Inter-Metropolitan Location Patterns of Craft Breweries in the United States

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Abstract
The number of craft breweries in the United States has increased dramatically in recent decades. In 1980 there were 8; by 2013 there were over 2,800. This growth reflects dissatisfaction, on the part of many Americans, with the bland and homogeneous beer that is brewed by the country’s two largest breweries — Anheuser Busch and Miller Coors. Consumers are demanding beer that exhibits greater variety in terms of flavor, style and strength. Despite this growth few studies have attempted to explain the spatial distribution. The purpose of this paper is to identify factors that are driving inter-metropolitan differences in the number of craft breweries. Using data from 361 Metropolitan Statistical Areas (MSAs) we built a series of regression models that use the number of craft breweries as a dependent variable. Our findings show that the primary driver of inter-metropolitan variation in craft breweries is the proportion of the population aged between 25 and 44. Other metropolitan characteristics that attract craft breweries are a creative population, the existence of farmers markets, total population size, educational levels and a MSA share of non-hispanic whites. One variable, income, was found to be negatively correlated with the number of craft breweries.

JEL Classification : J11, L66, O14, O18
Keywords : Craft Breweries, Metropolitan Areas, Millennials

1. Introduction
In recent decades the United States has experienced significant growth in craft breweries, with the number increasing from 8 in 1980 to over 2,800 in 2013 (Brewers Association [13], Figure 1). During the same time period the number of large-scale traditional breweries decreased in number from 40 to 25 (Beer Institute [5]; Brewers Association [14]). The growth in the number of craft breweries has occurred in an environment of stagnant demand for beer. In 2013 there were 2.7 billion cases of beer sold in the United States. This was down from the 2.9 billion cases sold in 2008 (Fottrell [30])

In dollar terms, craft brewers had 14.3% of the market in 2013, up from 5.4% in 2005 (Brewers Association [12]). Growth of the craft segment is driven to a large extent by consumer dissatisfaction with the beer that is brewed by America’s two major brewing companies — Anheuser-Busch and MillerCoors. The portfolio of beers offered by these two brewing giants is dominated by one style of beer, an American pale lager. Increasing numbers of American beer drinkers are demanding more variety in terms of style, flavor, and strength. Craft brewers have emerged to meet this demand. While craft breweries can be found in every U.S. state they are not uniformly distributed. Some states, and some communities within each state, have emerged as more attractive than others as locations for craft breweries. Yet, despite the rapid growth and increasing importance of the industry there have been relatively few studies that have examined its locational determinants. As a result we know
very little about what factors are influencing the geographic distribution of craft breweries. All the available data suggest that the craft breweries are emerging as a very significant segment of the broader beer industry. Craft breweries are, in a very significant way, challenging the hegemony of the country’s two major brewing companies. Furthermore, all projections suggest that the craft segment of the industry will continue to exhibit impressive growth into the foreseeable future. Understanding the locational drivers of the current geographic distribution of craft breweries may provide clues as to where future growth may occur. Even a cursory glance of a map showing the current distribution of craft breweries across the United States suggests that their spatial distribution is not driven simply by population size. In other words, there are other factors influencing the geography of this segment of the beer industry. Given the impressive growth and continued anticipated importance of craft breweries, our aim in this paper is to supplement the sparse literature that exists and to enhance our understanding of the factors that seem to be driving the spatial distribution of craft breweries. We do so by using the MSA as our unit of analysis and building a series of regression models that identify those factors that explain inter-metropolitan variations in the number of craft breweries.

The remainder of this paper has eight sections. In the next section we define craft breweries and explain the growing demand for craft beer in terms of three ideas—resource partitioning theory, the rise of the neo-localism movement, and the market preferences of the millennial demographic cohort. In the third section we discuss the economic importance of craft beer, particularly in terms of neighborhood and urban economic development. In the fourth section we review the brief literature that exists with respect to the geography and spatial distribution of craft breweries. In the fifth and sixth sections we describe our methodology and data respectively. In the seventh section we report our results. In the eighth and final section we discuss the implications of our findings.

