Czech University of Life Sciences Prague

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Diploma Thesis

Analysis of the American Craft Beer Industry

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DIPLOMA THESIS ASSIGNMENT

Mark Robert Baron

Economics and Management

Thesis title

Analysis of the American Craft Beer Industry

Objectives of thesis

The thesis aims to analyze the American Craft Beer industry and the immense growth it has experienced in the recent years. The main factors that will be analyzed include a set of legislative elements that have gone through recent reform in response to changes in the American brewing industry. In addition to the main factors, the study will analyze the effects of the state beer excise tax rate, population density, and beer consumption per capita on the proliferation of the industry. The effects will be analyzed at both the national and regional levels.

Methodology

The methodologies include building a reliable dataset based on the latest available data from industry groups. In addition to the industry information, each state's statutes will be checked and examined for laws concerning the craft brewing industry. The final data will be examined using a multiple equation multivariate ordinary least squares econometric model. This same model structure will be used not only on the national level but also for four sub-regions of the United States of America. The factors will then be analyzed for their effects on the endogenous variables and their statistical significance to the study.

The proposed extent of the thesis

70 pages

Recommended information sources

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Declaration

I declare that I have worked on my diploma thesis titled "Analysis of the American Craft Beer Industry" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any third person.

In Prague on March 31, 2015 _____

Mark Baron

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I would like to thank my supervisor, Tomas Maier for all of his guidance and advice throughout the entire process of writing this thesis. Also my father and my uncle, Joe Baron and Don Esbjornson for their help in revising and editing my work. Finally, I would like to thank Arum Eyen for his help and insight throughout the project.

Analysis of the American Craft Beer Industry

Analýza minipivovarnictví v USA

Abstract

This thesis aims to analyze the effects of franchise laws and excise tax breaks targeted specifically at small brewers, as well as the effects of the right of small brewers to self-distribute their products. The amount of the state excise tax per gallon, population density, and beer consumption per capita are also analyzed as secondary effects to explain the size and growth of the craft beer industry. The analysis is carried out using two-equation, multivariate ordinary least squares regressions at the national level and additional models for the Northeastern, Midwestern, Southern, and Western regions of the United States of America.

The final discussions of this thesis discuss the findings of these legislations as well as the additional factors regressed and provide insight for implications or lack thereof on the booming American Craft Beer Industry.

Keywords: Beer, Craft Beer, Franchise Laws, Self-Distribution Rights, Excise Taxes, United States Beer Industry

Souhrn

Tato diplomová práce si klade za cíl analyzovat působení zákonů týkajících se franšíz a spotřební daňové úlevy zaměřených speciálně na malé pivovary a také vliv práva malých pivovarů na distribuci vlastních výrobků. Výše státní spotřební daně za galon, hustota obyvatelstva a spotřeba piva na osobu jsou analyzovány jako sekundární vlivy, které vysvětlují velikost a růst minipivovarnického řemesla. Analýza se provádí pomocí dvou rovnic, regresí vícerozměrnou metodou nejmenších čtverců na národní úrovni a doplňkovými modely pro severovýchodní, středozápadní, jižní a západní oblast Spojených států amerických.

V diskusi práce shrnuje zjištění z těchto právních předpisů, jakož i další regresované faktory a poskytuje náhled do důsledků nebo nedostatků vzkvétajícího amerického minipivovarnictví.

Klíčová slova: pivo, minipivovarnictví, franšízové zákony, právo vlastní distribuce, spotřební daně, pivovarnictví ve Spojených státech amerických.

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3 Thesis Objectives and Methodology

3.1 Thesis Objectives

The American brewing industry is and has been experiencing one of its most dynamic periods in its entire history. The Craft beer industry has been growing at an alarming rate since the late 1970s and continues to do so through 2015 with little signs of slowing down. Throughout this renaissance of craft beer in the United States, some states have engaged in passing legislation, which is aimed at directly benefitting the small brewers who operate within that respective state. One of the goals of this work will be to evaluate whether or not the existence of franchise law, self-distribution rights, and excise tax breaks at the state level for small brewers influence the proliferation of the number of craft breweries within each state.

The key legislative components (franchise laws, self-distribution rights, and excise tax breaks) are explained and analyzed in a manner, which can effectively display theoretical value to the craft beer industry from both literature review and industry experts' publications. Additionally, their historical existence and participation in the craft beer industry is analyzed as support to the growing industry segment.

A large majority of both franchise law data and self-distribution rights data for all 51 (including Washington D.C.) was collected from the individual state's legislative code from their own respective online access points. All of the data was taken from the most recent available public version of the legislative code for each state, which for nearly all cases had been updated within the past year.

The information and data concerning the individual states' policy towards excise taxes at the state level was a two-tiered approach. The first source was the annually published Brewers' Almanac, which is published each year by the Beer Institute a leading trade organization in the United States. Then, with this data from 2013, for the states which reported giving favorable tax policies to brewers of smaller quantities of beer there was an extra round of research on this topic but this time in the states' legislative code concerning excise taxes in the alcoholic beverages industry.

This Diploma Thesis is based on thorough literature review to convey the situation, which this thesis attempts to explain and to explain in detail each of the factors, which may be affecting it. The literature review is complemented by extensive data collected from trade organizations, government organizations and analysts to create a complete picture of what is happening in this industry. The hypothesis testing and statistical data analysis was carried out using data from industry participants, trade organizations, and certain government organizations as well. The statistical analysis takes precedent of importance to the theoretical explanations as the theoretical explanations are aimed at supporting the understanding of the variables being tested.

In order to test the hypotheses in this thesis, multiple linear regression models will be constructed to properly evaluate relationships between the variables within the dataset. In all models, the dependent variables being tested is the number of breweries per 100,000 inhabitants in addition to the brewery per capita growth rate of each state. All of the models use the existence of franchise laws benefitting craft brewers, self-distribution rights for brewers, excise tax breaks for small brewers, population density, state excise tax rate and beer consumption per capita as independent variables. In order to test and compare the effects of the same six independent variables in the different regions, four more separate regression models were ran in order to evaluate the same relationships among the endogenous and exogenous variables.

The main hypotheses being tested in this thesis are:

I. "The existence of franchise laws, self-distribution rights, and excise tax breaks for small brewers have an impact on the amount of operating breweries per capita within the United States of America"
II. "The existence of franchise laws, self-distribution rights, and excise tax breaks for small brewers have a larger significant impact on breweries per capita in some regions more than others within the United States"

III. “The extent to which excise taxes are applied to small brewers in the United States at the state level has an impact on the proliferation of small brewers in the given state”
IV. “The population density of each state significantly impacts the relative proliferation of the craft brewing industry for that state”
V. “Overall beer consumption per capita has a significant impact on the relative proliferation of craft breweries in that state”

3.2 Statistical Sources

Some of the beer statistics used in this study can vary according to the source of the information and the procedure that the given source has used to report the figures. This study uses data from a variety of different sources from within the brewing industry as well as adjacent industries and directly related studies. In all cases the author has attempted to be as statically consistent as possible.

4 Definitions

Throughout the duration of this report, there will be many industrial specific terms used which will be defined here for simplicity for the reader.

4.1 Terminology

Craft Breweries per Capita:

When this variable is referred to throughout the text it should be noted that it is calculated literally as "craft breweries per 100,000 inhabitants of the state"

Prohibition

The period of time in the United States of America from 1920 to 1933 when it was illegal to make or sell alcohol.

Minimum Efficient Scale (MES)

"The smallest amount of production a company can achieve while still taking full advantage of economies of scale with regards to supplies and costs." (investopedia 2014)

Macrobrewery

A brewery producing greater than 6 million barrels per year and distributing on either the national or international level.

4.2 Units of Measurment

Depending on the source of the information, the individual state's preferred unit of measurement, and brewer's preferred method, there are a few different units used to express similar laws, production volumes and shipments. In many cases within this study the volume of beer will be expressed in either US gallons or barrels, often interchangeably. However, for simplicity for the reader it is useful to be mindful of these units of measurements to those commonly used in an international context. The table below lists these units of measurements and the conversion factors; which can be used to simplify the data according to reader preference.

	Liter	Hectoliter	UK Gallon	US Gallon	Barrel
Liter	1	100	4.546	3.785	117.348
Hectoliter	0.01	1	0.0455	0.0379	1.173
UK Gallon	0.220	21.997	1	0.833	25.813
US Gallon	0.264	26.417	1.201	1	31
Barrel	0.00852	0.852	0.0387	0.0323	1

5 Introduction

When the average consumer in America today decides to purchase a beer, he/she is faced with more options then almost ever before in history. Currently in the United States there were 2,822 operating breweries as of the end of 2013, not counting anything in the previous year (Brewers Almanac, 2013). That being said, it is important to note this industry has been anything but static in the recent years boasting a nearly 15% growth rate in the number of breweries between 2012 and 2013 with no signs of slowing down (Brewers Association, 2014). This is giving American consumers a plethora of options unlike anything seen before anywhere in the world in terms of domestic beer industries. An outstanding majority of these breweries belong to the group of breweries called "craft breweries".

It is important in this study to understand what exactly a "craft brewery" is defined as in terms of its relation to the brewing industry as a whole. The trade association representing more than 2,400 breweries in the United States alone, the Brewers Association (2014), agreed upon the official requirements within the United States for being formally recognized as a "craft brewer". These requirements today are defined as follows:

Small

Annual production of 6 million barrels of beer or less (approximately 3 percent of U.S. annual sales). Beer production is attributed to the rules of alternating proprietorships.

Independent

Less than 25 percent of the craft brewery is owned or controlled (or equivalent economic interest) by an alcoholic beverage industry member that is not itself a craft brewer.

Traditional

A brewer that has a majority of its total beverage alcohol volume in beers whose flavor derives from traditional or innovative brewing ingredients and their fermentation. Flavored malt beverages (FMBs) are not considered beers.

The very first microbreweries and craft beer producers in the United States (1970s) touted the avoidance of using brewing adjuncts in the brewing process (Tremblay and Tremblay, 2009). This is part of the response to the large brewers intensifying usage of adjuncts within the brewing process in order to both dramatically reduce costs (in large scale production schemes) and increase the shelf life of the beer. Whereas traditional brewing methods call for all malt ingredients, when a beer is brewed with the use of adjuncts, un-malted grains are substituted for the malted counterparts. Some typical adjuncts which are used within the brewing industry include unmalted corn, rice, barley, wheat or oats (beer-brewing.com, 2014). However, it needs to be understood that this "adjunct-free" beer, which is being produced by craft beer brewers is typically only adjunct free in regards to the type of starch (unmalted or malted) being used. According to craftbeer.com (2014), adjuncts are not necessarily a negative trait of any given beer, in fact they are very commonly used within the craft beer industry. The major difference which distinguishes the typical use of adjuncts within the craft beer industry and the typical use in the large, national and regional breweries is the purpose. In the case of the larger, macro-breweries, adjuncts such as corn or rice are used to not only obtain their lighter flavor but also reduced production costs. As of 2013, the domestic light beer segment accounted for 52% of the total beer sales in the United States (Wong 2014).

For the remainder of this study, any brewery which is referred to as "craft" will be assumed to meet the description which was defined earlier in this section. Furthermore, the craft breweries can be broken down into one of four subcategories: microbrewery, brewpub, contract brewing company, and regional craft brewery, which are further explained below. However, an overwhelming majority of the breweries in question are classified as either a microbrewery, or brewpub (Brewers Association, 2014).

Microbrewery

A brewery that produces less than 15,000 barrels (17,600 hectoliters) of beer per year with 75 percent or more of its beer sold off-site. Microbreweries sell to the public by one or more of the following methods: the traditional three-tier system (brewer to wholesaler to retailer to consumer); the two-tier system (brewer acting as wholesaler to retailer to consumer); and, directly to the consumer through carry-outs and/or on-site tap-room or restaurant sales.

Brewpub

A restaurant-brewery that sells 25 percent or more of its beer on site. The beer is brewed primarily for sale in the restaurant and bar. The beer is often dispensed directly from the brewery's storage tanks. Where allowed by law, brewpubs often sell beer "to go" and /or distribute to off site accounts. Note: BA re-categorizes a company as a microbrewery if its off-site (distributed) beer sales exceed 75 percent.

Contract Brewing Company

A business that hires another brewery to produce its beer. It can also be a brewery that hires another brewery to produce additional beer. The contract brewing company handles marketing, sales and distribution of its beer, while generally leaving the brewing and packaging to its producer-brewery (which, confusingly, is also sometimes referred to as a contract brewery).

Regional Craft Brewery

An independent regional brewery with a majority of volume in "traditional" or "innovative" beer(s). Producing between 15,000 and 6,000,000 barrels of beer annually.

According to the Brewer's Association (2014), at the end of 2013, there were approximately 1,243 brewpubs, 1,412 microbreweries, and 119 regional craft breweries to bring the total operating craft breweries at the time to 2,768. Of the three sectors of American craft brewing, microbreweries comprised a major part of the industry due to various legal and natural factors. Prior to 1979, it was illegal in the United States to brew your own beer at home, let alone decide to sell that beer as a consumer good (Tremblay and Tremblay, 2009). However, President Carter signed a bill, which was introduced by then California Senator Alan Cranston that would legalize home brewing across the nation (Tremblay and Tremblay, 2009). For the first time in recent history American citizens were granted the right to create beers that they wanted to drink rather than let the very concentrated brewing industry decide for them.

Similar to late acceptance of homebrewing (which in turn led to microbrewing), the upbringing of brewpubs on United States soil was also dependent on legal restrictions. Following the legalization of home/microbrewing, in the 1980s some states decided to lift the previous ban on brewpubs which took up until 1999 to gain full acceptance by all 50 states (Tremblay and Tremblay, 2009) Like homebrewing and microbrewing, not only state but also federal laws made the massive boom experienced possible.

The third category, "regional craft breweries" may seem like it is lagging behind the other categories in a currently booming industry, however this is far from the truth. In fact, in 2013, regional breweries accounted for 75% of total craft production (Brewers Association, 2014). This large percentage can be attributed to the volume of output, distribution capabilities and more efficient economies of scale realized (Tremblay and Tremblay, 2009).

Although the current state of craft beer suggests a strong rooted industry with significant market share, surprising to most, this is not the case. In fact, in terms of barrels of beer sold, in 2013 craft beer accounted for just 17.2% of the entire US brewing industry (Brewers Association, 2014). Moreover, this is at a time when in the same year, overall US beer sales decreased almost 2% (Lu, 2014). Not only is craft beer leading the industry

pack in sales volume growth, but also in 2013 it experienced 20% increase in total sales dollars to bring it to $14.3 billion in the United States when the brewing industry as a whole totaled just $100 billion. When put next to its relative market share in the US (7.8%) in 2013, it boasts interesting numbers as it controls just 7.8% of the volume sold, but almost double (about 14.3% of the sales dollar share). This of course is evidence of one of the momentum of the booming industry.

