

# Craft Beer Market Analysis

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## Introduction

The next great revolution in beer is coming from the largest brewer in the world. That's nothing new. Our introduction of Bud Light in 1982, started as our answer to Miller Light. Bud Light quickly became the best selling beer in America and one of the best selling beers in the world. A-B InBev has developed cutting edge brewing from our history of serving a changing market, specifically, making current offerings less caloric and less alcoholic.

Our newest process, ZERO, produces an identical-tasting, low-alcohol alternative to the original beer. This new process positions us to surpass our corporate goal of making 20% of our beverages zero or near-zero alcohol by 2025. A-B's current American portfolio remains heavily weighted in lighter styles that are easy to drink. The question is, what beverages should we bring to market with this new technology?

Among craft beers, the IPA dominates.

The craft brew market has gained momentum over the last 20 years, with the number of craft breweries increase eight-fold. The national market for these beers continues to rise and millinal preference for for these beer styles remains strong. Among craft beers, the IPA dominates as the most popular style. The bitter taste profile and the higher alcohol content make the IPA well-suited to the ZERO process.

We recommend securing market share through partnership with an large, established craft brewery, as our American competitors, Heineken and Molson-Coors, already have. This partnership will credibly round out our taste portfolio and set us up to introduce low-alcohol versions to market.

The following is a summary analysis of the market based on that data and recommendations for next steps in entering that market.

## Analysis

First we bring in the data provided and clean it up for analysis.

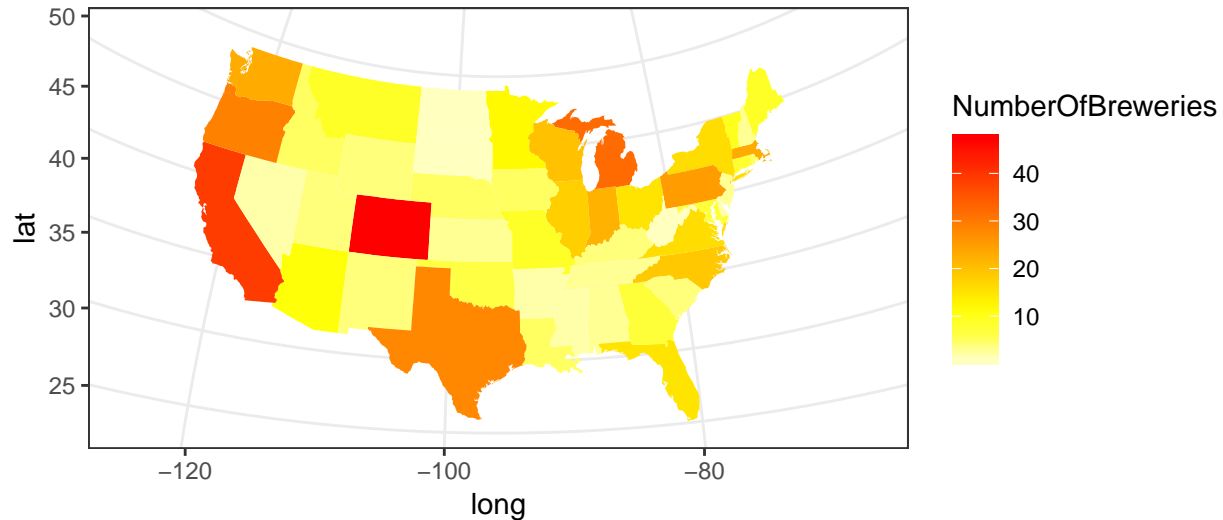
The current population data of craft breweries and beers provided for analysis contains 551 craft breweries producing 2410 beers within the United States.

## Craft Breweries across the United States

We sorted the Brewery data by number of Breweries per state.

This heat map (fig 1) reflects the concentration and variability of the 551 craft breweries across the United States. Colorado leads the way with 47 breweries, followed by a solid west coast, and predictably beer-loving states like Michigan, Texas and Pennsylvania following suit. Four states have one brewery, and No state is beer free. The median number of breweries per state is 7.