2. Why Craft Beer?

In the United States craft breweries are defined by the Brewers Association, the trade group that represents the interests of the industry. According to the Brewers Association [10] craft breweries are small, independent, and traditional (yet innovative). From a size perspective a craft brewery is one that produces no more than 6 million barrels of beer per year\(^2\). In terms of ownership less than 25 percent of the brewery must be owned or controlled “by an alcoholic beverage industry member that is not itself a craft brewer.”

\(^2\) A barrel of beer comprises 31 U.S. gallons.
Finally, while the Brewers Association emphasizes traditional brewing ingredients and processes many craft brewers are highly innovative by adding non-traditional ingredients with the goal of providing unusual flavor profiles. Craft brewers range in size — from the Boston Beer Company in Massachusetts that sold 2.1 million barrels of beer in 2012 to the literally dozens of craft breweries who sell under 500 barrels per year.

Three major ideas have been invoked in the literature to explain consumer demand for craft beer — resource partitioning, neo-localism, and the growing importance of the millennial consumer. According to resource partitioning theory, as an industry evolves there is tendency for production to be concentrated in the hands of an increasingly smaller number of producers. This has certainly occurred in the American beer industry where the market share of the four largest producers increased from 10% in 1910 to over 80% in the 1990s (Carroll and Swaminathan [15]). Market concentration occurred gradually over time as a result of mergers, acquisitions, and closures with the stronger competitors eventually being able to consolidate their position by taking advantage of economies of scale in both production and marketing (Tremblay et al. [59]; Greer [36]). In 1865 the United States had over 2,200 breweries (Stack [55]). By 1987 it only had 45 (Beer Institute [5]). As the American brewing industry became increasingly concentrated the beer that it brewed became, from a flavor perspective, increasingly bland and homogeneous. Choi and Stack [17] attribute the emergence of inferior tasting beer to the interplay of a number of factors, all of which impacted the taste palettes of American beer drinkers. First, thirteen years of Prohibition (1920-33) removed the memory of what constituted good tasting beer. Second, the increased consumption of soft drinks as an alternative beverage during Prohibition resulted in post-Prohibition brewers altering the taste profiles of their beer to make them more carbonated and less bitter. Third, by 1948 75% of American households had acquired refrigerators (Bowden and Offer [9]) with the result that consumers developed a taste for ice-cold beer; cooling beer to refrigerator temperatures suppressed many of its delicate and nuanced flavors. Fourth, the progression of the 20th century saw Americans declare an increasing preference for convenience and uniformity (in terms of taste and quality) in their food and drink products. The promise of uniformity was most effectively delivered by the development of national brands (Choi and Stack [17]). For breweries a national brand meant brewing a homogeneous beer that would appeal to the broadest possible consumer base. As noted by Scherer [52] “the leading U.S. premium brewers have deliberately chosen formulas sufficiently bland to win a mass following among relatively inexperienced consumers and (through repeat purchase) consumers acculturated to bland beers.” Despite this concentration of production and homogenization of beer there still existed a market for brewers that were willing to offer variety. This market opportunity existed on what Caves and Porter ([16], 259) refer to as the “competitive fringe” and craft brewers emerged to meet this market demand. As noted by Watson [63] “consolidation leads to commoditization and commoditization opens market spaces for businesses that differentiate”.

The rise of neo-localism in the United States has also been suggested as contributing to the growing popularity of craft beer (Flack [27]). Neo-localism can be broadly defined as the “deliberate seeking out of regional lore and local attachment by residents (new and old) as a delayed reaction to the destruction in modern America of traditional bonds to community and family” (Shortridge [54], 10). On a practical level the increasing numbers of farmers markets (Cone [20]), community supported agriculture initiatives (Galt et al. [32]), and community gardens (National Gardening Association [42]) are reflective of increasing consumer demand for more products with a strong local connection. As noted by Schnell and Reese ([54], 66) “the explosive growth of microbreweries indicates a desire on the part of an increasing number of Americans, brewers and consumers alike, to reconnect with the cities or the towns in which they live, to resurrect a feeling of community tied to a specific landscape”. Many craft breweries emphasize their place connections by naming their beers after places, people, and events that have a connection with the local community (Reid et al. [49]; Schnell and Reese [53]).