6 Industry Background

Despite the relativity young age of America, it boasts one of the strongest economies in the world in terms of both production and consumption. One of the oldest and recently dynamic factors in this economic success is the brewing industry. The United States of America as a country was formally founded in 1776 however there are records of active breweries long before this time. The first recorded brewery in America was in New Amsterdam in 1612, some 164 years prior to American independence (Tremblay and Tremblay, 2009). In fact, beer had become such a staple in early American culture that even throughout the Revolutionary War, the Continental Congress declared that soldiers receive a beer ration of almost one liter per day (Mittelman 2008). However, hard cider was also staple in the everyday American diet, and during the 18th and 19th centuries was considered the drink of choice, which of course was supplemented with whiskey. It was not until the middle of the 19th century, when many central and eastern European immigrants began coming that the brewing had such a strong presence in American culture (Mittelman 2008). In fact, it was during the American Civil War (1861-1865) when there was the first federal excise tax placed on beer in order to help fund the war efforts (Brewers Association, 2014). Since then, with the exclusion of a few dark years in the early 1900s, beer has always been a staple of the American life. In the early years of the industry and country, the American colonial breweries were typically producing English ales, porters, and stouts (Tremblay and Tremblay, 2009) until a group of German brewers came over and introduced the Lager. The lager style of brewing experienced great demand and popularity in America (even to this day). There was also a smaller population who in the pre-prohibition days greatly influenced both the American beer scene and even the German-American beer production, the Czechs. In the mid 1800s, they created the pilsner, which to this day is the basis of the American (macro) beer standard (Hall, 2003). In terms of quantity of firms, the American brewing industry experienced its first era of great expansion and prosperity, which continued strongly until the Eighteenth Amendment to the Constitution of the United States of America.

6.1 Prohibition

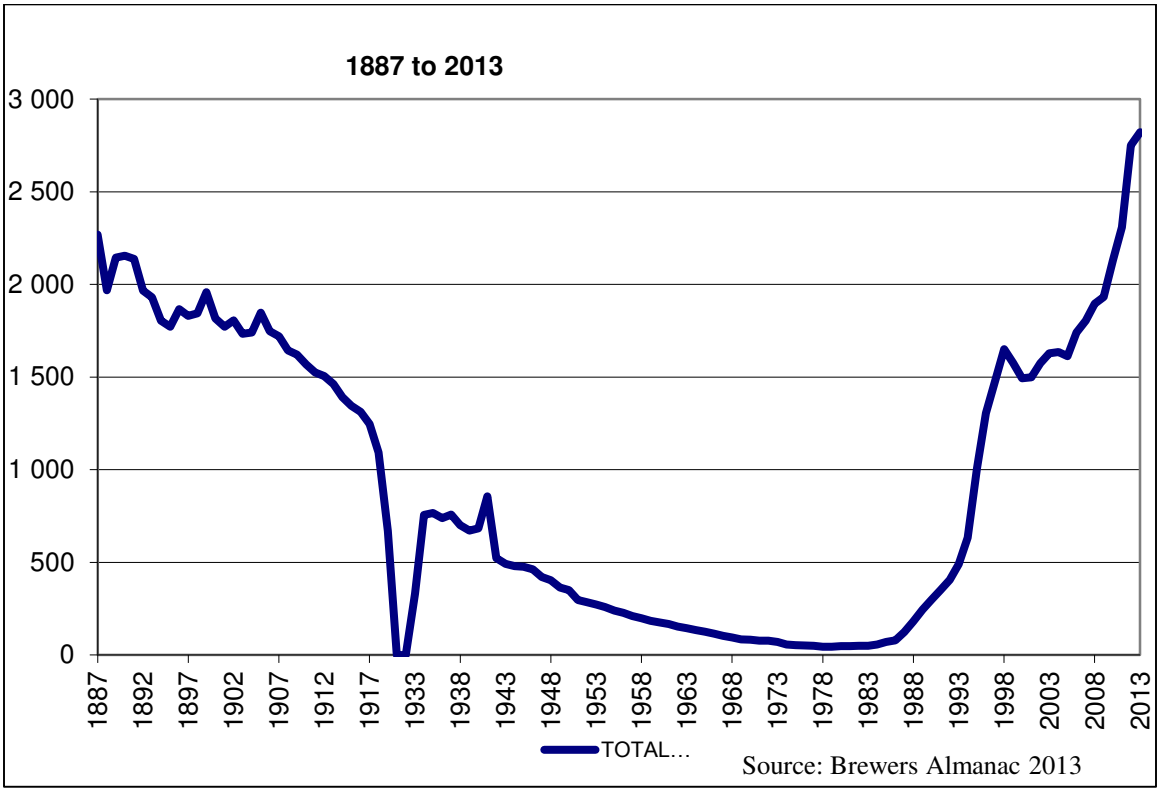
The eighteenth amendment to the United States Constitution dealt with making the production, sale, and consumption of alcoholic beverages illegal for all persons in the United States. The foundations and reasoning for this amendment came from a combination of forces that alone may have not been sufficient to essentially shut down an entire booming industry but together successfully ratified the amendment. Some of the proponents of installing prohibition in the United States included "social crusaders" who saw many of the social problems society was dealing with such as crime, over-consumption, and domestic unrest as rooting from alcohol abuse. At the same time, the country was on the midst of great industrial advances and saw the availability of alcohol ultimately as a barrier to worker productivity; Prohibitionists even argued that the use of grains for alcohol production was a waste when it could be used as a food source (Mittelman 2008). Ultimately, when the 18th amendment was ratified in 1919 at its core it was an attempt to better American society by means of government intervention at the expense of not just the beer industry but all alcohol suppliers and sellers. At the time when the amendment was ratified there were over 1,560 breweries in operations, which were either shutdown or repurposed to survive (Tremblay and Tremblay, 2009).

With further legislative action, the Volstead act gave the appropriate power to the right parties to properly enforce prohibition however there was a serious lack of available resources to make this a reality (Sorini, 2014). Additionally, the banning of alcohol created a massive underground market in shadow industry, which led to the proliferation of organized crime, and corruption in the country as a side effect of the ban. This, along with many other unforeseen consequences, including the massive loss of excise tax revenue at a time when the United States was experiencing it's worst economic depression in history as well as participation in World War I ultimately led to the 19th amendment being repealed in the form of the 21st amendment after 13 years of a largely unsuccessful attempt to ban alcohol (Sorini, 2014). It was not until 2 years after the ratification of the 21st amendment when the Federal Alcohol Administration Act (FAA Act) was enacted which put into place the legal framework for alcohol regulation, which

is still referred to today. However, unlike attempted federal regulation prior to prohibition where the focus was to regulate consumption, the new alcohol control policy was focused on regulating sales rather than consumption (Mittelman 2008). It was through this act which the "Three Tier System was established and will be discussed in further details later in the study (Sorini, 2014).

During Prohibition there were many brewers who attempted to stay afloat by expanding their business into other areas. Some brewers took up producing things such as milk, butter, cheese, condensed milk, grain, flour and even feed (Mittelman, 2008). Many of the larger brewers such as Anheuser-Busch, Blatz, Pabst and Stroh decided to start brewing malt syrup, on of the ingredients when brewing beer (Mittelman, 2008). However, the number of breweries in the United States that were able to resume their operations was significantly lower and only 331 breweries emerged in 1933 (Brewers Almanac, 2013). Despite this industry disappointment, the brewing in America regained its presence in as little as 2 years time when in 1934 there were 756 breweries in operation producing 37,678,313 barrels of beer (Brewers Almanac, 2013). In the final year of "normal production" in 1914 prior to prohibition, beer production was 66,189,473 (Mittelman, 2008). Beer had already regained 50% of its previous production levels after just 2 years of becoming legal again. In fact, this trend of post-prohibition growth was intense however short-lived due to the coming wave of mass consolidation within the American brewing industry.

Figure 1: Breweries in Operation 1887 to 2013



6.2 Consolidation

This growth was short lived when in 1942 the United States brewing industry saw a dramatic decline in the number of breweries when the total breweries in operation dropped from 857 in 1941 to 523 in just the following year (Brewers Almanac, 2014). While at first glance this may indicate a serious drop in the demand for beer, this is not the case. Instead, the main reasons for this sudden sharp decline in operating firms is a merger and acquisition boom within the brewing industry paired with optimal conditions which allowed for market dominance by larger brewers (Mittelman 2008). From the year 1941 to the year 1979 a total of 813 breweries had either shut their doors due to lack of competitiveness, been bought out by another brewing company, or merged with a fellow competitor (Brewers Almanac, 2014). Furthermore, the number of independent, mass producing brewers between 1947 and 2000 decreased from 421 to just 24 (Tremblay and

Tremblay, 2009). There are many contributing factors to this phenomenon of which will be discussed later in this paper, however it is important to know the end result, a very concentrated, cost efficient brewing industry producing similar lager beers. The characteristics of this new market created a gap in the market, which led to what will be referred to in later parts of this report as the "Craft Beer Boom".

Looking at the beer industry in the United States, within the last 60 years the competitive environment has gone through serious changes. In particular the industry concentration for beer producers has experienced a great transformation. The Oxford Companion to Beer indicates that between the period of 1950 and 2000, the four-firm producer-concentration ratio in the United States for beer had increased from 22 to 95. In layman's terms this means that in the year 2000, just four brewing companies controlled 95% of the domestic market for beer (Tremblay and Tremblay, 2009). There are many theories which attempt to explain this mass "shakeout" of the industry but one general consensus amongst industry experts points towards technological advancement which made a higher level of brewing automation and packaging efficiency possible, which made it possible for a few of the top macro breweries at the time to produce beer at a far superior scale compared to many of the smaller breweries (Swinnen, 2011). Additionally, because the domestic beer market at the time (1950-2000) was calling for lighter, pale lagers, the larger brewers were able to save significant costs on packaging. According to (Swinnen, 2011), "if setup costs are large, then firms producing many different beers, and packing them in many different types and sizes of container, might not gain much from adapting new technology". Through this large-scale production, the larger macro brewers were able to realize far greater economies of scale with their narrow in-house product differentiation than their smaller counter parts with more differentiated products.

As a byproduct of technological advances, which served the industry, the level of minimal efficiency of scale at which a mass producer of beer could be profitable at drastically changed. In the post-World War II era, the industry had significant room for more firms to participate in the market and still operate at the desired MES at the time. However, as technology improved, and the nature of the industry began to change, so did

the MES and just 10 years later there were too many mass-producing brewers on the market for all firms to be able to operate with profit (Tremblay and Tremblay, 2009). The table below is taken from The U.S. Brewing Industry: Data and Economic Analysis and displays the comparison between what is the minimum efficient scale for mass producing brewers for the given year (MES*), the market share needed to reach scale efficiency (SE*), the average production of a firm in the industry (Avg. Scale), the number of firms which can compete together while reaching MES* (n*), and finally the actual number of firms in the industry.

Table 1: Minimum Efficient Scale Development

Year	MES*[1]	SE*[2]	Avg. Scale	n*[3]	n
1950	0.1	0.1%	0.24	829	350
1960	1.0	1.1%	0.52	88	175
1970	8.0	6.4%	1.59	15	82
1980	16.0	9.1%	5.11	11	42
1990	16.0	8.5%	6.59	12	29
2000	18.0	9.9%	8.23	11	24

Source: Tremblay and Tremblay 2009

In 1950, there was plenty of room within the industry for firms to enter the market and still be able to compete with the existing firms on an efficient scale of production (assuming all other factors for market success were indeed cared for). In terms of number of firms there is a surplus capacity of 489 firms in the industry. However, every single decade following we saw the MES and n* move drastically in opposite directions which meant that there was no room for all of the existing firms to profitably operate or compete against other firms who had achieved this MES. This left brewers with four strategic

[1] Mes* is an estimate of minimum efficient scale in millions of barrels. SE* is an estimate of scale efficiency measured by MES* divided by total beer production.
[2] Avg Scale is total beer production in millions of barrels divided by number of mass producing brewers.
[3] n* is the optimal number of cost minimizing firms. n is the actual number of firms.

options: expand internally, merge with a competitor, find a profitable niche market, or exit the industry (Tremblay and Tremblay, 2009).

6.3 "The Beer Boom"

At the time when the United States brewing industry was experiencing its highest level of concentration in history in 1976, there were only two registered craft breweries in operation, Anchor Brewing Co and New Albion Brewing Company, both in southern California. (Hindy, 2014) The remaining 50 breweries were classified as regional, non-craft brewing companies who were mass producing their beers either for their regions or on the national level (Tremblay and Tremblay, 2009). As mentioned prior, the factor that differentiated both Anchor Brewing Co. and New Albion from the rest of the domestic brewing industry was the commitment to brew traditional styles of beers without the use of adjuncts. This strategy proved successful when in the first ten years of operation (1965-1975), Anchor Brewing was able to increase production from just 1,000 barrels to 7,500 barrels annually (Tremblay and Tremblay, 2009). The next 10 years for Anchor were even more astonishing as by 1980 annual production grew to 20,000 barrels and then increased another 40% to 28,000 barrels by 1982 (Tremblay and Tremblay, 2009). The demand for quality, tasteful, and full bodied beers was clearly established in the United States by the 1980's, or at least in southern California.

New legislation in the late 1970s also helped provide a foundation for this new market segment to take off, namely when President Jimmy Carter signed a bill which legalized home brewing in the United States (Mittelman, 2008). This bill let any person who is at least eighteen years of age brew up to 100 gallons of beer per year, which meant that for the first time Americans could legally begin to experiment with the possibilities of what beer could really taste like instead of rely on what at the time was mainly mass produced, light lagers. Support for this new opportunity in the beer community came quickly when in the same year, 1978, the Association of Brewers was founded by Charlie Papazian in order to represent the interests of both homebrewers and microbrewers in America (Mittelman, 2008).

One of the large aspects of the craft beer boom and the industry in general is the emergence of brewpubs. Brewpubs served as a great catalyst in the craft beer boom because they offered breweries the chance to diversify their brand from the beginning through an attached restaurant to the brewery. The joining of dining and brewing represented a change in post-prohibition alcohol consumption, which had always been illegal before (Mittelman, 2008). One such example is Dogfish Head Brewing Company, which is based out of Delaware. In the company's early days it began as a brewpub founded by a homebrewer who decided to share his beers with his community. The original brewery which opened in 1995 had a capacity of only 12 gallons (less than half of one barrel) and brewed beer for the restaurant it was attached to (Dogfish Brewing Co., 2014). Through creative advertising, great beer, and distribution efforts Dogfish head was able to take its 12-gallon local brewpub and expand to a regional craft brewery, which produced over 200,000 barrels (6,200,000 gallons) in 2013.