Number of Breweries in Each Mainland State, fig. 1



### Closer Look: Top 15 States with most breweries

table 1

State	NumberOfBreweries
Colorado	47
California	39
Michigan	32
Oregon	29
Texas	28
Pennsylvania	25
Massachusetts	23
Washington	23
Indiana	22
Wisconsin	20
North Carolina	19
Illinois	18
New York	16
Virginia	16
Florida	15

Two thousand four hundred and ten craft beers are produced within the United States. We combine the Brewery and Beer data and then ordered by Beer ID. As a result, the first six beers and last six beers each come from only two breweries total in table 2.

	BreweryID	BreweryName	City	State	StateName	BeerName	BeerID	ABV
1013	167	Oskar Blues Brewery	Longmont	CO	Colorado	Dale's Pale Ale	1	0.06
1014	167	Oskar Blues Brewery	Longmont	CO	Colorado	Gordon Ale (2009)	4	0.08
1008	167	Oskar Blues Brewery	Longmont	CO	Colorado	Old Chub	5	0.08
1016	167	Oskar Blues Brewery	Longmont	CO	Colorado	GUBNA Imperial IPA	6	0.09
1000	167	Oskar Blues Brewery	Longmont	CO	Colorado	Mama's Little Yella Pils	7	0.05
1012	167	Oskar Blues Brewery	Longmont	CO	Colorado	Ten Fidy Imperial Stout	8	0.09
3	1	NorthGate Brewing	Minneapolis	MN	Minnesota	Parapet ESB	2687	0.05
2	1	NorthGate Brewing	Minneapolis	MN	Minnesota	Stronghold	2688	0.06
1	1	NorthGate Brewing	Minneapolis	MN	Minnesota	Pumpion	2689	0.06
6	1	NorthGate Brewing	Minneapolis	MN	Minnesota	Wall's End	2690	0.04
5	1	NorthGate Brewing	Minneapolis	MN	Minnesota	Maggie's Leap	2691	0.04
4	1	NorthGate Brewing	Minneapolis	MN	Minnesota	Get Together	2692	0.04

## Missing Data Analysis

Some notes about the data - we ran a check for missing columns, and note the following:

There are 62 beers missing both the ABV measurement and IBU measurements.

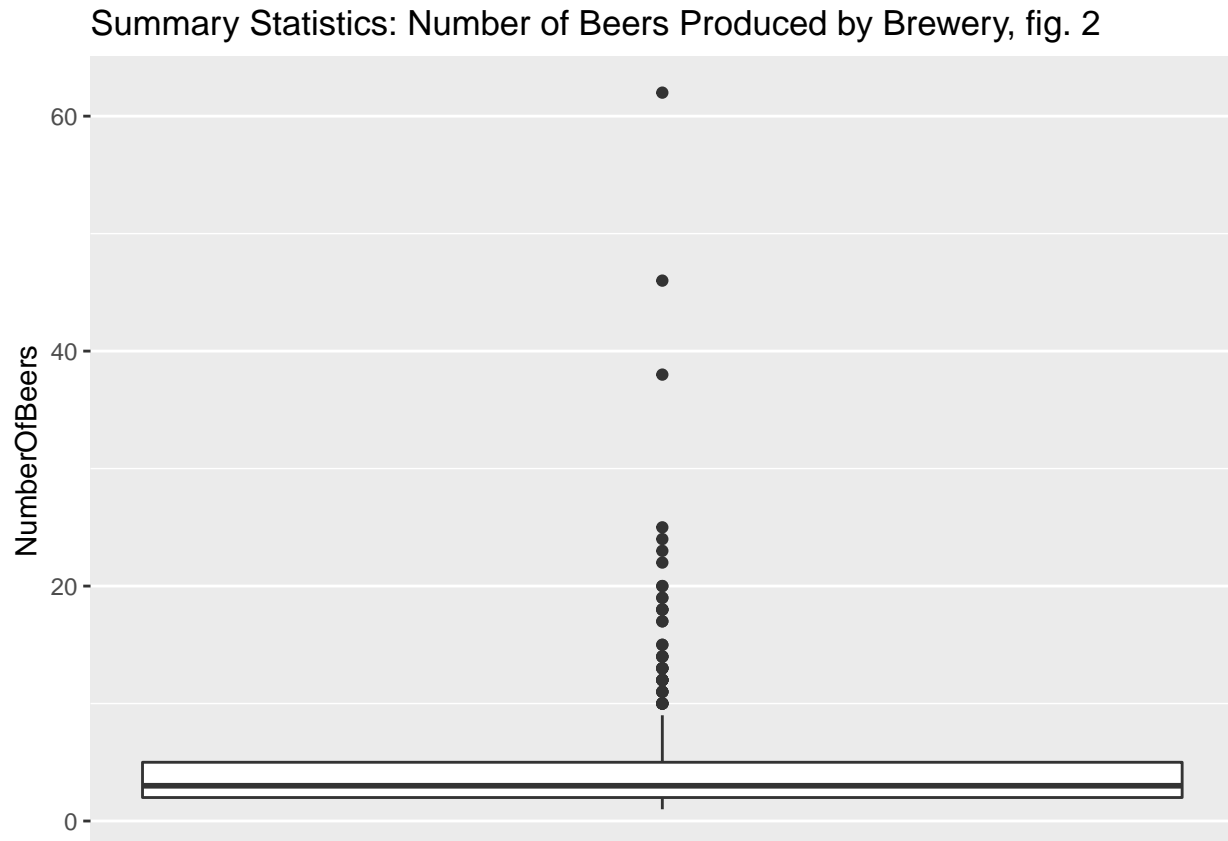
There are an additional 943 beers missing only the IBU measurement.