It has also been suggested that demographic factors have played an important role in the growing popu-

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3 The Brewers Association is careful to distinguish between beers and flavored malt beverages. Flavored malt beverages are not considered beer.
larity of craft beer. Craft beer drinkers tend to be white (non-Hispanic), aged between 21 and 44, and earn at least $50,000 per year (Clarke [18]). The age cohort of 21–44 includes what are termed the millennial generation; those born between 1982 and 2003 (Winograd and Hais [67]). As a group, millennials have been characterized as being “confident, self-expressive, liberal, upbeat and open to change” (Pew Research Center [47], 1). They have higher levels of educational attainment than older generations (Pew Research Center [47]). They also tend to prefer experimentation over brand loyalty and are willing to pay a premium for what they perceive to be a higher quality product (Gilman [33]; Rottuno [51]). A survey of Millennial beer drinkers is revealing — 94% had tried a new beer during the previous month, one in four said that the availability of craft beer influences which restaurants they patronize, seven out of ten were interested in following their favorite craft brewery on social media, and they indicated that they are five times more likely to be influenced by word-of-mouth than traditional marketing when choosing a beer (Granese [35]).

3. Craft Beer and Local Economic Development

Nationally, the commercial craft brewing industry contributed $33.9 billion to the U.S. economy in 2012 and was responsible for more than 360,000 jobs4. These jobs pay an average annual wage of $33,806 (Brewers Association [11]). At the sub-national scale the industry makes significant contributions to both local and regional economies (Taylor et al. [57]; National University System Institute for Policy Research [44]; Wobbekind et al. [68]). As a result of its beneficial economic impacts numerous states and communities across the United States are trying to capitalize on the growth of the industry (Best [8]). Local economic development teams and elected officials are tapping into the potential tax revenue streams, good paying jobs, and neighborhood revitalization successes that the industry is generating. Cities such as Asheville, Cleveland, and New York have integrated craft breweries into local economic development projects and have used incentive based packages and no-interest funding to attract or expand craft beer operations to/in their jurisdictions. For example, Asheville, North Carolina, in collaboration with county officials and the Governor’s Office, has successfully attracted three regional brewers (New Belgium, Sierra Nevada, and Oskar Blues) to its region within the past five years. Incentive packages and regional cooperation allowed for city, county, and state officials to politick around the hundreds of jobs and millions of dollars of contractual investments the attraction of these brewers generated for the area (Glancy [34]; Vaughn and Wacther [62]; WBTV.com [66]).

Cleveland’s Ohio City neighborhood has gone through a dramatic renaissance due in part to the success of Great Lakes Brewing Company, which opened in 1988. The brewery has grown from a small business into the 19th largest regional craft brewery (by volume) in the United States, bringing rejuvenation, identity, and other startup companies to the store fronts within the Ohio City neighborhood (Alexander [1]; Schnell and Reese [53]). Since 2005, the value of the real estate around the brewery has more than doubled and the crime rate has dropped by 25% (Alexander [1]). In 2010, Cuyahoga County supported a 300 barrel per year expansion of the brewery in an adjacent building from the brewpub in the Ohio City neighborhood. The county issued $3 million in tax-free industrial revenue bonds and $3 million in recovery bonds to help finance the project (Conway [21]).

Similarly, Brooklyn Brewing, located in the Williamsburg neighborhood of Brooklyn, New York went through an expansion in which the brewery increased production from 12,000 to 120,000 barrels annually in February, 2011 (Beer Street Journal [6]). Mayor Michael Bloomberg cut the ribbon on the opening date of the expansion project, which was partially funded by an $800,000 grant from the Empire State Development Corp, with the desire to keep jobs in Brooklyn (Beer Street Journal [6]).