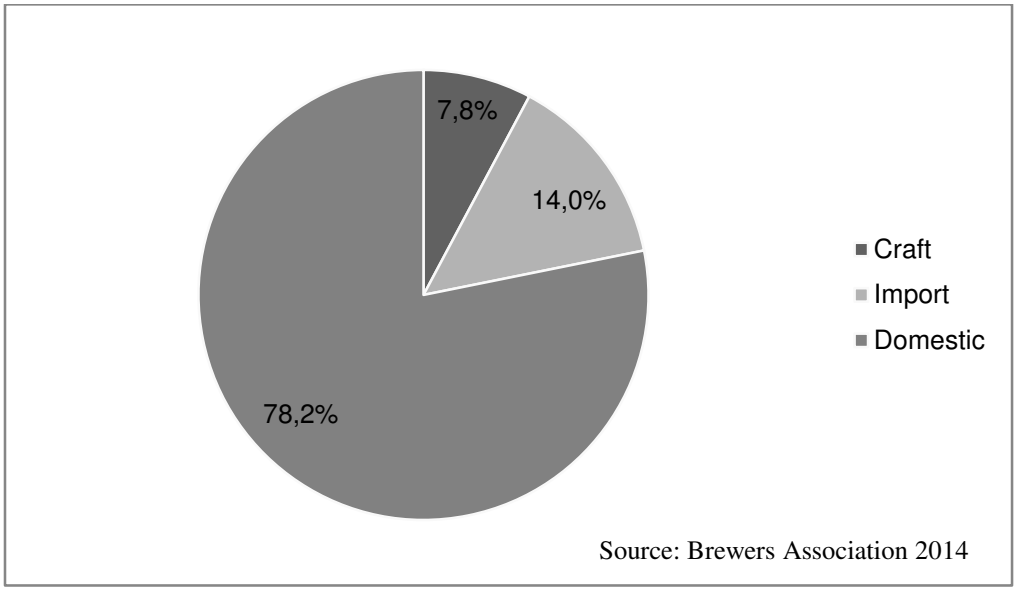
While the initial boom was slow in the beginning, the craft industry experienced tremendous economic success as an industry category as a whole, experiencing an average year-on-year growth rate of 25% for the time between 1976 and 2010 (Brewers Almanac, 2014). This growth rate can be attributed to many different factors, which will be discussed in more detail later in the report.

7 Current state of industry

7.1 Craft Market

Currently, at the time of this study the United States craft beer industry, as a whole is currently experiencing a very strong status amongst the domestic beer market. At a time when the overall shipments of beer decreased by nearly a whole two percent to 196,241,321 barrels from 2012 to 2013, the craft segment grew by an unprecedented 17.2% bringing its total shipments to 15,302,838 barrels for year ended 2013 (Brewers Association, 2014). To add to this, the import segment, which had traditionally been the second largest market share behind macro-brewers in the United States, also fell by almost 1% to 27,539,358 barrels. These factors combined brought the craft beer segment to gain 7.8% of the domestic sales volume in 2013, the highest it has experienced.

Figure 2: U.S. Beer Sales 2013



Source: Brewers Association 2014

In addition to the craft segment's market growth in terms of sales volume, it has consumed even more market share in terms of sales dollars. Due to a 20% growth in sales dollar market share, the craft segment accounted for 14.3% of the total beer sales dollars in the United States (Brewers Association, 2014).

In terms of the U.S. beer domestic production volumes, the craft segment again shows great positive momentum in comparison to the overall beer industry. In 2013, the overall U.S. beer market saw a 2% decline in overall production due in large part to market share lost by the macro brewers. At the same time, the craft beer segment increased its combined production volume by nearly an entire 18% to 15,585,364 barrels (Brewers Association, 2014).

In addition to the domestic proliferation of craft brewing, U.S. craft brewers are also experiencing tremendous growth in the exportation of their beer. In terms of sales volume, craft beer exports experienced 50% growth in 2013, which represented 282,526 barrels with estimated sales dollars of $73 million (Brewers Association, 2014).

Table 2: Craft Beer Exports

Market	Export Growth
Canada	93%
Brazil	12%
Western Europe	46%
Hong Kong	150%
Singapore	379%
Asia Pacific	74%
Source: Brewers Association 2014	

Canada is the largest importer
of American craft beer accounting for nearly 50% of its exports, with the next largest markets coming from Western Europe, and then followed by Australia and Japan. The Asia-Pacific region accounted for 44,228 barrels of exports, however within that region certain emerging markets are experiencing substantial growth in American craft beer imports, specifically Thailand (+99%), Hong Kong (+150%), and Singapore (+379%) (Brewers Association 2014).

7.1.1 Regional Breweries

The regional brewery segment of the craft beer industry is still growing at a strong, constant rate. In 2013, in terms of number of active firms in the category, regionals grew by 24.7%, which brings the number of operating firms as of 2013 to 119 (Brewers Almanac, 2014). Although the segment represents just 119 breweries or roughly 4.2% of the total craft brewery count in 2013, the product volume coming from regional breweries accounts for almost 79% of the total craft beer production for 2013. In fact, the production volume growth from 2012 to 2013 for regional craft breweries accounted for 74% of the total increase in craft beer produced between 2012 and 2013.

7.1.2 Micro Breweries

Microbreweries currently represent the largest part of the craft beer industry in terms of number of breweries with 1,412 active breweries as of 2013, which represents just over 50% of all craft breweries in operation. Since 1993, the microbrewery segment has averaged a growth rate of 11% in terms of volume of beer produced and 14% in terms of number of firms operating within the category. In fact in 2013 over there were over 300 microbrewery openings in the United States with just 20 closings, which gave the segment a firm growth rate of 26.3% from 2012 to 2013 (Brewers Association 2014). A report from the Brewers' Association suggests that this large rise in microbrewery proliferation in relation to other segments within the craft category could be due to "blurring of the category lines, with food trucks, restaurant partnerships, and other innovative business models bringing the microbrewery into territory once occupied solely by brewpubs" (Gatza and Watson 2014). In addition to closing, there were 22 breweries which exited the microbrewery segment who expanded pass the 15,000 barrel per year threshold to be considered a microbrewery and are now considered regional breweries by definition.

The volume of beer produced by these breweries grew in a similar fashion to the tune of 25.2% bringing their production level to a total of 2,408,757 barrels in 2013 from 1,922,550 in 2012 (Brewers Almanac, 2014)

7.1.3 Brewpubs

Up until recently in 2013, brewpubs were the most abundant type of craft brewer in the United States of America until they were passed up by microbreweries. At the conclusion of 2013, there were 1,243 brewpubs in operation according to the Brewers Association. On average, in terms of production volume the segment was producing 769 barrels annually per firm. This number brings the total production share of craft beer in the United States to just over 6% (Brewers Association 2014). Over the past twenty years brewpubs have maintained an average growth rate of just over 10% each year.

7.2 Macro Brewers

The U.S. non-craft segment, otherwise known as macrobrewers, is starting to experience losses in market share in the recent years for the first time in the modern day domestic beer market. The segment ended 2013 with just over a 78% market share of U.S. beer sales that amounts to a 1.5% drop in market share from 2012. In fact, the segment has lost nearly 130 million cases of production volume in the past six years alone (Schuhmacher, 2014). There is a lot of speculation as to the causes of why this decrease in market share is occurring but many sources believe the root causes lay with the consumer. With a new generation of legal drinkers emerging, their tastes are shifting from premium light beers to more diverse tastes, which are currently being met in part by the craft segment.

The largest share of the beer market belongs to ABinbev who lost over 2.7 million barrels in production volume during 2013, or what can be equivalent to a 2.7% decrease in output. Although still maintaining over 45% of the total U.S. market, the giant's market share also dropped be a whole half of a percent, a trend they are trying to mitigate with the purchase of smaller craft brewers to add to their brand portfolio (Statista, 2014) The firm bought Blue Point Brewery in Long Island during 2013 as a means to penetrate the craft demand further, the brewer also purchased Goose Island Brewing Company in Chicago the year before (Schuhmacher, 2014).

The second largest player in the U.S. beer market, is MillerCoors with a 27% market share as of 2013. The brewery, which is a join venture between SABMiller and MolsonCoors, dropped its production volume by nearly 3% on the year. However, their high end “craft-like” brand, Tenth and Blake saw over a 5% growth confirming the consumer shift towards craft brands (Schumacher, 2014).

Overall, the macrobrewers are still a massive force in the American brewing industry and will continue to be one for the foreseeable future. The giants are beginning to recognize the consumer shift towards craft beers and starting to mitigate this shift either by acquisition or in-house development.

8 Excise Taxes

8.1 History

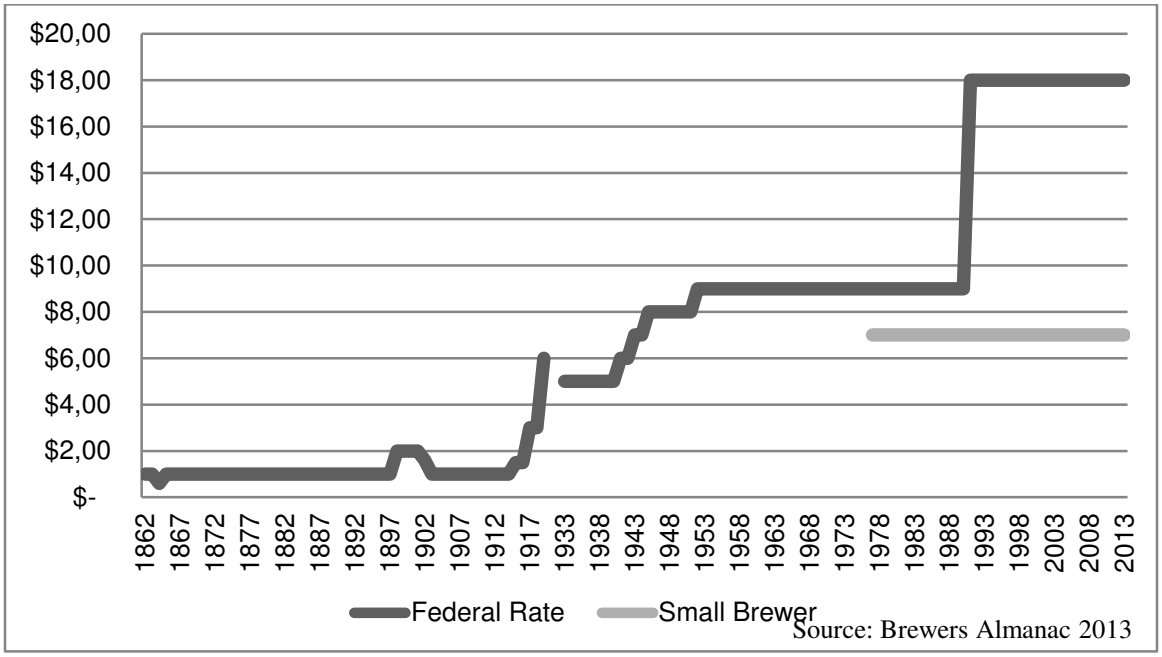
In the United States, excise taxes are typically classified as an indirect tax. This means that the tax on the good is applied to the merchant or producer instead of directly on the consumer. Currently, this is the taxation system that applies to all domestically produced alcoholic beverages in the United States, including beer. Theses excise taxes can also be applied in two different ways; Ad Valorem, and Specific (Investopedia, 2014).

- Ad Valorem: A fixed percentage which is charged on a specific good
- Specific: A fixed dollar amount which is calculated depending on the quantity purchased

The United States federal government applies its excise taxes on beer using the specific method. However, as shown in the following chart, individual states have the right to choose exactly how they wish to enforce the excise tax at the state level.

As mentioned above, in the United States producers of beer are taxed on their product not only from the federal government but also the respective state governments as well. Historically, the federal excise tax on beer steadily increased from $1 per barrel in 1902, to $9 per barrel in 1951.

Figure 3: Federal Beer Excise Tax History ($/bbl)



However, in 1991 the federal excise tax on beer doubled to $18 per barrel in the United States. This was a substantial increase considering that a brewer who was at the time producing 10,000 barrels annually would have a 100% tax increase from $90,000 to $180,000 per year in an industry with already seemingly low margins at lower levels of production. Taxation on the federal level as of 2014 is currently $18 for each barrel of beer produced. However, in the case of small brewers, this tax is substantially less. According to the US tax code, a small brewer is someone who produces beer domestically in the United States at a volume below 2 million 31-gallon barrels. If a brewer falls in the "small brewer" category, then the tax is significantly less for the first 60,000 barrels produced each year, only $7 per barrel. Once a small brewer expands production beyond 60,000 barrels, each additional barrel of beer produced will be taxed at the normal, $18 per barrel rate (Beer Institute, 2013).

Furthermore, certain states also give small brewers (defined the same as on the federal level) tax breaks.

Table 3: State Tax Exemptions for Small Brewers

State	$/gal	Small Brewer Exemption
Alaska	$1.07	$0.35 on first 1,860,000 gallons
Illinois	$0.231	75% tax credit for brewers with less than 4.9 million gallons
Iowa	$0.19	Tax rebate for small brewers who sell to Iowa retailers
Kentucky	$0.78	300,000 barrel tax credit of 50% for beer sold in state
Michigan	$0.20	$2.00 rebate on 50,000 barrels
Minnesota	$0.47	$4.60 credit on first 25,000 barrels for 100,000 barrel brewery
Montana	$0.14	Progressive tax up to 20,000 barrels, $1.30(5K), $2.30(10K) and $3.30(20K)
New Mexico	$0.41	Microbrewery tax of $0.08/gallon
New York	$0.14	$0.14 credit on first 500,000 gal, $0.045 credit on next 15 million gallons for producers under 60 million gallons.
Ohio	$0.18	Breweries with less than 1 million barrels, get credit following year for 300,000 barrels
Rhode Island	$0.11	Tax exempt for first 100,000 barrels
Washington	$0.26	$4.782 on first 60,000 barrels
Wisconsin	$0.06	50% tax credit for beer sold in state and under 300,000 barrels

Source: Brewers Almanac 2013

Looking at the tax credits, which certain states have decided to grant to smaller brewers, there are many different strategies used in many different sizes. Some of these states even use different measuring systems to apply their taxes, either gallons or barrels.

