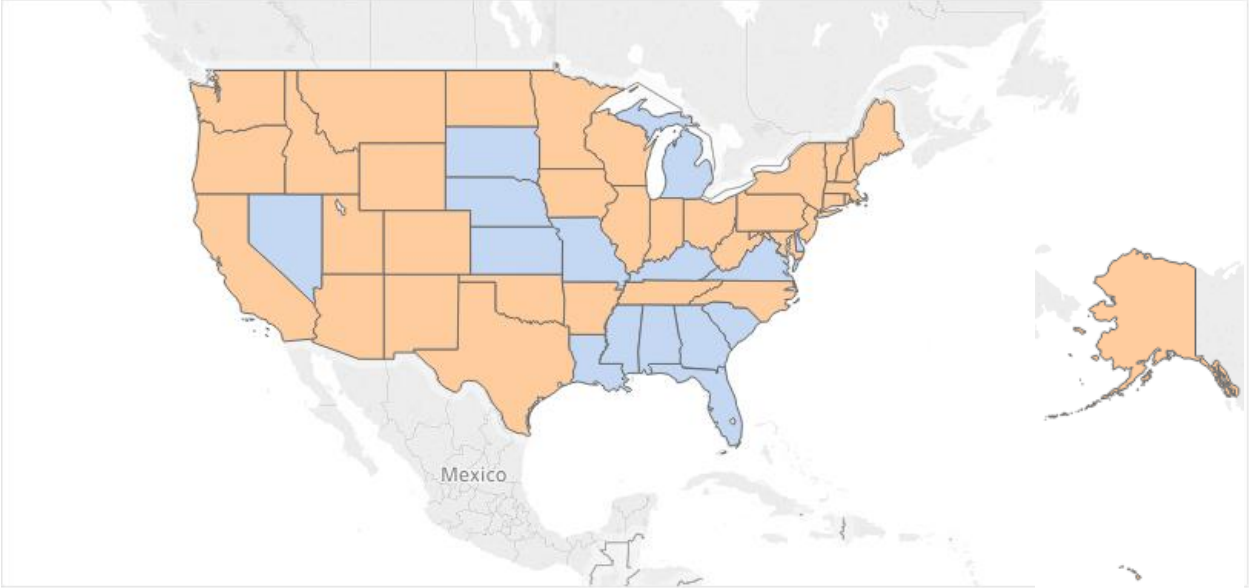
The trends of sum of Production (Sheet1 (beerdata northeast) (2)), sum of Production (Sheet1 (beerdata west)), sum of Production (Sheet1 (beerdata south)) and sum of Production (Sheet1+ (beerdata midwest)) for Year.

States Allowed to Self-Distribute (2005)



Light orange represents States that are allowed to self-distribute
Light blue represents States that must adhere to three-tiered distribution