There are no other missing data points in the dataframe. Some missing data could be imputed if justified by a further study.

Also, a visual check of the data revealed that some beers have multiple entries marked with different years, possibly due to reformulation. We did not analyze the number of reformulations for this presentation but feel it is a good idea to vet these before the next steps.

## Brewery Production

We ordered the breweries by number of beers produced. We also ran summary statistics for brewery size, shown in figure 2. The median number of beers per brewery is 3. But if we take a deeper look, that is also quite variable, like the breweries per state. One brewery produces 62 of these beers, while 120 breweries produce only 1 beer each.



## Craft Beer Styles

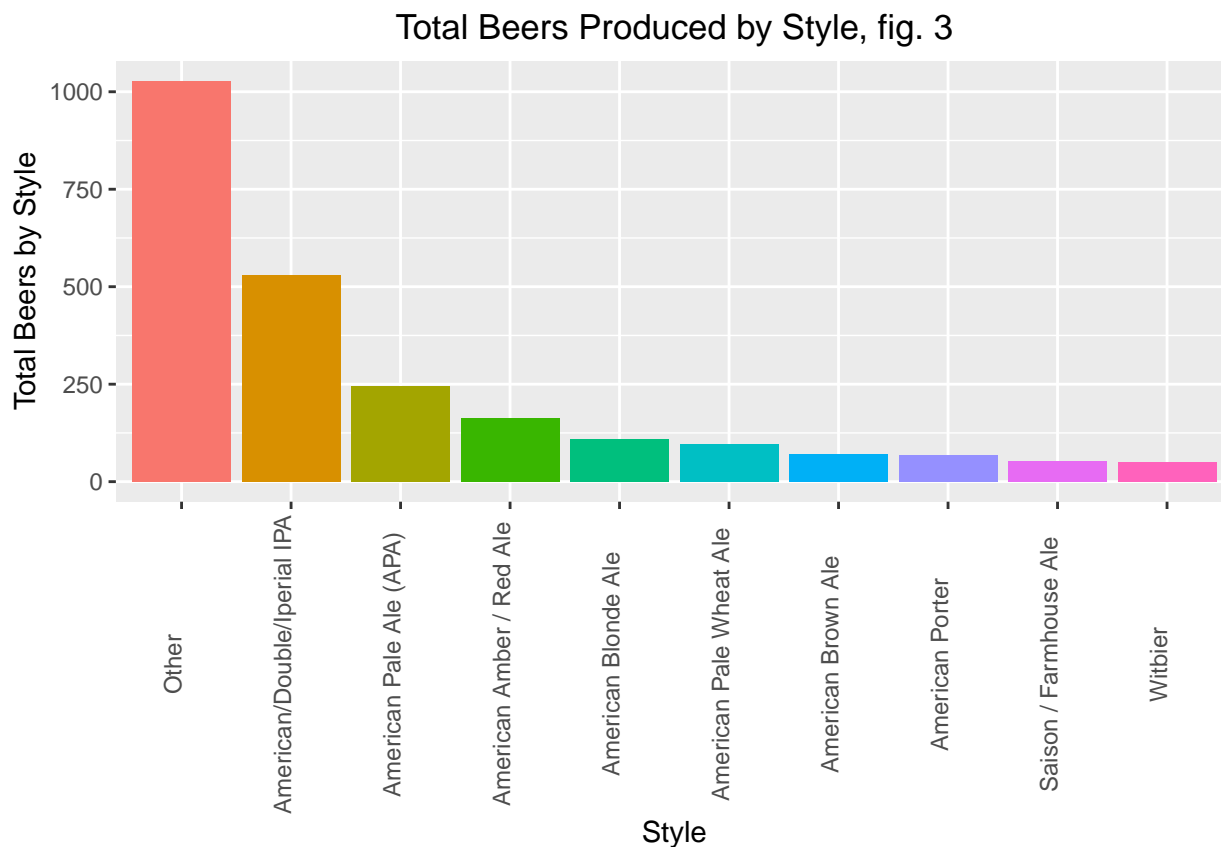