8.2 BEER Act vs. Small BREW Act

The issue of federal excise taxes on breweries continues to be a hot topic of discussion amongst the legislators in Washington D.C. Currently, there are two pieces of legislation circulating through congress with different agendas for the federal excise tax on beer. The Brewers Excise and Economic Relief (BEER) Act, which was introduced in 2013 from the Beer Institute; and the Small Brewer Reinvestment and Expanding Workforce (Small BREW) Act, which was introduced by the Brewers Association (Gribbens, 2013). The two acts have different agendas as a means to achieve a similar goal, reduce the federal excise tax rate for breweries. The two acts are structured according to the following table:

Table 4: Fair BEER Act vs. Small BREW Act

Annual Production	Fair BEER Act Rate [4][5]	Small BREW Act Rate
0 to 7,143 barrels	$0.00	$3.50
7,144 to 60,000 barrels	$3.50	$3.50
60,001 to 2,000,000 barrels	$16.00	$16.00
2,000,001 to 6,000,000 barrels	$18.00	$16.00
> 6,000,000 barrels	$18.00	$18.00

Source: Brewers Association 2015

Critics of the BEER Act proclaim that it will cost the government almost 86 million dollars more per year in lost tax revenue as opposed to the Small BREW Act. Additionally, the largest benefactors of the BEER Act are the larger, multinational brewing conglomarates such as SABMiller, ABInBev, Heinekin USA and Constellation brands, all of which export a large share of profits and therefore tax savings that are earned in the United States (Brewers Association, 2014). Additionally, according to the Brewer's Association, the current average effective tax rate for the two largest corporate brewers in the United States who make up nearly 80% of the domestic market share is just 21.5%. This is a small number when compared to the average effective tax rate the 3,200 small breweries are paying, an even 40% (Brewers Association, 2014).

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4 tax rates are expressed as dollars per gallon

5 all tax rates are incremental

On the other hand the critics of the SMALL Brew Act claim that all brewers both big and small would benefit *more* from the Fair BEER Act, saving almost $90 million more per year. One key difference between the two proposed legislations is that the Small BREW Act caps the production level for breweries who would qualify for tax breaks at 6,000,000 barrels, while under the Fair BEER Act, every single brewery in the United States is entitled to the incremental tax breaks on the first 2,000,000 barrels produced. Thus is seems that that battle between the two acts is a direct reflection of the friction within the industry between the large, macro brewers and the craft brewing industry. In either case, excise taxes are becoming a key factor to the increasingly dynamic American beer industry.

9 The Three-Tier System

9.1 Background

Within the US brewing industry, there are certain guidelines that brewers and sellers of beer must follow in order to legally operate within the borders. One of the most important of these legal guidelines is what is called "The Three Tier System". The system was originally put into place following the end of Prohibition as a part of the Federal Alcohol Administration Act in 1935. Although the amendment gave states rather than the federal government the final decision as to how and when to repeal the 18th amendment. In fact, some states decided to continue to enforce the prohibition laws such as Mississippi, which was the last state to repeal prohibition in 1966 (Ascher, 2012). However most of the states did repeal Prohibition in a timely manner and all generally use different versions of the same three-tier distribution system. The goal of the system was to make it impossible for a single entity to own all three tiers, which was thought to be part of the problem that led to the "out of control" consumption in the years leading to Prohibition. Initially, according to Research Firm McDermott, Will and Emery, in the 1930s brewers had the ability to both sell to retailers and hold wholesaler licenses. This gave them access to at least two of the three levels of the system and served as a very valuable function for them (Sorini, 2014).

The first tier of the system refers to the producers or manufacturers of the product in question; in the case of the craft brewing industry this would mean the breweries themselves.

The second tier of the system refers to beer distributors and wholesalers. The trade organization within the United States, which represents these organizations, is the National Beer Wholesalers Association or NBWA. According to the NBWA, there are currently around 3,300 beer wholesalers in operation as of year ended 2014 (NBWA, 2014). The self-described purpose of these companies is to "provide transportation, refrigerated storage and maintenance for beer, a perishable product, from the time it leaves a brewer or importer until it arrives at a retailer such as your neighborhood bar,

restaurant or convenience store. This means they are acting as the intermediary between the producers and consumers and there existence is required for almost all breweries within the United States to be able to sell their product to the end consumer (NBWA, 2014). Like the producers or brewers themselves, distributors also have restrictions on their activities within the industry and are forbidden to both produce any type of beer and also sell any beer directly to consumers (Ascher, 2012).

Finally, the third tier of the system refers to the retailers of the final product, beer.

The three-tier system of the distribution of alcohol has a great influence on how beer is not only marketed but also sold and taxed. The licensing and control laws and regulations of the state governments determine who can manufacture and sell beer, how they can sell, and to whom they can sell to (Ascher, 2012).

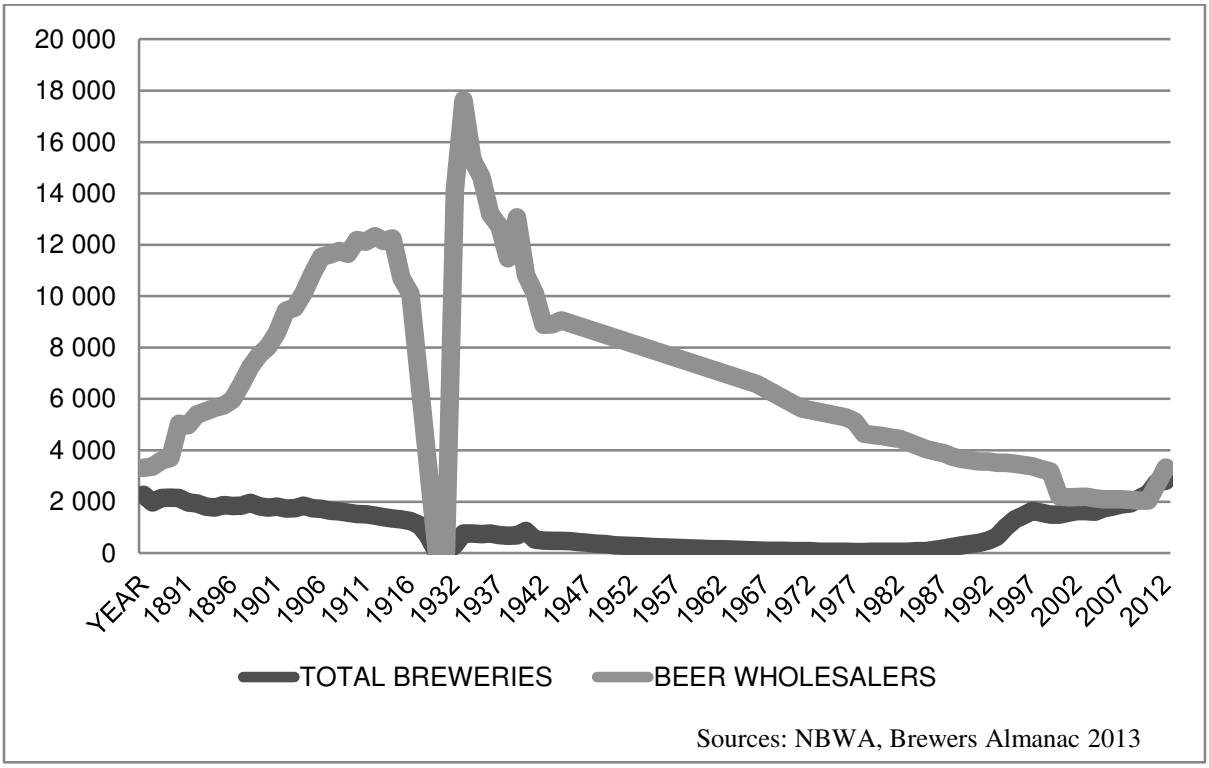
9.2 Beer Franchise Laws

As stated prior, in a large majority of cases in order for a brewer to sell its beer to an end consumer, it must first enter into a relationship with a wholesaler so that their beer can then be distributed to the retailer and in turn the final consumer. However, the legal regulation of these relationships between suppliers (brewers) and their distributors (wholesalers) did not become common amongst the states until 1971 when Massachusetts enacted section 25E in their state code concerning supplier-distributer relationships (Sorini, 2014). These laws are thought to severely limit the ability of beer suppliers to terminate their wholesalers. Since the first laws began to emerge large organizations such as the National Beer Wholesalers Association (NBWA) and the United States Brewers Association (USBA) began intensive lobbying for these laws at the national level (Sorini, 2014). Most of these laws were enacted between 1970 and the mid 1990s in all but a few jurisdictions in the nation. At the time when these laws were coming to surface, it made sense that wholesalers needed to have some sort of protection against the few, domestic brewers within the country. In fact, in 1976 there were only 49 breweries, only 2 of

which were classified as small craft brewers and 5,289 distributors (Brewers Almanac, 2014). The reasoning for the laws was actually quite logical, there were few large brewers and many smaller distributors. This meant that for many of the distributors, a large portion of their business was from the same brewer, so if that brewer were to decide to move to a different distributor then the effects on the original distributor would be devastating (Hinley, 2014).

However, overtime this imbalance between distributors and brewers has been changing with little change in the legislation. Since then, the massive gap between the number of breweries and number of beer wholesalers in the United States has significantly narrowed. In 1970, amongst the more than 6,000 beer wholesalers operating in the country, the shipments per firm averages about 20,000 barrels per year. This is in huge contrast to 2014, where the average shipments per wholesaler is about 150,000 barrels per year and some of the largest wholesalers can ship nearly 10 million barrels (Watson, 2014).

Figure 4: Historic Brewers vs. Wholesalers



The form of legislation there where this market power shift from brewers to distributors matters most is in the form of franchise laws. However, Bart Watson (2014) argues that just as the beer industry required legal intervention in the relationship between brewers and their wholesalers in the 1970s, today there needs to be another adjustment due to the dynamic activity within the industry. The only difference being that this time there needs to be a power shift away from the distributors and back to small brewers.

Within each state and including the District of Columbia, there are different rules and regulations which govern the relationships between brewers and wholesalers, these rules and regulations are referred to as "Beer Franchise Laws" (Brewers Association, 2014).

The following is a "typical" beer franchise law, which is meant to give a general idea of what most states follow.

1. Define franchise agreements to include informal, oral arrangements, making any shipment to a wholesaler the start of a franchise relationship.
2. Prohibit coercive brewer practices, most often including actions in which a brewer (a) requires the wholesaler to engage in illegal acts, (b) forces acceptance of unordered beer, or (c) withholds shipments in order to impose terms on the wholesaler.
3. Require "good cause" or "just cause" before a brewer can terminate a wholesaler.
    a. The burden is generally on the brewer to demonstrate cause for termination.

b. "Good cause" is usually defined to include a significant breach of a "reasonable" and "material" term in the parties' agreement.

4. Dictate that a brewer give prior written notice (60 or 90 days is common) to a wholesaler before termination is effective, with the notice detailing the alleged deficiencies that justify termination.

5. Grant wholesalers an opportunity to cure the deficiencies alleged in a termination notice, with termination ineffective if a wholesaler cures the defect(s) or presents a plan to cure the defect(s).

a. "Notice-and-cure" requirements usually are waived under certain circumstances. These most often include a wholesaler's (a) insolvency, (b) conviction or guilty plea to a serious crime, or (c) loss of a license to do business. Many franchise laws also permit expedited termination where a wholesaler (d) has acted fraudulently or (e) has defaulted on a payment under the agreement despite a written demand for payment.

6. Require wholesalers to provide brewers with notice of any proposed change in ownership of the wholesaler, giving the brewer an opportunity to object. The brewer's approval of an ownership change cannot be "unreasonably" withheld.

a. Brewers usually have little or no right to block a transfer to a previously designated family successor.

7. Create remedies for unfair termination, generally granting wholesalers the right to receive "reasonable compensation" following termination.

a. Most beer franchise laws grant wholesalers the right to seek an injunction that, if granted, would quickly halt termination

proceedings pending the resolution of wrongful termination claims. The forum for such relief can be either a state court or the state's alcohol control authorities.

b. Although arbitration of the entire dispute is not required, and sometimes prohibited, disputes over what constitutes "reasonable compensation" often must be arbitrated at the request of a party.

c. Even if the franchise law prohibits arbitration, an arbitration clause in the parties' written agreement is likely enforceable under the Federal Arbitration Act if the parties reside in different jurisdictions.

8. Declare any waiver of franchise law protections void and unenforceable.
9. Set a date that the law becomes effective. Some franchise agreements may predate franchise acts' effective dates, likely making the franchise law inapplicable to that agreement.

As is visible above, the typical franchise law places a binding contract between a brewer and distributor, which may only be broken in certain circumstances. The discussion on whether or not these laws are ultimately beneficial or harmful to the craft brewing industry is currently under debate. Steve Hindy argues that the presence of franchise laws "not only prevent other companies from distributing a company's beers, but also give the distributor virtual carte blanche to decide how the beer is sold and placed in stores and bars — in essence, the distributor owns the brand inside that state." (Hindy, 2013). This can cause trouble for the access to different markets if a craft brewer experiences stagnation or declination of the acceptance of its brand. For example, the manager for one Missouri ABinbev distributor claimed that when a new craft brand is taken on by the distributor, they generally see a large spike in sales for that brand. However, as time goes by the sales trend for that craft brand will generally taper off which in turn can leave a craft brewer with beer sitting in a warehouse with nowhere to go and the inability to change distributors (O'Malley, 2015).

9.2.1 Beer Franchise Law Exceptions

Despite the widespread acceptance of beer franchise laws concerning brewers and their relationships to suppliers there are some states which either decided not to apply any sort of franchise laws or gave special privileges to those brewers who are considered "small" according to the state's own definition.

Table 5: States with no Franchise Laws

Alaska
District of Columbia
Hawaii
Source: Brewers Association 2014

Table 6: States with Franchise Laws Benefitting Small Brewers

Arkansas	Brewers who produce less than 30,000 barrels per year are exempt from franchise laws
Colorado	Brewers who produce less than 300,000 gallons per year are exempt from exclusive contracts
Illinois	Small brewers who's annual volume of products supplied represents less than 10% of wholesaler business may terminate upon "reasonable payment"
Nevada	Brewers selling less than 2,500 gallons per year within the state are exempt from requirement to terminate "with good cause"
New York	Small brewers with less than 300,000 barrels per year or less than 3% of wholesaler business may terminate without "good cause" assuming "reasonable payment"
North Carolina	Small brewers with less than 25,000 barrels per year may terminate without "good cause" assuming "reasonable payment"
Oklahoma	Small brewers with less than 300,000 gallons per year are exempt from franchise laws
Rhode Island	Local Rhode Island brewers are completely exempt from franchise laws*

Utah	Small brewers with less than 6,000 barrels per year are exempt from franchise laws
Washington	Small brewers with less than 200,000 barrels per year are exempt from franchise laws

Source: Brewers Association 2014[6]

These legal exceptions for small brewers are thought to be pertinent to the success of these small brewers. Steven Hindy remarks that "For small brewers, the flexibility to change distributors or distribute their own products is essential to gain access to markets, increase consumer choice, grow and pour money back into the economy. The success or failure of a beer should depend on whether consumers like it — not on whether archaic distribution laws prevent them from finding it in the first place" (Hindy, 2013). There are also states like Indiana which is currently attempting to get similar legislation passed in the interest of aiding its growing craft beer segment.

9.3 Self-Distribution

Distribution is one of the most important factors both a new and existing craft brewer should be considering. It is important to note that the second tier of the system, wholesalers, often do very little promotion and advertising for the beers in their portfolio with the exception of the top two or three brands (McCormick, 2013). In the states where it is allowed, self distribution is often the best option for small brewers to establish their brand in the local surroundings before handing it over to a distributor for larger access to markets (McCormick, 2013).