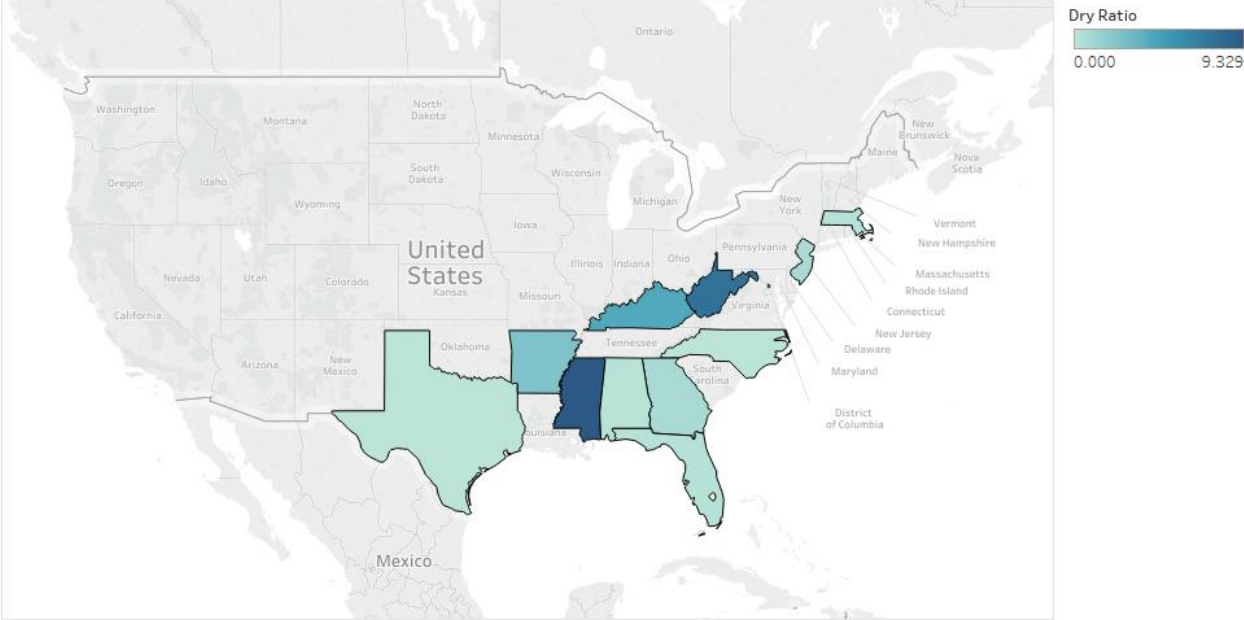
States Allowed to Self-Distribute (2013)



Light orange represents States that are allowed to self-distribute
Light blue represents States that must adhere to three-tiered distribution

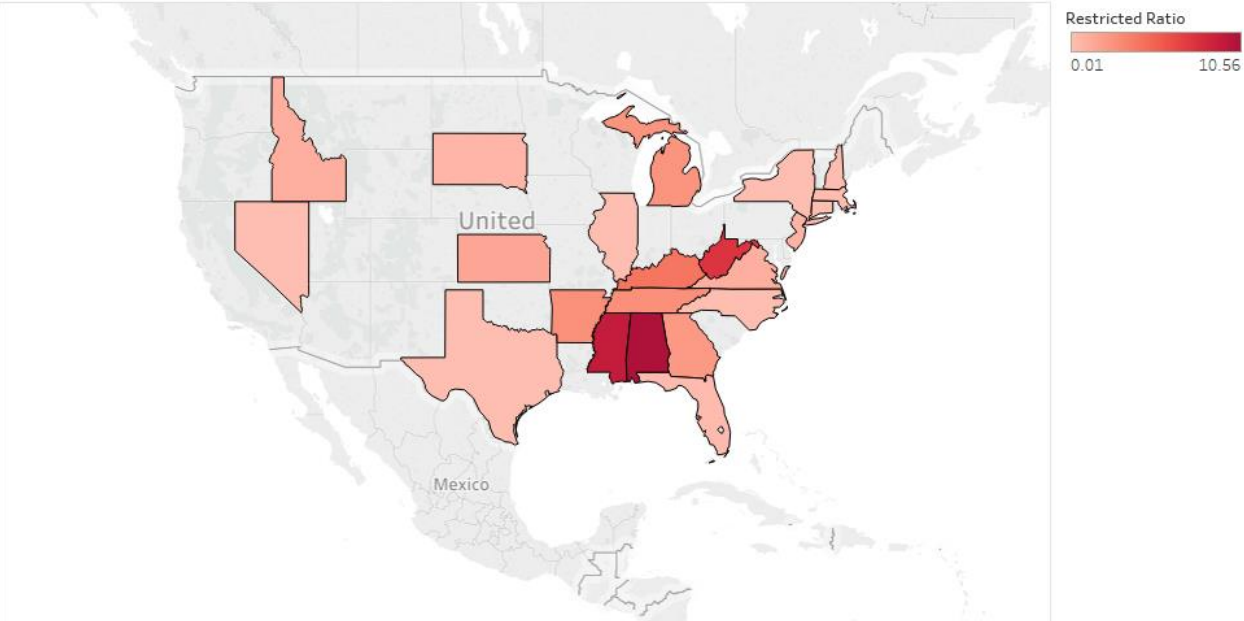
7

Ratio of the population living in Dry location (2014)