In addition to potentially boosting urban neighborhoods the rising popularity of craft beer is seen as a tool to boost regional economies by attracting tourists who include visits to local breweries in their vacation plans (Francioni [31]; Alonso [2]; Plummer et al. [48]). To enhance the visitor experience regions have developed beer trails that provide suggested itineraries and information about individual breweries (Maine Brewers

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4 Of these 360,000 jobs 108,440 are people working at breweries. The additional jobs are those that are supported by the industry as its spending trickles through the economy.
Beer Festivals are also increasingly popular and are another mechanism that brings tourist dollars into cities and regions (Kiss [37]; Renzulli [50]). There are literally hundreds of beer festivals that are held all across the United States every year with the largest being the Great American Beer Festival that attracts over 45,000 people to Denver every autumn.

4. The Geography of Craft Breweries

Despite the impressive growth of craft breweries throughout the United States there have been relatively few studies that have tried to document and explain their geographic distribution. The small number of existing studies clearly demonstrates considerable variation in the geographic distribution of craft breweries. At the broad regional scale craft breweries are concentrated in the Pacific coast states (California, Oregon, and Washington), northeastern states (particularly Maine, Massachusetts, New York, and Vermont), Great Lakes States (particularly Michigan and Wisconsin), and the High Plains state of Colorado (Figure 2). Reid et al. [49] identified six states that, based both on absolute and per capita number of craft breweries, could be considered core states when it comes to commercial craft brewing — California, Colorado, Michigan, Oregon, Wisconsin, and Washington. In sharp contrast there is a group of states in the southern U.S. (stretching from Oklahoma to South Carolina) that have relatively small numbers of craft breweries, both in absolute and per capita terms. These states constitute a craft beer desert of sorts (Baginski and Bell [4]).

The geography of the industry that is displayed in Figure 2 is one that has evolved over time. McLaughlin et al. [40] provided a fairly comprehensive picture of the industry’s spatial evolution by mapping the location of craft breweries at four points in time — 1980, 1990, 2000, and 2011. Their maps showed that the relatively small number of craft breweries that existed in 1980 were primarily located in major metropolitan areas in the traditional manufacturing belt (e.g., Chicago and Philadelphia) and the west coast (Seattle and San Francisco). Additional early craft breweries could also be found in the resort areas of the Rocky Mountains, northern Michigan, and New England. By 1990 San Francisco was clearly emerging as a craft brewing center while the emergence of an early production center in and around Denver, Colorado was apparent. By

Figure 2. Geographic Distribution of Craft Breweries, 2013
Source: Brewers Association
Note: Each dot is a craft brewery
2000 Colorado's position as major location for craft brewing was clearly established as was Seattle’s, Portland’s (Oregon), New York’s and Boston’s. At the start of the new millennium there was also a visible concentration of craft breweries throughout the Great Lakes states, particularly Detroit, Cleveland, and Chicago. In Texas, the Austin and Dallas–Fort Worth areas were also emerging as up and coming brewing centers. In the southern United States at this time an emergent craft brewing industry was evident in both North and South Carolina and the Florida metropolitan areas of Miami, Tampa, and Jacksonville. By 2011 (and 2013 — see Figure 2) the pattern that was apparent in 2000 remained in place. There were more craft breweries but the additions to the landscape simply reinforced the geography that had been established by 2000. The broad regional geography described above is, not surprisingly, reflected in the locations of the metropolitan areas with the largest number of craft breweries. These include Seattle (93 craft breweries), Portland (92), and San Diego (77) (Figure 3).