Under the typical three-tier system law, under no circumstances should a supplier of beer and a wholesaler of beer assume the same ownership, nor should the supplier sell directly to retailers. This means that every bottle of beer produced must go from the brewer to the

[6] Some states' information was updated via state-specific online statutes

wholesaler and then the wholesaler then sells the product to retailers. For larger breweries, this often does not present any problem as in order to reach consumers on a national level the use of distributors is necessary. However, in the cases of smaller brewers, this is not always the case. Some small brewers have the ability to efficiently and economically distribute their beer in their own markets, often most of which are local (Sorini, 2014). This also allows them to move their brands around so as not to have them trapped at a distributor with no hope of exiting the contract of said distributor thus sabotaging efficient operation for the brewer. *McDermott, Will and Emery* claims that there are far too many craft brands and not enough distributors to realistically expect the current three-tier system to properly represent every new product, which enters the market. Marc Sorini argues that the presence of self-distribution aids in the process of new brewers entering the market and slowly bringing their brands into acceptance. This allows the brands to grow at least to a level when letting a distributor handle the brands would then be acceptable. He argues that "success or failure should depend on consumer acceptance, not on artificial barriers to entry" (Sorini, 2014). In the states where it is legal, craft brewers typically choose to leave self distribution because of increased demand or growth however Sorini argues that brewers should not be forced into the hard interpretation of the three tier system.

However, although it may seem logical and fair to promote these self distribution rights to brewers, distributors across the country perceive a threat from the large brewers and thus aim to limit to ability for brewers to self distribute (Papazian, 2011). In the eyes of the distributors, if too much distribution power is granted to brewers then (mainly the mass producing brewers) will take away their business and shrink the distribution industry. It is for this reason that there is a strong opposition on the topic of self-distribution rights between the wholesalers and distributors and the brewers themselves. Both sides are actively pursuing beneficial legislation for their own interests although as shown on the table below, the small brewers have successfully secured the right to self distribute at least in some capacity in 38 states.

Amongst the United States, each state has taken its own stance on the matter of self-distribution. While some states allow it, others have taken stances against it or are resistant to new legislation allowing it.

Table 7: Self-Distribution Rights

States Allowing Self Distribution Rights		
Alaska	Arizona	Arkansas
California	Colorado	Connecticut
District of Columbia	Hawaii	Idaho
Illinois	Indiana	Iowa
Maine	Maryland	Massachusetts
Michigan	Minnesota	Montana
New Hampshire	New Jersey	New Mexico
New York	North Carolina	North Dakota
Ohio	Oklahoma	Oregon
Pennsylvania	Rhode Island	Tennessee
Texas	Utah	Vermont
Virginia	Washington	West Virginia
Wisconsin	Wyoming	

Source: Brewers Association 2014

States without self-distribution rights (13)		
Alabama	Delaware	Florida
Georgia	Kansas	Kentucky
Louisiana	Mississippi	Missouri
Nebraska	Nevada	South Carolina
South Dakota		

Source: Brewers Association 2014

It should however be noted that although most states currently have legislation which grants the right to small brewers to distribute their own beer to retailers, in many cases that brewer must have a manufacturing license in the state they want to distribute in (Watson, 2014).

10 Additional Variables

10.1 Population Density

A large majority of craft brewers, almost 90% produce less than 7,000 barrels of beer per year (Beer Institute 2014). This means that a majority of their business volume is conducted at a relatively local level. Thus, we can assume that the population density of a given area can give clue to the amount of craft breweries in that area. According to density dependence theory, the founding rate of firms in a given area is directly proportional to the population density in that area (Peli and Kamps 1995).

In fact researchers have found that there is "a developing trend in the industry [which] shows that the presence craft breweries seem to correspond with higher population densities" (Patterson and Pullen 2014). This study was based off of data collected in the early 2000s and an updated version goes on to state that craft breweries are not only appearing in densely population areas, but are becoming increasingly abundant in suburban and even rural areas. As of 2011, around half of all existing craft breweries in the United States were located within 51 miles of communities with populations of 315,000 inhabitants or greater (Patterson and Pullen 2014). This could indicate a trend to suggest that although craft breweries early success may have been correlated with higher population densities, perhaps there are some other factors in play as the industry expands to more rural areas.

10.2 Beer Consumption per Capita

In the United States of America, the level of beer consumption per capita has been somewhat stagnated for the last 20 years. The average amount in the United States dropped to 27.6 gallons per capita in 2013 from a previous level of 28.3 gallons per capita in 2012 (Hess and Frohlich 2014). What this number does not tell you is the wide range of average consumption levels amongst all of the states. For examples, in North Dakota the level of consumption in 2013 was just over 43 gallons per capita with only 6 breweries operating in the state. This was the highest consumption in the whole country in 2013 with one of the lowest number of breweries in the state. Following the same inverse trend, the state with the lowest consumption level was

Utah with just 19.6 gallons per capita in 2013. What's more interesting is that Utah had 16 operating breweries in the state at the time, almost three times that of North Dakota but on average its inhabitants consumed less than half the amount of beer each year.

Logical reasoning would tell us that the level of beer consumption is related to the demand for beer which would in turn then lead to a need for an increase in the number of breweries in the state. However, according to data from *USA Today*, this might actually be the opposite case within the United States. It is also important to examine the types of beers being consumed and which type of consumer exactly is consuming them. However for the purpose of this study only the consumption per capita will be examined in its relation with the number and growth of craft breweries in the United States of America.

11 Empirical Analysis

11.1 Ordinary Least Squares Model

The empirical analysis of this study is based on multiple, two equation least squares regression models to look at both the national and region-specific effects of the exogenous variables. The ordinary least squares method (referred to as OLS) is used as a way to determine economic relationships amongst different groups of data (Pedace 2013). According to the classic linear regression model, there are certain assumptions, which must be met in order to assure that the model is in fact reliable. The assumptions according to Roberto Pedace (2013) are as follows:

- The model is linear in parameters and has an additive error term
- The values for the independent variables are derived from a random sample of the population and contain variability
- No independent variable is a perfect linear function of any other independent variable (no collinearity)
- The model is correctly specified and the error term has a zero conditional mean
- There error term has a constant variance (no heteroskedasticity)
- The values of the error term aren't correlated with each other (no autocorrelation or serial correlation)

In total there are 5 models that were will be tested. The first model attempts to explain the relationships amongst all the variables at the national level. Models 2 though 4 will run very similar models but with different smaller, sub-datasets. The last 4 models which were run are specific to each region of the United States of America which was defined in previous chapters. However, all models will look very similar in structure and will use the same variables and data sources as each other.

11.2 Definitions of Variables, Coefficients and Residual

Endogenous Variables

- y_1 = Breweries per Capita
- y_2 = Breweries per Capita Growth

Exogenous Variables

- x_1 = Franchise Laws
- x_2 = Self Distribution Rights
- x_3 = State Excise Tax Breaks
- x_4= Population Density
- x_5= State Tax Rate per Gallon
- x_6= Beer Consumption per Capita

Residual

- u_1= Error or Residual

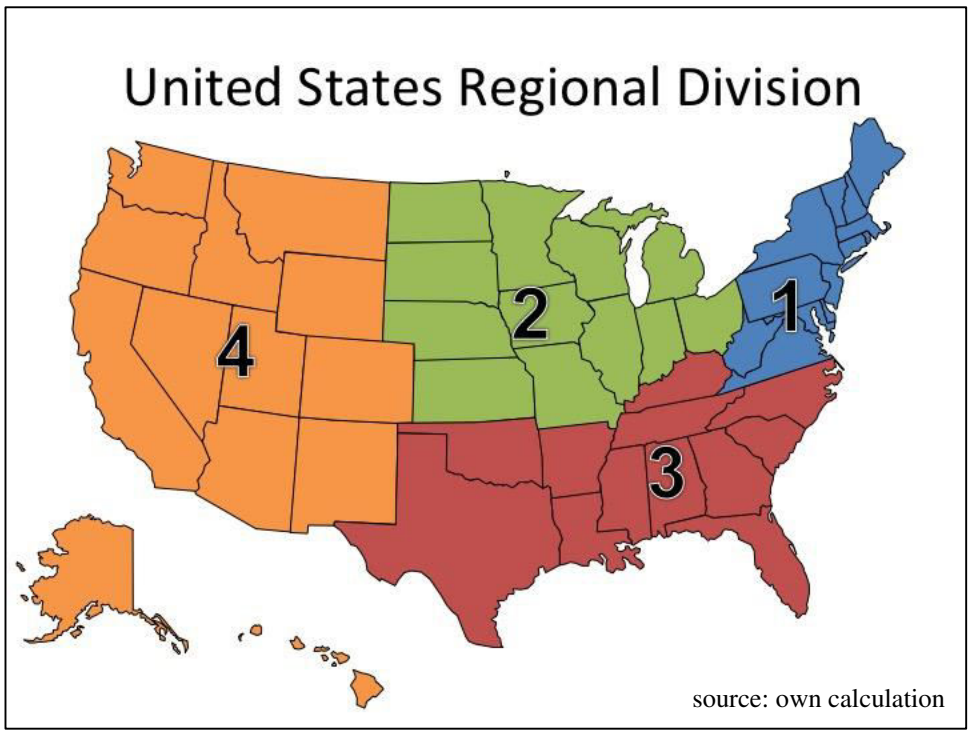
11.3 Data Description

The main dataset, which is used for this thesis, is as state before, from multiple sources. For each state in addition to the District of Columbia, multiple measurements were considered. Each of the laws being tested (franchise laws, self-distribution rights, and excise tax breaks for small brewers) were recorded as nominal variables and thus were given values of either a 0, for no benefit for small brewers, or a 1, meaning there is a beneficial policy in place for that state. Additionally, a measure of population density was added for each state in terms of inhabitants per square mile of land area, which was obtained from the US Census Bureau. Two more additional variables which will be regressed are the state excise tax rate per gallon and the beer consumption per capita (in gallons). It should be noted that in the case of beer consumption per capita, the most recent available data came from 2011 and so the data is technically lagged one year behind all other variables. In addition to these data, the data set also includes information on the number of breweries per 100,000 inhabitants in each state, which was obtained from the Beer Institute and is used as one of the dependent variables in this thesis. The second dependent variable being tested in this study is “craft brewery growth per capita”. This variable is calculated for

each state as the amount of craft breweries per capita in 2013 subtracted from the amount of craft breweries per capita in 2012.

For the purposes of testing "Thesis II", each individual state is assigned a region according to the divisions used by the US Census Bureau, which are recognized as Northeast, Midwest, South, and West with corresponding values of 1, 2, 3, and 4. It should be noted that certain states were moved around to create regions with a consistent number of observations in order to create consistency amongst significance testing. For each individual region, the effects of the same exogenous variables were tested using a multiple linear regression model with the same exogenous variables form the national regression model. The detailed list of regions can be found in the attached appendix.

Figure 5: United States Regions



Following the initial build of the final dataset, the decision was made to remove one observation, Washington D.C. from the entire dataset. This was done because of significant outliers contained in the variables which corresponded to Washington D.C. The removal of the Washington D.C. from the study also gave further consistency

throughout the data as technically speaking Washington D.C. is not actually one of the states which make up the "50 States of America", but is rather considered as a district and the nation's capital.

11.4 Descriptive Statistics

There are in fact two subjects of this research and thus there will be two dependent variables being tested on a few different levels. The first dependent variable (y1) is the amount of breweries per 100,000 inhabitants, or for the purpose of this paper, breweries per capita. The second dependent variable (y2) is the increase in breweries per capita from the year ended 2012 to year ended 2013. Both of these subjects will be examined at the state level for each of the fifty states excluding the District of Columbia.

Table 8: Variables Entering the Research

Variable	Frequency	Description
Breweries per Capita	Annual	One of two dependent variables being predicted. The use of breweries per capita is used as opposed to total breweries per state due to the vast range in state populations. Calculated as breweries per 100,000 inhabitants of the state.
Breweries per Capita Growth	Annual	Breweries per Capita Growth is a simple measure of the change in the first variable, y1, from 2012 to 2013.
Franchise Laws	Annual	This binary or nominal variable simply represents whether or not the given state has franchise laws, which benefit small brewers. A value of "0" indicates that no such law is present, and a value of "1" indicates the presence of beneficial legislation.
Self-Distribution Rights	Annual	This binary or nominal variable represents whether or not a given state has granted the right to self-distribute to small brewers at any level. A value of "0" indicates no presence of the right, and a value of "1" indicates the right is present.
State Excise Tax	Annual	This binary or nominal variable represents

Breaks		whether or not a given state has granted excise tax breaks at any level to small brewers. A value of "0" indicates no special tax breaks are present, and a value of "1" indicates there are tax breaks present.
Population Density	Annual	Population density is a measure of the number of the average number of inhabitants per square mile of land for each state.
State Excise Tax Rate	Annual	The state excise tax rate is expressed in dollars per gallon for each state.
Consumption/Capita	Annual	Consumption per capita data is expressed in gallons per person per year and is based off of the total population of each state.
		Source: Own Calculations

Within this study there two levels in which the effects will be tested; at the national level, and then again also at the state level. The regions being tested will be made up by a similar amount of states and were determined according the geographic regions of the United States of America. As mentioned prior, the regions are defined as the Northeast, South, Midwest, and West.

The tables which will follow include a range of descriptive statistics which will help us better understand the variables which are being regressed and tested at both the national level and also the regional level.

Table 9: National Data Summary

		Mean	Standard Deviation	Min	Max
Breweries/Capita	y1	1.702839	1.573075	.189958	6.267628
Breweries/Capita Growth	y2	.2197474	.2584216	-0.0964031	1.2466
Franchise Laws	x1	.26	.4430875	0	1
Self Distribution	x2	.26	.4430875	0	1
Excise Tax Breaks	x3	.74	.4430875	0	1
Population Density	x4	196.276	265.142	1.3	1210.1
State Tax Rate/gal	x5	.3506	.295873	0.02	1.17

Consumption/Capita	x6	21.65355	3.868537	12.2557	31.8936

Source: Stata Output

When looking at the United States of America as a whole, we can see that in the variables which are describing the presence of beneficial legislation for small brewers, in both franchise laws and self distribution rights, approximately 26% of the state have such legislation. Coincidentally, the amount of states, which practice state excise tax breaks for small brewers is the exact complement at 74%. The standard deviation for these variables is perfectly identical because of the binary nature they have. The mean for Breweries per Capita Growth is approximately 12.3% of the mean for Breweries per Capita. Which means that on average, each state increased their breweries per capita by about 12.3%. Population density has a very high standard deviation in relation to its mean meaning that the value of any given valuation most likely differs significantly from the mean of the data and shows the large range of the data. The same conclusion can be drawn from the craft breweries per capita growth variable.