### IPA & Varietals Market Share

To find out more about the market, we analyzed craft beer styles. Some styles are close in temperament, or are too few to include as a separate entity. We combined those for analysis.

Figure 3 shows that ten beer styles account for half of the craft beers made in America

“Other” styles is comprised of 90 different styles, each with fewer than 50 beers of its type

IPA varietals have a 23.8% market share. American Pale Ales with IBU > 40 could easily be marketed and sold as IPAs. Including these increases share to 27.6%



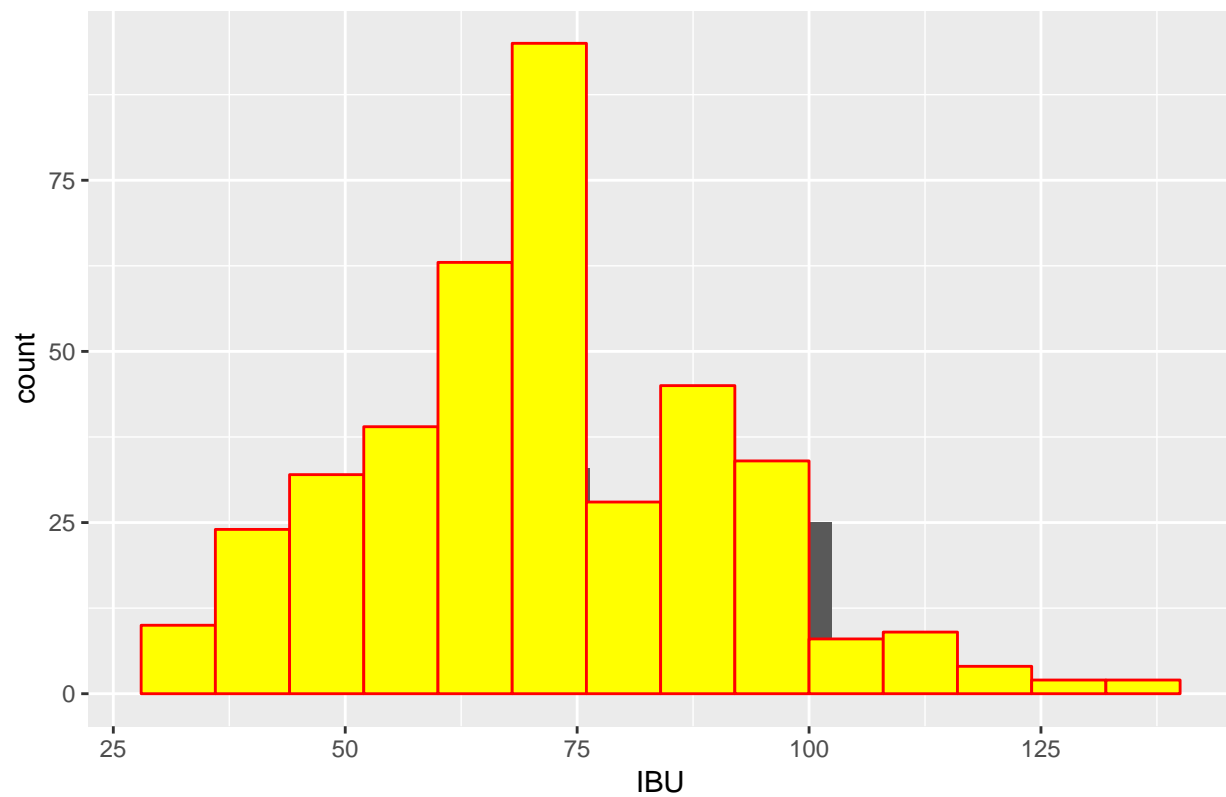
An IPA is defined in part by higher IBU. We separated the data with IBU into IPA Varietals and Non IPAs to show histograms of the IBU difference. Compare the distributions of IPA IBU ratings versus non-IPA varietals (figs 4 & 5)