Attempts to model the locational determinants of craft breweries have been undertaken by both Florida [28] and Baginski and Bell [4]. Florida’s [28] analysis tries to explain inter-state variations in the number of craft breweries per 100,000 population. He found higher concentrations of craft breweries to be positively correlated with higher levels of both education and happiness and well-being. In contrast, craft breweries were negatively correlated with populations that were more conservative, more religious, smoked more, and had higher levels of obesity. Baginski and Bell [4] conducted two analyses in which they tried to explain inter-metropolitan variations in the number of craft breweries per 100,000 population. Their first analysis focused on the southeastern United States, a region that is lagging the country in terms of the development of its commercial craft brewing industry. They found higher concentrations of craft breweries to be correlated with higher living costs, higher levels of social tolerance, and the existence of fewer health risks and the provision of a greater level of health care services. These three variables were also significant when Baginski and Bell [4] extended their model to the entire country. In addition, however, they found five other variables to correlate significantly with the existence of craft breweries — higher quality education services, a higher quality of life, higher degrees of wage inequality, the existence of less developed technological sectors, and a less vibrant arts and culture scene.
In his analysis of a single metropolitan area (Portland, Oregon) Cortright [23] argues that traditional industrial location factors do not adequately explain the existence of a vibrant craft brewing industry. Rather he suggests that the presence of a large number of craft breweries in Portland can be attributed to the popularity of home brewing and an eclectic culture of entrepreneurialism. Home brewing functions as an incubator of sorts for the industry and many successful commercial craft brewers started by brewing beer at home (Alonso [2]). Cortwright [23] also suggests that the region’s thriving wine industry has served as both a role model and an inspiration for the fledgling craft beer industry.

5. Methodology

In this paper we test for the effects of economic, geographical, and cultural factors that might influence the location of craft brewing establishments at the metropolitan level, and utilize the modeling approach employed used by Baginski and Bell [4]. We conduct our analysis across 361 Metropolitan Statistical Areas (MSAs), with the number of craft breweries in each MSA in 2013 as our dependent variable.

Our empirical analysis consists of two models in which we test for the locational determinants of craft brewery location in US metropolitan areas. Although we base our models on Baginski and Bell’s [4] analysis, we depart from their specification in a number of ways. First, instead of using a population standardized dependent variable (breweries per 100,000 persons), we choose to use the number of craft breweries as the dependent variable and include population as an independent variable. This allows us to estimate the relative impact of population when compared to our other dependent variables. Second, we extend Bakinski and Bell’s model by testing for the effect of metropolitan variation in creative class culture and innovation. The hypothesis here is that more culturally diverse, creative, and innovative areas have a larger pool of craft-beer consumers and microbrewery entrepreneurs. We also test for the effects of income, race, age, and education. As noted above craft beer drinkers tend to be higher income earning Whites in the millennial age cohort. Third, we test for the effects of spatial dependence in brewery location, whereby metropolitan areas in close proximity to metropolitan areas with larger numbers of craft breweries are themselves more likely to have larger numbers of craft breweries. Finally, we test for the effects of cultural-neo-localism — that is, the propensity of consumers to consume locally made goods — by including the number of farmer’s markets as a proxy. Our base model appears as equation (1) below:

\[
breweries_i = \alpha + \beta_1 creativeIndex_i + \beta_2 innovationIndex_i + \beta_3 age_i + \beta_4 pop_i \\
+ \beta_5 income_i + \beta_6 education_i + \beta_7 white_i + \beta_8 farmerMarket_i + \theta stdummy + \varepsilon_i
\]

where \(breweries_i\) is the number of craft brewery establishments in metropolitan area \(i\); \(creativeIndex_i\) is the Richard Florida’s creativity index; \(innovationIndex_i\) is the 2012 innovation index (developed by Purdue University and Indiana University); \(age_i\) is the proportion of the population aged 25-44; \(pop_i\) is the total population; \(income_i\) is the median income; \(education_i\) is the proportion of adults 25 years or older with a college degree; \(white_i\) is the proportion of non-Hispanic whites; \(farmerMarket_i\) is the number of farmers markets; \(stdummy\) is a vector of dummy variables for each state; and \(\alpha, \beta, \theta, \varepsilon_i\) are intercept, the coefficients for the independent variables, a vector of coefficients for the regional dummy variables, and the stochastic error term, respectively. We include state dummies to control for all non-observed factors that might influence the number of breweries in a state. Most importantly, the state dummies control for variation in the restrictiveness of state-level laws and tax regulations that might affect the feasibility of brewery establishment. All terms except the dependent variable and regional dummies are logged so that we can interpret the coefficients as partial elasticities.