Table 10: Region 1, Northeast Data Summary

		Mean	Standard Deviation	Min	Max
Breweries/Capita	y1	1.738661	1.722581	.4002387	6.18412
Breweries/Capita Growth	y2	.2303435	.2766934	0	.9897903
Franchise Laws	x1	0.1538462	.3755338	0	1
Self Distribution	x2	0.9230769	.2773501	0	1
Excise Tax Breaks	x3	0.1538462	.3755338	0	1
Population Density	x4	473.9538	387.1332	43.1	1210.1
State Tax Rate/gal	x5	0.2569231	.1866541	.08	.76
Consumption/Capita	x6	21.2704	4.774968	15.85553	31.8936

Source: Stata Output

The data shows that the Northeastern region has the lowest number of states that contain franchise laws, which benefit small brewers and contains a mean of about

0.154. The region also shares the highest mean for participation in self-distribution rights for small brewers amongst the other regions. The average population density in this region is also extremely high when compared to the other regions. The next highest population density comes from the Southern Region but even still its average is not even half that of the Northeast Region.

Table 11: Region 2, Midwest Data Summary

		Mean	Standard Deviation	Min	Max
Breweries/Capita	y1	1.412531	.4150877	.8955517	2.163255
Breweries/Capita Growth	y2	.207353	.130554	.0492279	.5071448
Franchise Laws	x1	.16667	.3892495	0	1
Self Distribution	x2	.66667	.492366	0	1
Excise Tax Breaks	x3	.5	.522233	0	1
Population Density	x4	106.0167	91.52626	10.5	283.2
State Tax Rate/gal	x5	.2291667	.1647289	.06	.62
Consumption/Capita	x6	22.94138	3.651594	18.32918	30.60948

Source: Stata Output

The Midwestern states have the highest occurrence of state excise tax breaks for small brewers with 50% of the states using them. This mean is higher by about .2 compared to the next highest, the Western states (Region 4). Additionally, it has the lowest mean state excise tax rate per gallon at about $0.23 for each gallon of beer produced. We can interpret based off of descriptive statistics that this region has the most liberal tax policies when considering the craft brewers operating within it.

Table 12: Region 3, Southern Data Summary

		Mean	Standard Deviation	Min	Max
Breweries/Capita	y1	.5386357	.2766384	.189958	1.291134
Breweries/Capita Growth	y2	.1023844	.0649146	.0313813	.2837657
Franchise Laws	x1	.25	.452267	0	1
Self Distribution	x2	.416667	.5149287	0	1
Excise Tax Breaks	x3	.083333	.2886751	0	1
Population Density	x4	129.075	93.24174	11.3	364.6
State Tax Rate/gal	x5	.601667	.3349582	.2	1.17
Consumption/Capita	x6	20.96367	2.552479	17.15687	24.23967

Source: Stata Output

Within the Southern Region, the data concerning the chosen factors on the craft brewing industry can lead to assumptions that would argue against the proliferation of the industry. For example, the mean excise tax rate per gallon within the region is the highest amongst all of the regions and a full $0.25 higher than the national mean at just over $0.60 per gallon. The region also has the lowest mean beer consumption per capita, breweries per capita, brewery growth per capita, and population density. This data would support the assumption that the exogenous variables do in fact play a significant role in explaining the variance observed in our endogenous variables.

Table 13: Region 4, Western Data Summary

		Mean	Standard Deviation	Min	Max
Breweries/Capita	y1	3.009643	1.902107	.7712248	6.267628
Breweries/Capita Growth	y2	.3289274	.3868889	-.0964031	1.2466
Franchise Laws	x1	.4615385	.5188745	0	1
Self Distribution	x2	.9230769	.2773501	0	1
Excise Tax Breaks	x3	.3076923	.4803845	0	1
Population Density	x4	63.94615	79.84522	1.3	246.1
State Tax Rate/gal	x5	.3246154	.3267929	.02	1.07
Consumption/Capita	x6	22.53421	3.334958	18.00851	29.80366

Source: Stata Output

The Western Region seems to be the most active region in the craft brewing industry as far as we can tell from examining the descriptive statistics. The region contains the highest means for the endogenous variables, breweries per capita and breweries per capita growth. It also has the highest concentration of states that have some sort of self-distribution rights set up for the small brewers in that region. Interestingly, it contains both the minimum value for breweries per capita growth and also the maximum value. This can tell us how unique the craft brewing situation may be on a state-to-state basis, even within one region. The region also contains the lowest state excise tax rate in the nation and almost the highest rate as well following a similar trend as the brewery per capita growth, differentiation within the region.

11.5 Econometric Model

As previously determined, the econometric model will be made of two equations, one which will attempt to explain breweries per capita, and one which will attempt to explain the growth in breweries per capita from 2012-2013. Additionally, an identical model structures are used at the national level as well as each individual regional model. So the following model form will remain constant. The regression equations are as follows:

$$y_1 = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \mu$$

$$y_2 = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \mu$$

11.6 Multicollinearity

One of the ways in which we test the accuracy of the model is to identify and multicollinearity between variables. The term multicollinearity refers to the problem which arises when two or more of your independent variables have a linear relationship with one-another (Pedace 2013). This test is carried out in the form of making a correlation matrix. When interpreting the correlation matrix, we look at the correlation coefficients which were found for each pair of variables. As a general rule of thumb, any value which is greater than 0.8 signifies significant correlation between the two variables and may cause problems in the reliability of the model.

Table 14: National Level Correlation Matrix

	y1	y2	x1	x2	x3	x4	x5	x6
y1	1							
y2	0.7587	1						
x1	0.0104	-0.0576	1					
x2	0.3299	0.2337	0.2474	1				
x3	0.1483	-0.0094	0.1684	0.2474	1			
x4	-0.2972	-0.2550	0.0087	0.1594	-0.0098	1		
x5	-0.2564	-0.3465	0.0206	-0.3204	-0.0635	-0.1800	1	
x6	0.3145	0.2661	-0.3028	-0.1620	-0.0445	-0.3832	-0.0943	1

Source: Stata Output

At the national level, there is no significant multicollinearity between the variables within the model. Although technically acceptable according the definition of multicollinearity, there is a somewhat strong collinearity between the two endogenous variables. However, because they are not being tested against one another, is it not a serious concern for this study.

Within the Northeastern states' model (model 2), there is perfect collinearity between excise tax breaks and franchise laws. For this reason, the variable "state excise tax breaks" was therefor omitted from the problem. Like the national model, there is also strong collinearity between the two endogenous variables but it is not concerning as they are both endogenous variables and maintains a correlation coefficient below 0.8. Table can be found in the appendix.

The second region, the Southern states (model 3), has no significant signs of multicollinearity between any of its variables. The correlation matrix can be found in the appendix of this study.

The Midwestern states (model 4, region 3), has no significant signs of multicollinearity amongst its variables with the exception for the two endogenous variables. As previously stated, this is not a concern for the integrity of the study. The variables "breweries per capita" and "self distribution rights" also had stronger correlation between them, however because the value (0.6188) is below 0.8 it is not a large concern for this study. The correlation matrix can be found in the appendix.

Finally, the Western states (model 5, region 4), like the Midwest only had significant correlation between the two endogenous variables. For previously mentioned regions this did not cause a large concern for our study and there was no need to omit any variable. The correlation matrix may be found in the appendix.

11.7 Parameter Estimation Using OLS in Stata

In order to estimate the parameters of the equations, a two-equation ordinary least squares regression was run using the Stata software. As mentioned before one observation, Washington D.C. was removed from all of the models due to its significant outliers which would in turn skew the data. The two endogenous variables are Breweries per Capita and Brewery per Capita Growth. The exogenous variables which are attempting to explain them are franchise laws, self-distribution rights, state excise tax breaks, population density, state excise tax rate per gallon, and beer consumption per capita.

The formula for parameter estimation using the OLS method presented in matrix form is as follows:

$$(Y) = (XTX)\text{-}1 * XTy$$

After running the national-level model, the following parameters were realized:

Table 15: National Level Parameter Estimation

	Coefficient	**Std. Error**	**t-ratio**	**p-value**	
y1					
Constant	-.7457874	1.566169	-0.48	0.636	
x1	-.0213024	.483503	-0.04	0.965	
x2	1.239462	.4977014	2.49	0.017	**
x3	.2122397	.4602127	0.46	0.647	
x4	-.0017229	.0008327	-2.07	0.045	**
x5	-.9367035	.7203969	-1.30	0.200	
x6	.0992148	.0592425	1.67	0.101	*
y2					
Constant	.0837541	.2665486	0.31	0.755	
x1	-.0301934	.0822881	-0.37	0.715	
x2	.139784	.0847045	1.65	0.106	*
x3	-.0447548	.0783243	-0.57	0.571	
x4	-.0002886	.0001417	-2.04	0.048	**
x5	-.2775232	.1226054	-2.26	0.029	**
x6	.009513	.0100826	0.94	0.351	

Source: Stata Output

Interpretation of the Results

Through the output realized from Stata, we can now build the regression model using the coefficient values provided to us for each model.

Model 1 (National Level)

$y_1 = -.7457874 + -.0213024x_1 + 1.239462x_2 + .2122397x_3 + -.0017229x_4 + -.9367035x_5 + .0992148x_6 + \mu$

$y_2 = .0837541 + -.0301934x_1 + .139784x_2 + -.0447548x_3 + -.0002886x_4 + -.2775232x_5 + .009513x_6 + \mu$

Model 2 (Northeastern States)

$y_1 = -1.589956 + -.1787921x_1 + 1.218306x_2 + -.0014945x_4 + -2.389756x_5 + .1670788x_6 + \mu$

$y_2 = .1787216 + .1378722x_1 + .1080797x_2 + -.0003993x_4 + -.1349912x_5 + .0072682x_6 + \mu$

Model 3 (Midwestern States)

$y_1 = 1.291545 + .0176334x_1 + .0086523x_2 + .4230387x_3 + -.0027548x_4 + -.1779328x_5 + .0101821x_6 + \mu$

$y_2 = -.5607289 + .0608109x_1 + .0146841x_2 + -.0429182x_3 + .0001912x_4 + .1896178x_5 + .0307695x_6 + \mu$

Model 4 (Southern States)

$y_1 = -1.724488 + .4609961x_1 + .3856597x_2 + .7002613x_3 + .0021387x_4 + .4414653x_5 + .0661697x_6 + \mu$

$y_2 = -.3317373 + .1515635x_1 + .0291455x_2 + .0593511x_3 + .0003228x_4 + .0894193x_5 + .0135317x_6 + \mu$

Model 5 (Western States)

$y_1 = 2.355534 + .4977247x_1 + 2.119955x_2 + 1.052379x_3 + -.0088874x_4 + -2.254424x_5 + -.024681x_6 + \mu$

$y_2 = .5691617 + .0916131x_1 + .3186885x_2 + .0458423x_3 + -.0007328x_4 + -.8069671x_5 + -.0125135x_6 + \mu$

In order to interpret the exact effects which the exogenous variables individually have on the endogenous variables, we need to assume ceteris paribus, or that all other parameters are assumed to be zero with the exception of the one being interpreted. The table below explains parameters effects for all models. The table suggests that for every 1% increase in a given exogenous variable, it will have the following effect (in %) on the endogenous variable. A percentage, which is formatted in green indicates and increase in the endogenous variable, and a percentage formatted in red indicates a decrease in the dependent variable. For example, when interpreting the effects of self-distribution laws at the national level we can say, "For every 1% increase in the presence of self-distribution rights, there will be a 1.24% increase in breweries per capita, and a 0.14% increase in brewery per capita growth." The column labeled constant assumes that all exogenous variables would be zero. The variables y1 and y2 refer to the endogenous variables "breweries per capita" and "brewery per capita growth", respectively. However, this is logically problematic because of the assumption that if the breweries per capita in the country were zero, and nobody is consuming beer then there would almost certainly be no possibility of any breweries existing. In Model 2, concerning the Northeastern states, the variable "state excise tax breaks" was omitted due to perfect collinearity with franchise laws.

Table 16: Master Parameter Matrix

	National		Northeastern		Midwestern		Southern		Western	
	y1	y2	y1	y2	y1	y2	y1	y2	y1	y2
Constant	0.75	0.08	1.59	0.18	1.29	0.56	1.72	0.33	2.36	0.57
Franchise Laws	0.02	0.03	0.18	0.14	0.02	0.06	0.46	0.15	0.50	0.09
Self-Distribution Rights	1.24	0.14	1.22	0.11	0.009	0.01	0.39	0.03	2.12	0.32
State Excise Tax Breaks	0.21	0.04	(-)	(-)	0.42	0.04	0.70	0.06	1.05	0.05
Population Density	0.002	0.000	0.001	0.000	0.003	0.000	0.002	0.000	0.001	0.001
State Tax Rate per Gallon	0.94	0.28	2.39	0.13	0.18	0.19	0.44	0.09	2.25	0.81
Consumption per Capita	0.10	0.01	0.17	0.007	0.01	0.03	0.07	0.01	0.02	0.01

Source: Stata Output

From examining the parameters which were estimated, its appears that only one explanatory variable had the same effect on both endogenous variables throughout all of the models, the variable "self distribution rights". All other variables varied in their effects depending on which region or which level it was being regressed on. Additionally, "population density" seems to have a very minimal effect on both endogenous variables across all five of the models.

11.8 Statistical Verification

11.8.1 Goodness of fit and F-Statistic

In order to determine how well the regression models fit the data, we need to measure the "goodness of fit". To do this we will use the coefficient of determination or more commonly referred to as R-squared. The value of R-squared tells us what proportion of the variation in the endogenous variable is explained by the variations in the exogenous variables. This is always expressed as a ratio and thus must retain a value between 0 and 1, with 1 being perfectly explained variances (Pedace 2013). Because we have 5 different two-equation models, there are 10 coefficients of determination in which we must evaluate.

The R-squared method of testing the goodness of fit of a model does tell you how well the data explains the variation however it does not tell you whether or not the variation explained within the model is statistically significant. Even if a model contains a very low R-squared value, it may explain a significant amount of variation in your endogenous variables (Pedace 2013). Likewise, even if individual variables are insignificant, collectively they may be very significant. The F-statistic tests the collective significance of the exogenous variables on the given endogenous variable. The following table lists the R-squared values with the p-value for the F-statistics underneath in parenthesis by model:

Table 17: F-statistic Results

	Equation 1	Equation 2
National (Model 1)	0.3322 (0.0059)***	0.2832 (0.0206)**
Northeastern (Model2)	0.4491 (0.4206)	0.3601 (0.5898)
Midwestern (Model 3)	0.3212 (0.8558)	0.6275 (0.3634)
Southern (Model 4)	0.7365 (0.1859)	0.6943 (0.2504)
Western (Model 5)	0.4397 (0.6120)	0.4898 (0.5194)

Source: Stata Output

The only model which has collective significance amongst its exogenous variables is Model 1, the national model. The first equation with breweries per capita as its endogenous variable has a collective significance at the 99.4% confidence level with only 3 independently significant exogenous variables. The second equation of model 1, with brewery per capita growth as the endogenous variable has a collective significance at about the 98% confidence level also with only 3 independently significant exogenous variables. That being said, the model only explained roughly 30% (avg.) of the variations in the endogenous variables.