IPA median IBU is 70 units, while Other varietal median IBU is 27 units.

By comparison to our best-sellers, Bud Light registers 27 IBU and Budweiser registers 12 IBU.

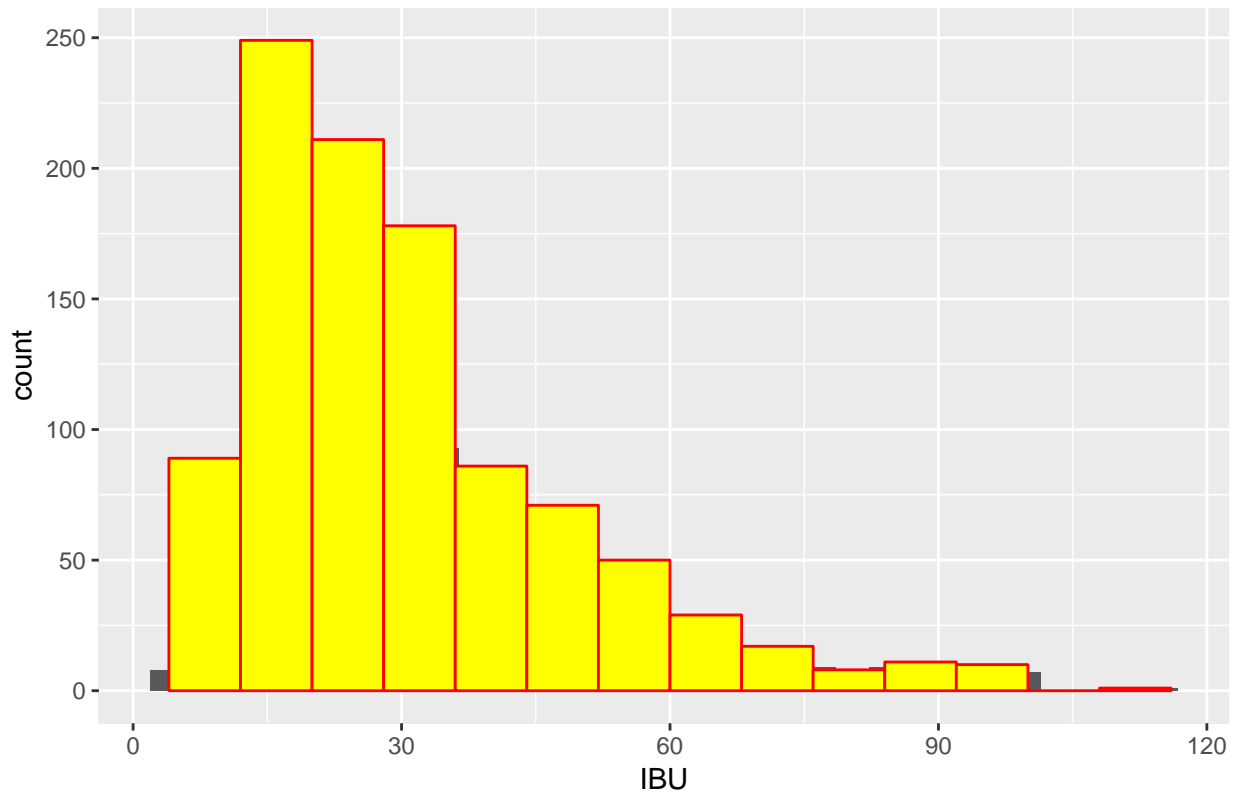
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## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
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IBU Distribution for IPA Varietals, fig. 4