While we include state-fixed effects in equation (1), the specification does not eliminate potential bias due to spatial dependence. In our case, spatial dependence can arise under two circumstances: (a) if the number of craft breweries in one metropolitan area is codetermined by the number of craft breweries in a

5 All independent variables are for 2010 unless otherwise stated.
nearby metropolitan area, and/or (b) when the error term \( \varepsilon_i \) is correlated across space. As such, we test equation (1) for spatial dependence using Anselin, Bera, Florax, & Yoon’s [3] Lagrange (LM) and Robust Lagrange Multiplier (RLM) statistic\(^6\). Our results indicate that neither spatial lag nor spatial error is present in our model. The results of the LM and RLM tests can be seen at the bottom of Table 2.

While the LM tests indicate that correction for spatial dependence is not needed, the distribution of our dependent variable, \( \text{breweries}_i \), follows a non-normal distribution. Figure 4 shows that \( \text{breweries}_i \) exhibits a rare-occurrence distribution, whereby nearly a quarter of MSAs do not have a craft brewery registered with the Brewer’s Association. To account for this non-normal distribution, there are two possible specifications — a Poisson regression or a negative binomial regression. A Poisson regression is appropriate if the mean and variance of the dependent variable are roughly equivalent (\( \alpha = 0 \)); otherwise a negative binomial regression is more suited. In our analysis we present the results of both estimators and the likelihood ratio test that \( \alpha = 0 \).

6. Data

We obtained our data from a variety of sources. First, we gathered locational information on all craft breweries in the US from the Brewers Association national database. We then aggregated these data to the metro 361 metropolitan statistical areas (MSA) in the US. Second, we sourced the creativity index for each MSA from Richard Florida’s [29] second edition of The Rise of the Creative Class. The innovation index is calculated annually by Indiana University’s Business Research Center and Purdue University’s Center for Regional Development and provides a measure of a MSAs innovation activity and capacity (Stats America [56]). Data on ages, population, income, education, and percent non–Hispanic whites were obtained from the 2010 US Census (United States Census Bureau [60]). The number of farmers markets is sourced from the USDA’s National Farmers Market Directory (United States Department of Agriculture [61]). We present the descriptive statistics for all of our variables in Table 1.

7. Results

Table 2 provides our estimates for all three of our models. Column A shows the results of the Poisson

\[^6\] To control for spatial dependence, we introduce a spatially lagged dependent variable weighted using an inverse distance squared spatial weights matrix for all metropolitan neighbors within 100 miles. The formal specification of each pair in our spatial weights matrix appears as \( w_{ij} = 1/d_{ij}^2 \), if \( d_{ij} \leq 100 \), otherwise \( w_{ij} = 0 \), where \( d_{ij} \) is the distance in kilometers between each metropolitan area \( i \) and \( j \). \( W \) is a 361×361 matrix that we use for the LM tests, and contains each pairwise combination of \( w_{ij} \) in our sample.
regression, while Column B shows the results for the Negative Binomial regression. While the coefficients vary little between the two models, results from the $\chi^2$ test of $\alpha = 0$ suggest that estimates from the negative binomial model are preferred, so discussion in the remainder of the paper will be limited to these estimates. All but one of the independent variables — the innovation index — is significant at below the one percent confidence level. Percent of population between the ages of 25 and 44 has the greatest impact, with an elasticity of 1.57. This suggests a one percent increase in the percent of persons aged 25-44 is associated with a 1.57 percent increase in the number of microbreweries at the metropolitan level. The percent non-Hispanic whites is second in magnitude at 1.49; third in magnitude is the coefficient on education, where a one percent increase in the proportion of persons with college degrees is associated with a .66 percent increase in the number of breweries; fourth, a one percent increase in median income is surprisingly negative, and is correlated with .82 percent fewer brewing establishments; fifth, a one percent increase in the creative class index is associated with .6 percent more breweries; sixth, a once percent increase in total population is correlated with a 0.58 percent increase in the number of breweries; last a one percent increase in
the number of farmer’s markets is associated with a 0.3 percent increase in breweries.

Of possible concern in our model results is multicollinearity amongst our independent variables. The presence of multicollinearity can lead to inflated standard errors of highly correlated independent variables, rendering their regression coefficients insignificant and biased estimates (Taylor, 1997). However, because most of our explanatory variables are significant, multicollinearity is likely to not be problematic in our models.