None of the regional models turned out to be collectively statistically significant, however all produced higher R-squared values than the national model. The Southern region (Model 4) in particular produced the highest R-squared of all models for both equation 1 and equation 2.

11.8.2 p-values

When we estimated our parameters for each model, a p-value for each exogenous variable within those models was calculated from Stata. The p-value of the variable represents "the level of marginal significance within a statistical hypothesis test, representing the probability of the occurrence of a given event...the smaller the p-value, the stronger the evidence is in favor of the alternative hypothesis" (investopedia 2014). To put into more simple terms, the smaller the p-value is for each variable, the higher the probability that the exogenous variable has a significant effect on the endogenous variable. In this scenario the null hypothesis would be that there is no significant effect on the endogenous variables, and the alternative hypothesis is the exact opposite. A p-value can be considered significant at three different levels:

1. Absolutely significant: < 0.01 (***)
2. Significant: <0.05 (**)
3. Marginally significant: <0.10 (*)

The following chart depicts all of the p-values, which were calculated after all five models were regressed and the parameters were estimated:

Table 18: Master p-value Matrix

	National		Northeastern		Midwestern		Southern		Western	
	y1	y2	y1	y2	y1	y2	y1	y2	y1	y2
Constant	.636	.755	.731	.823	.419	.162	.289	.409	.703	.636
Franchise Laws	.965	.715	.903	.589	.977	.671	.153	.080*	.739	.752
Self-Distribution Rights	.017**	.106*	.538	.750	.988	.913	.095*	.566	.420	.527
State Excise Tax Breaks	.647	.571	(-)	(-)	.471	.748	.152	.595	.479	.871
Population Density	.045**	.048 **	.421	.228	.380	.786	.067*	.222	.351	.682
State Tax Rate per Gallon	.200	.029**	.449	.801	.871	.471	.234	.327	.362	.119
Consumption per Capita	.101*	.351	.277	.776	.863	.065*	.274	.366	.907	.762

Source: Stata Output

Upon analysis of the p-value outcomes chart, we can see that there are very few statistically significant variables amongst all of the models. The national model appears to have the most significant variables in both equations. In the first equation of model 1, self-distribution rights and population density are significant at the 95% confidence level and beer consumption per capita is marginally significant at about the 90% confidence level. The second equation of model 1 shows that population density and the state tax rate per gallon are significant at the 95% confidence level and that self-distribution rights remain significant at about the 90% confidence level. Amongst the 4 regional models, the only other model with multiple significant variables identified is Model 4, the Southern States. In the first equation of this model both self-distribution rights and population density is significant at the 90% confidence level and in the second equation the presence of franchise laws is

significant at the 90% confidence level. Finally, in Model 3, the Midwestern States, beer consumption per capita appears to be significant at the 90% confidence level.

12 Analysis of the Results

12.1 Franchise Laws

In the beginning of the study franchise laws were explained to limiting the potential of the craft brewing industry in the United States of America. Some states have identified this limitation and drafted new legislation, which gave special benefits concerning franchise laws to smaller brewers. The variable, franchise laws (x1) is meant to signify that a state has these beneficial laws in place. Using logical reasoning, this would cause an expectation that when beneficial franchise laws are present then not only would breweries per capita be positively affected, but the brewery per capita growth would also be positively affected.

The parameters estimations for franchise laws (x1) at the national level showed a negative correlation with both breweries per capita and brewery per capita growth, which goes against the logical prediction of the effects. However, in every other model, there is some level of positive correlation with the exception of equation 1 of the Northeastern states (model 2).

The presence of franchise laws by itself however, was not found to be individually statistically significant in any equation of any model with the exception of equation 2 of the Southern states (model 4) at the 90% level of confidence. So we can then say that in the Southern states of the United States of America, the presence of beneficial franchise laws for small brewers significantly affects the brewery per capita growth in that region. However, on the national level (model 1) because of the collective significance of the exogenous variables in both equations, we can say that franchise laws do collectively play a significant role in explaining the variation in both breweries per capita and brewery per capita growth at least at the 95% level of confidence.

12.2 Self Distribution Rights

The right for a small brewer to self-distribute their own product was explained in earlier chapters of this study as majorly important in establishing their brand and surviving as a brewery in the United States of America. The variable, self-distribution rights (x2) represents the presence of such rights in a given state. For this reason logical reasoning makes the assumption that the presence of the right for small brewers to distribute their own beer would make a positive impact on both breweries per capita and brewery per capita growth amongst the states.

The parameters, which were estimated for self-distribution rights, were positively correlated with both endogenous variables across all models and equations. Moreover, the variable was individually significant at the 98.3% confidence level in equation 1 and at the 89.4% confidence level of equation 2 when regressed at the national level. The variable is also marginally significant in equation 1 of the Southern states (model 4) at the 90% confidence level.

As with franchise laws, the right to self distribute appears to be collectively significant in the first model at the national level. The equations of the models returned f-statistic p-values, which portrayed collective significance at the 99% and 98% confidence levels, respectively. With this information we can derive that the right for small brewers to self distribute their product definitely has a significant impact on the amount of breweries per capita in any given state and has a marginally significant impact on the brewery per capita growth in each state when analyzed at a national level. The only other individual significance the study found for the presence of self-distribution rights was in the Southern states' (model 4) variation in breweries per capita at the 90% confidence level.

12.3 State Excise Tax Breaks for Small Brewers

The variable, State Excise Tax Breaks for Small Brewers (x3) is depicting whether or not a given state has special excise tax policies in place, which will give benefits exclusively to brewers of smaller volumes of beer. Tax discounts and credits, especially when speaking about small brewers are expected to give much needed room to breath at least in the earlier years of the company when trying to establish a brand and build a sustainable business. So it can be expected that the presence of

beneficial excise tax policies for small brewers would not only mean a higher number of breweries per capita but also a higher brewery per capita growth rate.

When the parameters for x3 are examined across all five of the models, which were regressed, there was a very heterogenous mix of results across the study. At the national level, the variable seemed to have a positive correlation with the number of breweries per capita but a slightly negative correlation with the brewery per capita growth rate. In the Northeastern states (model 2) the variable was completely omitted from the equation due to perfect multicollinearity with another variable, self-distribution rights (x2) .In the rest of the 6 equations (models 3, 4, and 5), there were positive correlations between the presence of beneficial state excise tax legislation and increased breweries per capita and brewery per capita growth with the exception of brewery per capita growth in the Midwestern states.

Although collectively significant at the national level in both equations (model 1), it appears the state excise tax breaks for small brewers does not appear to be individually statistically significant in any of the 10 equations in total which were regressed. So within the limitations of this study, we can not statistically conclude that state excise tax breaks for small brewers have any significant effect on either the breweries per capita or brewery per capita growth in the United States.

12.4 Population Density

The variable population density (x4) was added to the equations under the logical reasoning that within organizations such as craft breweries, the population density relative to their relative geographical area of operation will have a direct impact on both the number of firms in that area and the rate at which the number of firms can grow in that area. Thus, we would expect that upon estimation of the parameters for all the models to be positive, meaning that when the population density would increase, then so would both the breweries per capita, and the brewery per capita growth.

However upon estimation of the parameters for population density in each model, we found somewhat interesting results. Not only do all of the parameters contain negative

values with the exception of both equations of the Southern states (model 4), but they all have extremely low values. For example, the highest absolute value of any parameter for the population density variable is only 0.003 for the number of breweries per capita in the Midwestern region. To reiterate from before, this can be interpret this in the following way: “for every 1% increase in the population density, the number of breweries per capita will decrease by 0.003%”. This hardly has a meaningful impact on the prediction of the endogenous variables in either equation of any model.

As far as the individual significance of the variable, at the national level population density is significant at at-least the 95% level of confidence in both models. The only other model in which it appears to be significant in according to this study is the first equation examining breweries per capita in the southern states. Of course, in pattern with all of the other exogenous variables, collectively population density is significant at the national level in both equations. So we can conclude that population density has a significant relationship with both breweries per capita and brewery per capita growth on the national level, as well as breweries per capita in the southern states. However, the impact of population density on the two exogenous variables appears to be very small in truth.

12.5 State Excise Tax per Gallon

The state tax rate per gallon variable (x5) measures the reported state excise tax per gallon in each state. Because each state in the United States of America sets its own taxation policies on alcoholic beverages, there was a lot of variance in this variable. The assumption before running the regression models was that as the state excise tax per gallon increases, then the amount of breweries per capita and brewery per capita growth would in turn decrease. This expectation then translates into the expectation that all of the parameters in the models should be negatively correlated with the endogenous variable.

Following the estimation of all the parameters for the variable, the models showed that of the 10 equations analyzed, 7 of them show a negative correlation between the state excise tax rate per gallon and the endogenous variable. The Southern region

actually showed positive correlations for both breweries per capita and brewery growth per capita suggesting that the higher the state excise tax is in that region, the higher the proliferation of the number of breweries would be in that region. The other positive correlation discovered is in brewery per capita growth in the Midwest (model 2). This is suggesting that in the Midwest region, the higher the excise tax rate on beer becomes, the more breweries will open in that region.

In terms of the individual statistical significance of the parameters, there was only one equation from the total 10 equations that were regressed. At the national level (model 1), we found according to the returned p-value that state excise tax rate per gallon is statistically significant at the 98% confidence level in explaining the variance of brewery per capita growth. All other p-values that were returned were somewhat far from some level of statistical significance and therefore further conclusions could not be made about the effect of the state excise tax rate due to the lack of confidence the results show. However, at the national level, in combination with the other variables, the state excise tax rate per gallon is collectively statistically significant in both equations in explaining the two endogenous variables.

12.6 Beer Consumption per Capita

The beer consumption per capita variable (x6) was included in the models under the logical assumption that as beer consumption increases, consumers will then have a naturally higher demand for a higher number of breweries to meet that demand. Thus, following this logic can lead us to expect that there will be a positive correlation between the amount of beer consumed per capita and both the number of breweries per capita and brewery growth per capita in our models.

The assumption that there would be a positive correlation between the beer consumption per capita and the endogenous variables held true in all of the models with the exception of the Western Region (model 5). In the Western Region, both of the equations actually returned negative parameter values suggesting that there is actually an inverse relationship between the amounts of beer people consume in that region and the proliferation of the number of breweries in that region which completely negates our original assumption. Similar to the magnitude of the effects

the population density had on the endogenous variables, the beer consumption per capita also had a very marginal impact on the endogenous variables. The absolute value of the largest parameter is just 0.17.

In terms of individual statistical significance, the beer consumption per capita is only individually marginally significant in two of the ten equations that were regressed. The first of the two is the amount of breweries per capita at the national level. The p-value returned has a value of 0.101 so for the study we will accept the argument that beer consumption per capita when analyzed at the national level is statistically significant. The second instance of individual significance occurs within the equation for brewery per capita growth in the Midwestern Region (model 3). Although a lower p-value was returned than the first instance, we can still only assume this variable to be marginally significant. As expected, the variable does participate in the same collective significance in both equations at the national level alongside the all other variables mentioned within the study. From the results of this study we can conclude that beer consumption per capita has a statistically significant impact on the number of breweries per capita on the national level, and the brewery per capita growth in the Midwestern Region of the United States of America.

12.7 Results in Sum

If we aggregate all of the results from the models, we come up with findings that both support and reject our original theses. While some of the variables were significant in explaining the variance in breweries per capita and brewery per capita growth, there was not sufficient evidence to suggest and patterns which existed across all the models. The only thing each model shared with each other was the fact that in each equation, the existence of state excise tax breaks was not significant at any level. So according to this study we can say with some level of confidence that the existence of such laws have no significant affect on either the brewery per capita in a given state or the brewery per capita growth in a given state.

On all levels of this study (national and regional) our hypotheses could not be absolutely confirmed, however certain aspects within them held true. At the national level we can conclude that self-distribution rights, population density, and beer

consumption per capita all play a significant role in explaining variances between states in their number of breweries per capita. The presence of self-distribution rights and the level of beer consumption per capita are both positively correlated with the amount of breweries per capita. Interestingly, we found that as population density increases, the amount of breweries per capita will slightly decrease. Also at the national level, we can conclude that self distribution rights, population density and state excise tax rates per gallon all play a significant role in explaining the variance in brewery per capita growth in the United States from the year 2012-2013. From this we can say the state excise tax rate per gallon and population density have a negative correlation with the brewery per capita growth and that self distribution rights is positively correlated with it.

In the Northeastern Region, the entire model came back insignificant. The same is also true for the Western Region. Thus no meaningful interpretation can be made about any of the variables other than the fact that they play no significant role in explaining either breweries per capita in the region or brewery per capita growth in those regions.

The Midwestern Region surprisingly had no significant effects identified other than that of beer consumption per capita in the second model examining brewery per capita growth. The model found a positive correlation between the two variables that is interpreted as the more people drink beer in the region, the higher the growth rate will become in breweries per capita.

The only other region in which significant effects were found was the Southern Region. Both self distribution rights and population density are significant and positively correlated with the amount of breweries per capita in the region. Interestingly, when explaining brewery per capita growth in the region, the only significant variable is the presence of beneficial franchise laws for small brewers, which came back as significant. This is actually the only equation in the whole study where the franchise law brewery appeared to be significant in explaining the endogenous variable.

13 Conclusion

The American Brewing Industry is currently experiencing one of its most dynamic periods since its beginnings in the early colonial times, and has been on an interesting trend for about the past thirty years. As discussed throughout this thesis, the disrupting trend in the industry has been the explosive expansion of the number of craft breweries appearing all over the country. In the last thirty years alone the number of operating breweries in the United States of America has grown by over 3,400% since 1984 (Brewers Association 2015). What the America is experiencing now and for the past 30 or so years is truly a "Renaissance of Beer", and the momentum of the movement is only getting stronger. This thesis was an attempt to examine if the recent legislation drafted to help the booming market segment is actually effective both on the national level and in the individual regions as well.

Most of the 20th century in American Brewing can be characterized by the creation and then domination of the market by a few select macro-brewers as economies of scale and ability to nationally advertise became more and more important as the industry developed. The large brewing conglomerates were birthed from the development of new technologies, which began to have a great effect on the way beer was produced, packaged and ultimately delivered to the end consumer. This of course affected the industry in drastic ways and caused the number of operating breweries in the country to reach the lowest point in its history and in turn created an unsatisfied gap in the marketplace. In part, the emergence of the craft beer movement can be partly attributed to the macro brewers who unintentionally created an un-served demand for good, differentiated beer that was distinctly different than the mostly light-lagers which were being mass produced in the country at the time. Some of this gap in the marketplace began to be filled by foreign imports before the new wave of domestic producers stepped up to take control of the situation.