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## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
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IBU Distribution for non-IPA Varietals, fig 5

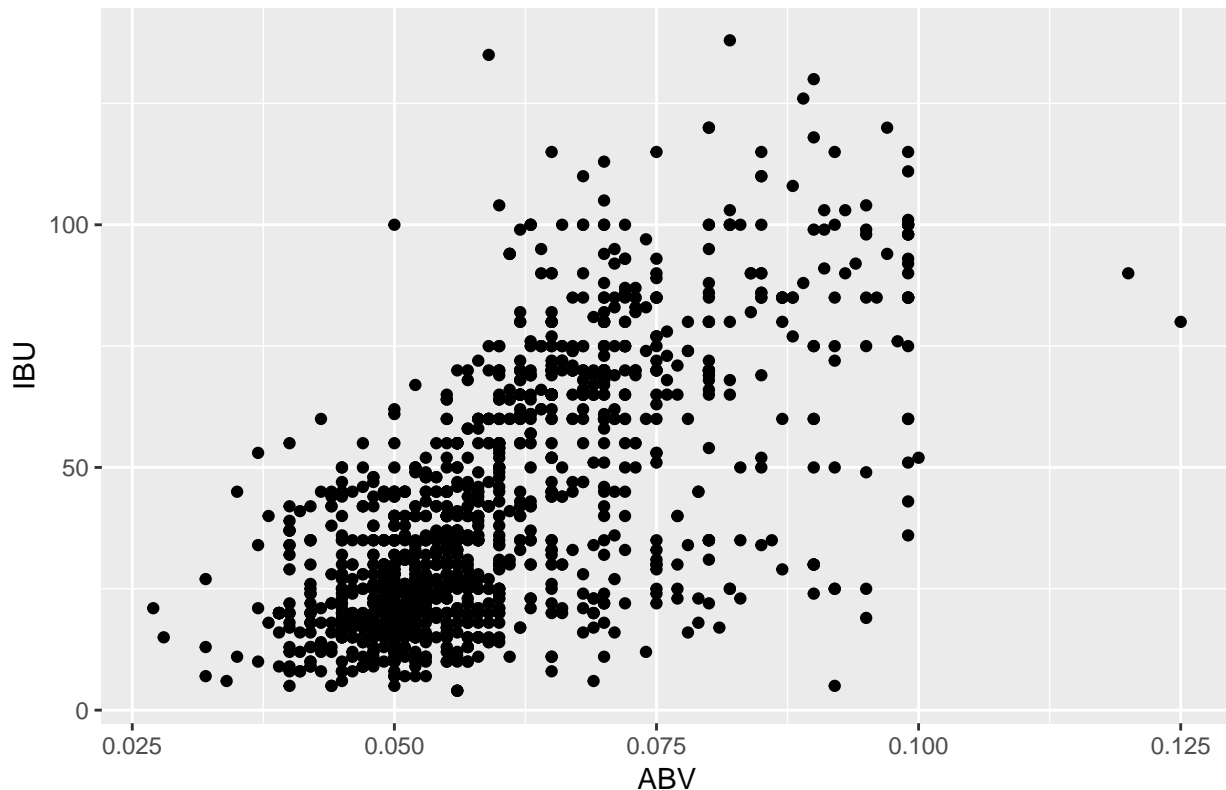


#### ABV-IBU Relationship

ABV and IBU have an obvious positive relationship. A correlation analysis of the data reports a positive correlation of .67 (fig. 6).