Still, we employ the commonly used variation inflation factor (VIF) test of multicollinearity, which measures the extent to which adding a specific independent variable to the model increases variation and thus the standard errors. A VIF score of 10 or greater general indicates a particular variable is problematic. Table 3 shows the VIF scores for each of our primary independent variables, with scores for the state dummy variables omitted for brevity. All of the VIF scores for our independent variables are below 10, with most below a score of four.

8. Discussion

So what do these results tell us about the locational determinants of craft brewing establishments in the United States? First, our results essentially corroborate the findings of Baginski and Bell [4]. Craft breweries are most likely to exist in metropolitan areas that have a larger proportion of their population between the ages of 25 and 44. We hypothesize a strong correlation between this age cohort and the number breweries for two reasons. First, persons between the ages of 25 and 44 represent the greatest market for craft beer consumption. These individuals were, for the most part, raised when a variety of beer styles — both from imports and from new domestic breweries — were beginning to emerge in US markets. Second, these individuals also likely represent a supply-side component, where by persons aged 25 to 44 are also the most likely to be entrepreneurial, and would thus be associated with a greater number of new brewing establishments in a metro area. Surprisingly, the effect of population is more muted than age by more than half.

Second, and surprisingly, our results indicate that income is negatively correlated with the number of craft breweries. While this finding may — at face value — appear to be counterintuitive, exploring both the cost and competition effects of high-income areas may help rationalize this finding: high-income areas are also likely to have expensive real estate markets, and since breweries tend to be space intensive (that is, the inputs for production require a relatively large parcel of real estate for operating brewing equipment), there are economic disincentives for breweries to locate in high-income areas because of greater competition with other land uses. In addition, beer (even craft beer) may be an inferior good to high-income individuals. That is, as income increases, the preferences for high-income consumers may switch from craft beer to high-quality wine and spirits.

Third, we find that metropolitan areas with a larger proportion of college-educated individuals and a larger proportion of non-Hispanic whites have greater numbers of craft breweries. We believe that more educated individuals may be more knowledgeable and appreciative of craft beer, and may have greater capacity to be entrepreneurial and open new breweries. Our interpretation of the positive coefficient on the propor-

<table>
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<th>Table 3. Variation Inflation Factor Scores</th>
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<td>Variable</td>
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<td>Creativity Index</td>
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<td>Innovation Index</td>
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<td>White (non-Hispanic)</td>
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<td>Farmers Markets</td>
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The proportion of non-Hispanic whites is parsimonious: from our colloquial observation, non-Hispanic white males make a large proportion of brewery owners. As such, we believe metropolitan areas with larger proportions of non-Hispanic whites are more likely to have craft brewery entrepreneurs.

Last, our findings also indicate that neo-localism likely matters, although the impact may be small compared to other, more fundamental factors. Our proxy for neo-localism—the number of farmer’s markets in a metropolitan area—is positively correlated with the number of craft breweries, but the magnitude is the smallest amongst the significant independent variables. However, the small magnitude could also indicate that the use of farmers markets is a poor proxy for neo-localism.

9. Some Thoughts on the Future of Craft Brewing

In this paper we explored the factors driving the location of craft breweries across 361 American metropolitan areas. As noted above, the commercial craft brewing industry has been growing at a rapid rate in recent years. In the period, 2011-2013, 1,171 new craft breweries opened up while only 135 closed down (Brewers Association [13]). So what does the future hold for this industry? In this final section we share our thoughts on this issue.

Analysts and experts predict continued growth of the craft beer segment (Watson [64]; Demeter Group [24]; Rotunno [51]). This prediction is supported by the Brewers Association’s New Brewer [45] which shows that 1,744 new craft breweries were in the planning stages in mid-2014. Data provided by the Alcohol and Tobacco Tax and Trade Bureau of the federal government show that as of June 2014, there were 4,526 active beer permits in the United States and only 2,822 active breweries (including the large scale mass producers). The difference between these two numbers (1,704) represent breweries that may be just starting to brew or may be brewing but are falling under everyone’s radar (National Beer Wholesalers Association [41]). Further evidence on the popularity of craft beer comes from a recent survey of over 1,200 members of the American Culinary Association identified locally produced beer/wine/spirits as the as the second “hottest” trend in the alcoholic beverage category (National Restaurant Association [43]).