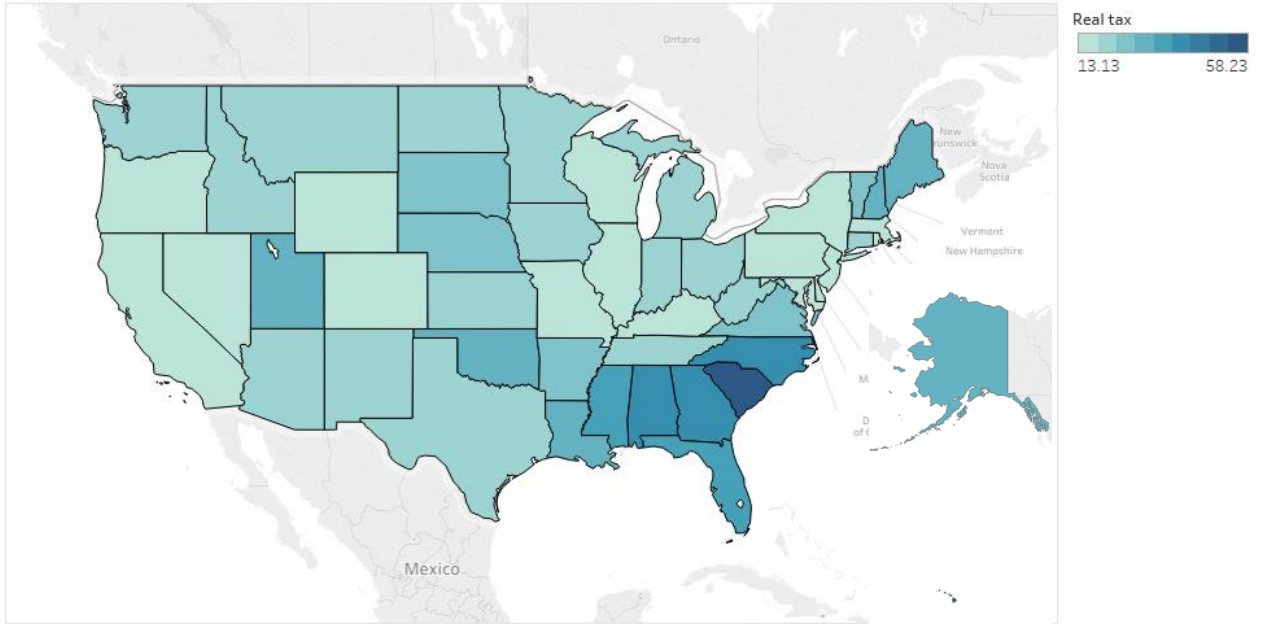
7

Ratio of the population with restricted access to alcohol (2014)