With the way the United States of America has its both federal and most state policies set up, distribution of beer is consistently one of the most important issues for small brewers trying to establish their brand on the market. Depending on the state in question, franchise laws can play an important role in either contributing to the success of the brewer or limiting its freedom of distribution. As previously discussed,

these laws attempt to facilitate the relationship between the brewer and its distributor with whom it has a relationship with for the given region. In many cases, if the state does not have specialized franchise law rights for small brewers, the general legislation can end up limiting the brewer's capacity to move its brand around and ultimately reach its potential end user. So this study attempted to confirm and measure just how effective these laws with regards not only to the national level but also within the outlined regions described in this study.

Another factor of the three-tier distribution system lays within the ability of small brewers to self-distribute their own beer. Many of the smaller, microbreweries in this country operate on a very local level. With the average production volume of microbreweries in 2013 being just less than 1,650 barrels per year (Brewers Association 2014), the need to be able to distribute at will becomes an important factor. Self-distribution also becomes important in the ability to respond to customer demand more quickly than using an intermediary such as a beer distributor.

Although this paper assumed that the presence of state excise tax breaks for small brewers would play an important role in the proliferation of the craft brewing industry, this study found otherwise. This was the only variable tested that was not significant in any model in the study which tells us something very interesting, that these excise tax breaks are not actually helping the industry develop at least with regards to the number of firms operating within it. It is possible that this may play a very significant role in the financial health of a small brewery but we cannot be sure of that with the results from this study alone.

One interesting take away from the study is the discovery that the two endogenous variables, breweries per capita and brewery per capita growth were not necessarily correlated. Prior to the study I had the assumption that both variables would move in the same direction however this was not true across all of the models. Although this study does not provide enough information about the relationship between the two, it would be very interesting to research further into the relationship. It may lead to an understanding or foreshadowing of when the craft beer industry in America will become saturated and growth will start to stagnate. An example of something that could hint at this conclusion would be the finding of a state with a very high craft

brewery per capita but low craft brewery per capita growth. Although there was no obvious representation of such data at the regional or national level, future studies could look into these types of relationships.

In total, the results of this study were somewhat surprising. The aim was to confirm and to see at what level the laws impacted the proliferation of the industry and in the end with a few exceptions the laws had very little significant effects. I believe this suggests that the massive expansion of the craft brewing industry in recent years can also be attributed to consumer taste. Perhaps the laws are also a factor in the growing industry but the primary driver must be the consumer and the ever-increasing demand for a differentiated, well-crafted beer.

13.1 Limitations

Although this study brought forward some interesting findings about the evolving American Brewing industry, there are without doubt some limitations of the work. On such limitation could be the chosen model for the regression. A multivariate, multiple-equation ordinary least squares method was chosen for the regression analysis. It should be remembered that within this equation of the six variables that were regressed, three of them were nominal in nature meaning that their values were binary (either a 0 or 1). This caused significant heteroskadasticity within the model and thus somewhat violated one of the assumptions of the classical linear regression model. In addition to the herteroskedasticity, this was the cause for perfect collinearity within one of the regional models. In future research it may be beneficial to qualify this variable from either a “yes or no” value to some sort of strength of benefit to the smaller brewers. Additionally, the consumption per capita data that was used in the regression analysis was taken from 2011 because of the public availability of such data. All other variables had values taken from either 2012 or 2013 depending on the nature of the variable. This obviously can be the cause for some doubts in the findings with the relationships between consumption per capita and both of the endogenous variables.

Sample size of the regional data is also a concern for the validity of the research. At the national level (model 1), there were 50 observations, which is more than sufficient to get a proper sample size for the regression. However, on the regional level the

sample sizes were either 12 or 13 observations for each region/model. This could have been a limitation and some level of explanation to explain the substantial lack of statistical significance amongst the exogenous variables in the regional models of the study.

Finally, the scope of the study may have been generously wide for the purpose of a Masters thesis. All together there was a total of five multiple equation models being regressed and interpreted. With the right variables and the correct data the same study could be modified to be carried out individually in more detail for each region and even at the national level.

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15 Appendix

15.1 Regional Correlation Tables

Region 1 (Northwest)

	y1	y2	x1	x2	x3	x4	x5	x6
y1	1							
y2	0.7163	1						
x1	-0.1688	0.0350	1					
x2	0.0437	0.0885	0.1231	1				
x3	-0.1688	0.0350	1.0000	0.1231	1			
x4	-0.5436	-0.5515	0.2787	-0.0009	0.2787	1		
x5	0.0548	0.1306	-0.3137	0.1560	-0.3137	-0.4064	1	
x6	0.5733	0.3809	-0.3057	-0.2323	-0.3057	-0.6520	0.2902	1

Region 2 (Midwest)

	y1	y2	x1	x2	x3	x4	x5	x6
y1	1							
y2	0.1997	1						
x1	-0.3238	-0.1447	1					
x2	0.0759	-0.0678	0.3162	1				
x3	0.1943	-0.2639	0.0000	0.7071	1			
x4	-0.3331	-0.3642	0.5189	0.5353	0.5392	1		
x5	0.0810	0.1255	-0.1536	-0.2391	-0.0370	-0.2970	1	
x6	0.2877	0.7332	-0.4373	-0.0856	-0.2263	-0.5325	-0.0455	1

Region 3 (South)

	y1	y2	x1	x2	x3	x4	x5	x6
y1	1							
y2	0.8873	1						
x1	0.5577	0.7081	1					
x2	0.6188	0.5361	0.6831	1				
x3	-0.0773	-0.3445	-0.1741	-0.2548	1			
x4	0.2676	0.2082	-0.1544	-0.1346	-0.3978	1		
x5	-0.1150	-0.2285	-0.4651	-0.3206	0.1489	0.0559	1	
x6	-0.3325	-0.1459	-0.3263	-0.2610	-0.4697	0.0336	-0.3569	1

Region 4 (West)

	y1	y2	x1	x2	x3	x4	x5	x6
y1	1							
y2	0.8130	1						
x1	-0.1997	-0.3379	1					
x2	0.3013	0.2554	-0.3118	1				
x3	0.3272	-0.0421	0.0514	0.1925	1			
x4	-0.4356	-0.1937	0.1058	0.1451	-0.2724	1		
x5	-0.3261	-0.6385	0.5466	-0.0601	0.2662	0.1758	1	
x6	0.0485	-0.1007	0.0359	-0.3273	0.0833	-0.4337	-0.0106	1

15.2 Regional ANOVA Output

Region 1 (Northeast)

Equation	Obs	Parms	RMSE	"R-sq"	F	P
BreweryCap	**13**	**6**	**1.674035**	**0.4491**	**1.141215**	**0.4206**
CapInc	**13**	**6**	**.2897895**	**0.3601**	**.7879809**	**0.5898**

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
BreweryCap						
Flaw	**-.1787921**	**1.407714**	**-0.13**	**0.903**	**-3.507507**	**3.149923**
SelfD	**1.218306**	**1.881117**	**0.65**	**0.538**	**-3.22983**	**5.666442**
ExciseT	**0**	(omitted)				
PopDense	**-.0014945**	**.0017469**	**-0.86**	**0.421**	**-.0056253**	**.0026364**
TaxRategal	**-2.389756**	**2.980543**	**-0.80**	**0.449**	**-9.437619**	**4.658108**
consumptioncapitagal	**.1670788**	**.1418968**	**1.18**	**0.277**	**-.1684537**	**.5026114**
_cons	**-1.589956**	**4.45125**	**-0.36**	**0.731**	**-12.11549**	**8.935579**
CapInc						
Flaw	**.1378722**	**.2436871**	**0.57**	**0.589**	**-.4383562**	**.7141007**
SelfD	**.1080797**	**.3256372**	**0.33**	**0.750**	**-.6619299**	**.8780893**
ExciseT	**0**	(omitted)				
PopDense	**-.0003993**	**.0003024**	**-1.32**	**0.228**	**-.0011144**	**.0003157**
TaxRategal	**-.1349912**	**.5159569**	**-0.26**	**0.801**	**-1.355035**	**1.085053**
consumptioncapitagal	**.0072682**	**.0245635**	**0.30**	**0.776**	**-.0508153**	**.0653517**
_cons	**.1787216**	**.7705487**	**0.23**	**0.823**	**-1.643337**	**2.00078**

Region 2 (Midwest)

Equation	Obs	Parms	RMSE	"R-sq"	F	P
BreweryCap	**12**	**7**	**.507242**	**0.3212**	**.3943627**	**0.8558**
CapInc	**12**	**7**	**.11818**	**0.6275**	**1.404014**	**0.3634**

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
BreweryCap						
Flaw	**.0176334**	**.5793588**	**0.03**	**0.977**	**-1.471656**	**1.506923**
SelfD	**.0086523**	**.5473018**	**0.02**	**0.988**	**-1.398232**	**1.415536**
ExciseT	**.4230387**	**.543189**	**0.78**	**0.471**	**-.9732731**	**1.819351**
PopDense	**-.0027548**	**.0028599**	**-0.96**	**0.380**	**-.0101065**	**.0045969**
TaxRategal	**-.1779328**	**1.043292**	**-0.17**	**0.871**	**-2.859799**	**2.503934**
consumptioncapitagal	**.0101821**	**.0561787**	**0.18**	**0.863**	**-.1342298**	**.1545939**
_cons	**1.291545**	**1.466615**	**0.88**	**0.419**	**-2.478509**	**5.061598**
CapInc						
Flaw	**.0608109**	**.1349822**	**0.45**	**0.671**	**-.2861719**	**.4077937**
SelfD	**.0146841**	**.1275134**	**0.12**	**0.913**	**-.3130995**	**.3424677**
ExciseT	**-.0429182**	**.1265552**	**-0.34**	**0.748**	**-.3682386**	**.2824023**
PopDense	**.0001912**	**.0006663**	**0.29**	**0.786**	**-.0015217**	**.001904**
TaxRategal	**.1896178**	**.2430719**	**0.78**	**0.471**	**-.4352183**	**.8144538**
consumptioncapitagal	**.0307695**	**.0130888**	**2.35**	**0.065**	**-.0028764**	**.0644154**
_cons	**-.5607289**	**.3417**	**-1.64**	**0.162**	**-1.439097**	**.3176389**

Region 3 (South)

Equation	Obs	Parms	RMSE	"R-sq"	F	P
BreweryCap	**12**	**7**	**.2106347**	**0.7365**	**2.32899**	**0.1859**
CapInc	**12**	**7**	**.0532383**	**0.6943**	**1.892367**	**0.2504**

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
BreweryCap						
Flaw	**.4609961**	**.2739044**	**1.68**	**0.153**	**-.2430976**	**1.16509**
SelfD	**.3856597**	**.1877333**	**2.05**	**0.095**	**-.096924**	**.8682434**
ExciseT	**.7002613**	**.414153**	**1.69**	**0.152**	**-.3643527**	**1.764875**
PopDense	**.0021387**	**.0009159**	**2.33**	**0.067**	**-.0002158**	**.0044932**
TaxRategal	**.4414653**	**.3259393**	**1.35**	**0.234**	**-.3963883**	**1.279319**
consumptioncapitagal	**.0661697**	**.0538262**	**1.23**	**0.274**	**-.072195**	**.2045344**
_cons	**-1.724488**	**1.455835**	**-1.18**	**0.289**	**-5.466832**	**2.017856**
CapInc						
Flaw	**.1515635**	**.0692298**	**2.19**	**0.080**	**-.0263974**	**.3295244**
SelfD	**.0291455**	**.0474499**	**0.61**	**0.566**	**-.0928284**	**.1511193**
ExciseT	**.0593511**	**.1046779**	**0.57**	**0.595**	**-.2097319**	**.3284341**
PopDense	**.0003228**	**.0002315**	**1.39**	**0.222**	**-.0002723**	**.0009179**
TaxRategal	**.0894193**	**.0823817**	**1.09**	**0.327**	**-.1223496**	**.3011882**
consumptioncapitagal	**.0135317**	**.0136047**	**0.99**	**0.366**	**-.0214403**	**.0485036**
_cons	**-.3317373**	**.3679648**	**-0.90**	**0.409**	**-1.277621**	**.6141465**

Region 4 (West)

Equation	Obs	Parms	RMSE	"R-sq"	F	P
BreweryCap	**13**	**7**	**2.013603**	**0.4397**	**.7846473**	**0.6120**
CapInc	**13**	**7**	**.3908166**	**0.4898**	**.9600026**	**0.5191**

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
BreweryCap						
Flaw	**.4977247**	**1.424285**	**0.35**	**0.739**	**-2.987375**	**3.982824**
SelfD	**2.119955**	**2.44667**	**0.87**	**0.420**	**-3.866831**	**8.10674**
ExciseT	**1.052379**	**1.39359**	**0.76**	**0.479**	**-2.357612**	**4.46237**
PopDense	**-.0088874**	**.0087867**	**-1.01**	**0.351**	**-.0303877**	**.012613**
TaxRategal	**-2.254424**	**2.286987**	**-0.99**	**0.362**	**-7.850479**	**3.341631**
consumptioncapitagal	**-.024681**	**.2030144**	**-0.12**	**0.907**	**-.5214395**	**.4720774**
_cons	**2.355534**	**5.891493**	**0.40**	**0.703**	**-12.06043**	**16.7715**
CapInc						
Flaw	**.0916131**	**.2764369**	**0.33**	**0.752**	**-.5848036**	**.7680299**
SelfD	**.3186885**	**.4748698**	**0.67**	**0.527**	**-.8432761**	**1.480653**
ExciseT	**.0458423**	**.2704793**	**0.17**	**0.871**	**-.6159967**	**.7076814**
PopDense	**-.0007328**	**.0017054**	**-0.43**	**0.682**	**-.0049058**	**.0034401**
TaxRategal	**-.8069671**	**.4438772**	**-1.82**	**0.119**	**-1.893095**	**.2791613**
consumptioncapitagal	**-.0125135**	**.0394027**	**-0.32**	**0.762**	**-.1089284**	**.0839015**
_cons	**.5691617**	**1.14347**	**0.50**	**0.636**	**-2.228807**	**3.367131**

15.3 States Listed by Region

1 (Northeast)	2 (Midwest)	3 (South)	4 (West)
Connecticut	Illinois	Alabama	Alaska
Delaware	Indiana	Arkansas	Arizona
Maine	Iowa	Florida	California
Maryland	Kansas	Georgia	Colorado
Massachusetts	Michigan	Kentucky	Hawaii
New Hampshire	Minnesota	Louisiana	Idaho
New Jersey	Missouri	Mississippi	Montana
New York	Nebraska	North Carolina	Nevada
Pennsylvania	North Dakota	Oklahoma	New Mexico
Rhode Island	Ohio	South Carolina	Oregon
Vermont	South Dakota	Tennessee	Utah
Virginia	Wisconsin	Texas	Washington
West Virginia			Wyoming