Growth of the industry is dependent upon more people drinking craft beer. New craft beer drinkers will come from two sources—new consumers who reach the legal drinking age and choose to drink craft over traditional beer and existing traditional beer drinkers who switch to craft beer. While the traditional profile of craft beer drinkers in the United States has been White (non-Hispanic) males there is evidence that craft beer is growing in popularity among both the Hispanic and female demographics and that the younger cohorts of these two groups represent significant growth opportunities (Eisenberg [26]; Brewers Association [14]; Clarke [18]). There are also a growing number of Hispanic-owned craft breweries (Bennett [7]; CNNMoney [19]). It is also worth considering the observation of Watson [64] that most craft breweries are very small and serve very local markets. Many are brewpubs that also serve food and function as restaurants that happen to brew and serve their own beer. In many respects it could be argued that these establishments are competing for customers with casual dining restaurants. The fact that brewpubs are offering patrons their own beer, as opposed to someone else’s beer, could give them a competitive advantage. To remain competitive many casual dining restaurants may find themselves having to expand their portfolio of beers (as some have already done) to include some craft offerings—a positive development for the craft beer industry.

If the findings presented in this paper have validity then we can expect the geographic distribution of the Millennials to drive future craft brewery growth. The types of cities and places where Millennials prefer to live have been well documented (Thomas [58]; Kotkin [38]; Northington [46]). Thus metropolitan areas like New York, Los Angeles, and Chicago that have large absolute numbers of educated Millennials and metropolitan areas like San Jose, Denver, and Austin where educated Millennials comprise an above average share of the population may be poised for additional growth (Cortright [22]). Many of these metropolitan areas already lead the way in the number of craft breweries so it may well be the case that existing geographic patterns will be reinforced. At the same time we believe that there is enough room for all communities, regardless of size and demographic composition, to benefit from the establishment of new craft breweries. Today, close to 75% of the U.S. population aged 21 and over lives within 10 miles of a craft brewery (Watson
(65). As the number of craft breweries increases we should expect more and more Americans to be in even closer proximity of such an establishment.

Finally, we believe that the findings of our study have important policy implications. As noted earlier in this paper as the craft beer industry grows so does its economic importance. Craft breweries can help a region boost its tourist dollars as well as contribute to local neighborhood development. All indications suggest that the industry will continue on its growth trajectory into the foreseeable future. This growth will manifest itself in two ways. First, — entrepreneurs will establish new breweries. These will be small-scale. Second, many larger established breweries will seek second production locations as they look to minimize transportation costs associated with reaching more geographically more distant markets. Whether it is nurturing entrepreneurs of attracting a large expansion brewery local officials wishing to capitalize on these opportunities will need to understand both the nature of the industry and the factors that drive its locational preferences.

Authors’ Note: Mike Moore was a doctoral student in the Spatially Integrated Social Sciences (SISS) Program at the University of Toledo. He was in the second year of the program and for his doctoral dissertation was examining the spatial dynamics of the American craft beer industry. On April 8, 2015 Mike was sitting on a bar stool enjoying a beer at the Maumee Bay Brewing Company in Toledo, Ohio when he collapsed and fell to the floor. Paramedics were called and he was rushed to a nearby hospital. Both paramedics and doctors at the hospital worked on his heart but to no avail and Mike was pronounced dead. His academic work on the brewing industry was not coincidental with his love for craft beer, and especially not coincidental with his love for local craft beer. He was just as comfortable diving into deep conversation at a bar as he was diving into complex statistical analyses of the brewing industry. And often times, these two things came together. Thus, it is very fitting that Mike passed in a local brewery. He was 34 years old.

References


Inter-Metropolitan Location Patterns of Craft Breweries in the United States