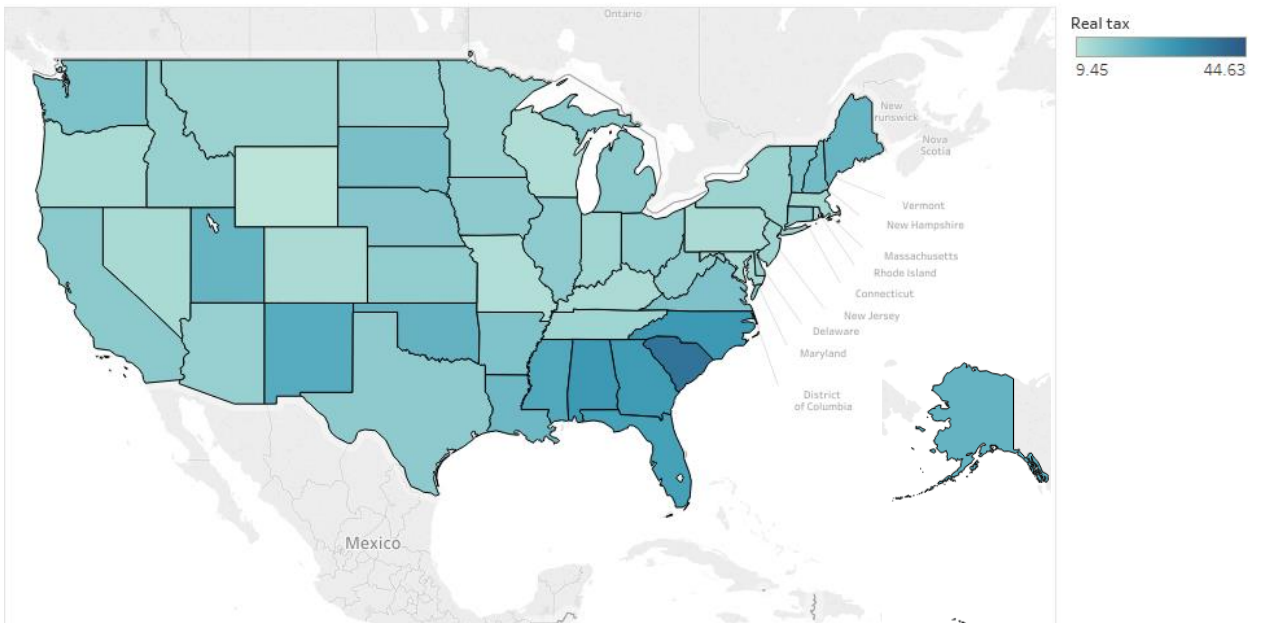
7

Excise Tax Rates 1989

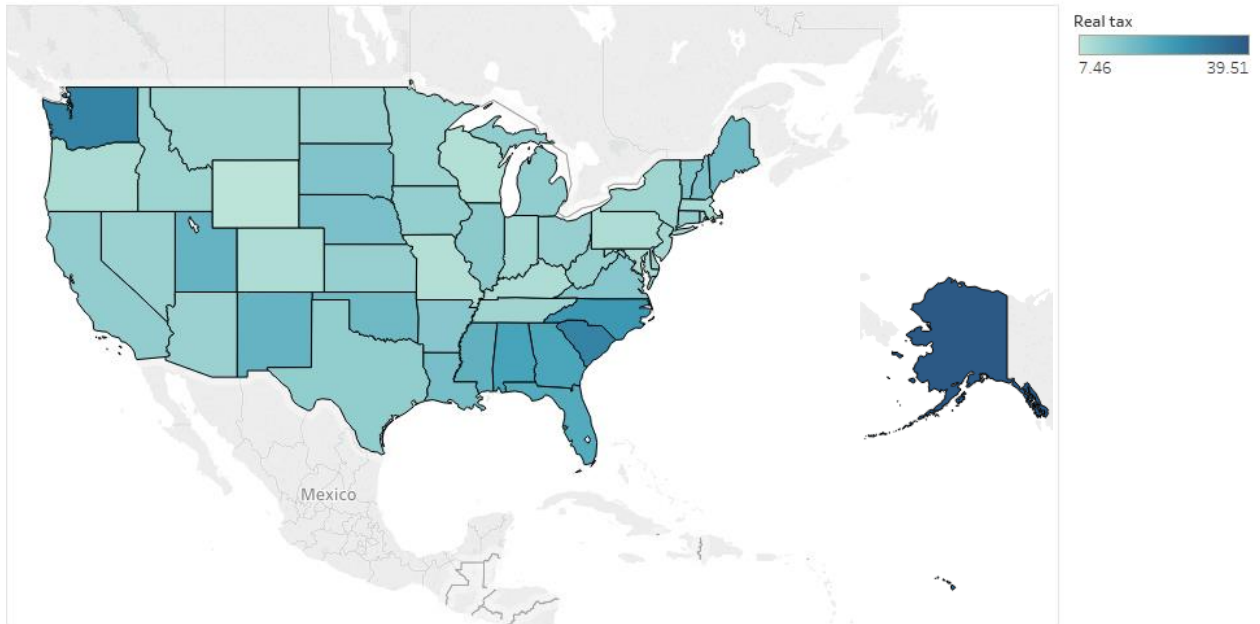


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Excise Tax Rates 2000

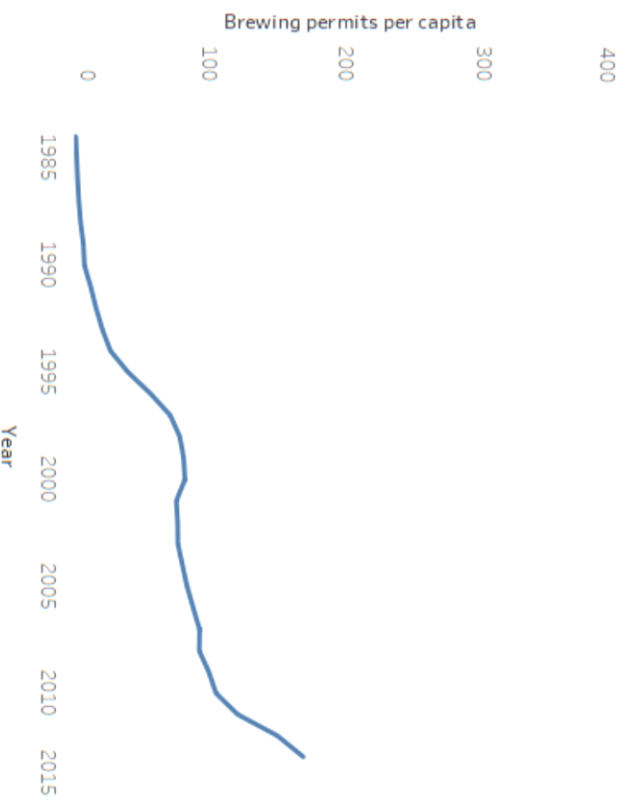


Excise Tax Rates 2010

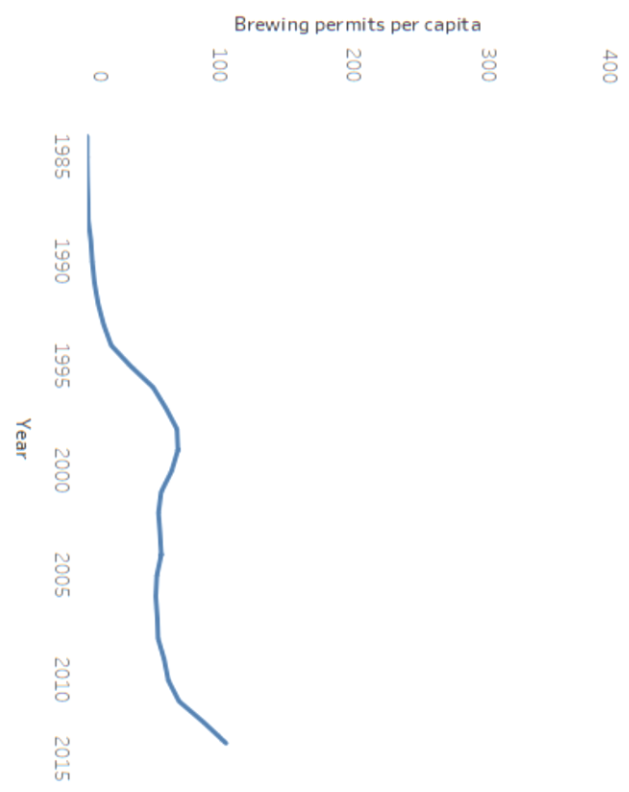


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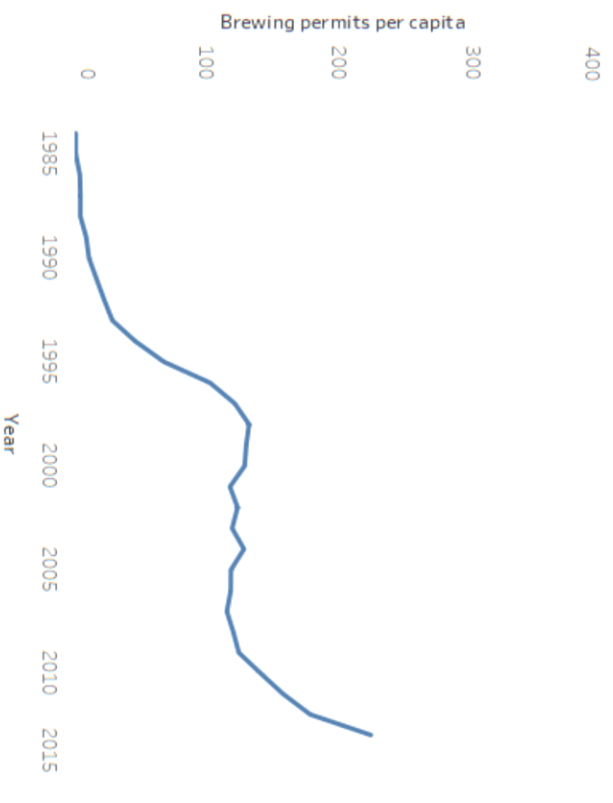
Midwest Brewery Growth/Capita



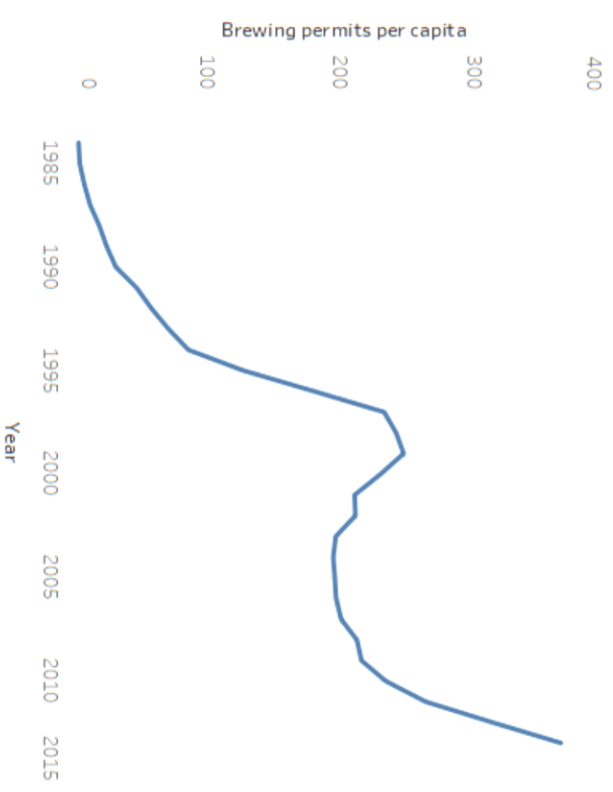
South Brewery Growth/Capita



Northeast Brewery Growth/Capita



West Brewery Growth/Capita



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dryratio	-38.332	-38.746	-38.02	-37.19	-38.27	-34.904	-33.156	-32.285
	(15.95)**	(16.2)**	(15.87)**	(15.83)**	(15.86)* *	(15.71)**	(15.76)**	(15.76)**
exterr	12.565			13.362	19.749	23.267	26.097	28.903
	(1.76)***			(1.85)***	(4.4)***	(4.31)***	(4.7)***	(5.7)***
fran		0.581		-0.461	1.497	-1.287	-3.739	-2.801
		(1.88)		(2.11)	(2.66)	(2.54)	(3.01)	(3.19)
threetier			-9.339	-10.163	-10.566	-3.775	-8.169	-6.223
			(1.84)***	(1.95)***	(4.02)** *	(2.8)	(4.03)**	(4.59)
exfran					-7.74	-4.413	-5.726	-9.577
					(4.74)	(4.66)	(4.75)	(6.48)
threeex						-11.698	-14.127	-21.302
						(3.5)***	(3.85)***	(9.07)**
threefran					0.118		7.173	4.222
					(4.35)		(4.72)	(5.79)
threeexfran								8.526
								(9.76)
constant	-144.589	-160.163	-151.837	-134.367	-138.313	-148.528	-143.395	-144.398
	(15.44)** *	(15.58)** *	(15.47)** *	(15.31)** *	(16.1)** *	(15.73)** *	(16.08)** *	(16.10)** *