High IBU beers usually have higher ABV. Also, observe that the IBU range increases as ABV increases.

IBU – ABV Correlation, fig. 6



## ABV-IBU Across the Country

### Median ABV and IBU by State

We aggregated data by state to highlight regional preferences and variability in the data. We expect medians to be more consistent than individual observations since they are an accumulation of values. #as you can see the individual data is far more extreme than medians reflect.

Median ABV is relatively consistent across states, with a low of 4% in Utah to a high of 6.25% in Kentucky and Washington DC, with a median of 5.6%.

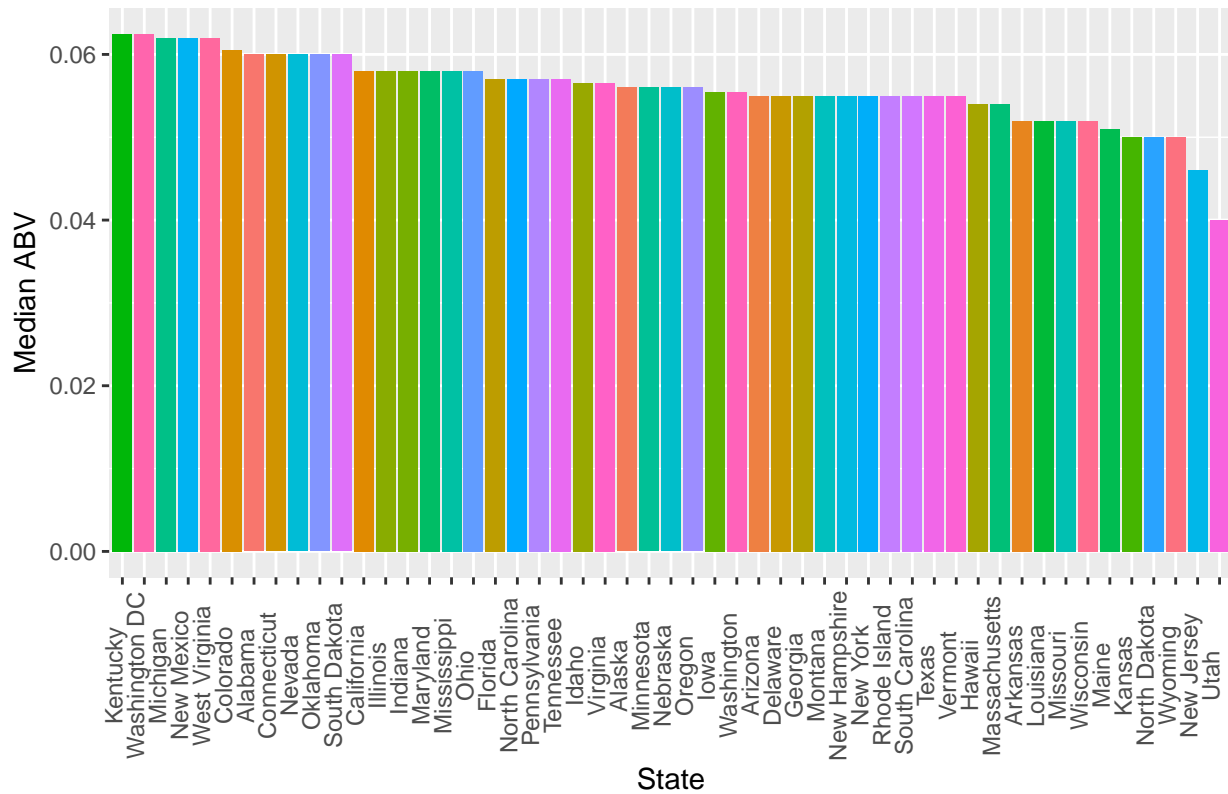
Colorado produces the beer with the single highest ABV, at 12.8%.

On the other hand, Median IBU has a relatively broad range, with a minimum of 19 units in Wisconsin to a maximum of 61 units on Maine, with a median of 35 units. This reflects the extremely broad range of the individual beers, which is due to style variety. While fermentation has traditionally produced a consistent ABV range, IBU dictates taste and is more broadly developed.

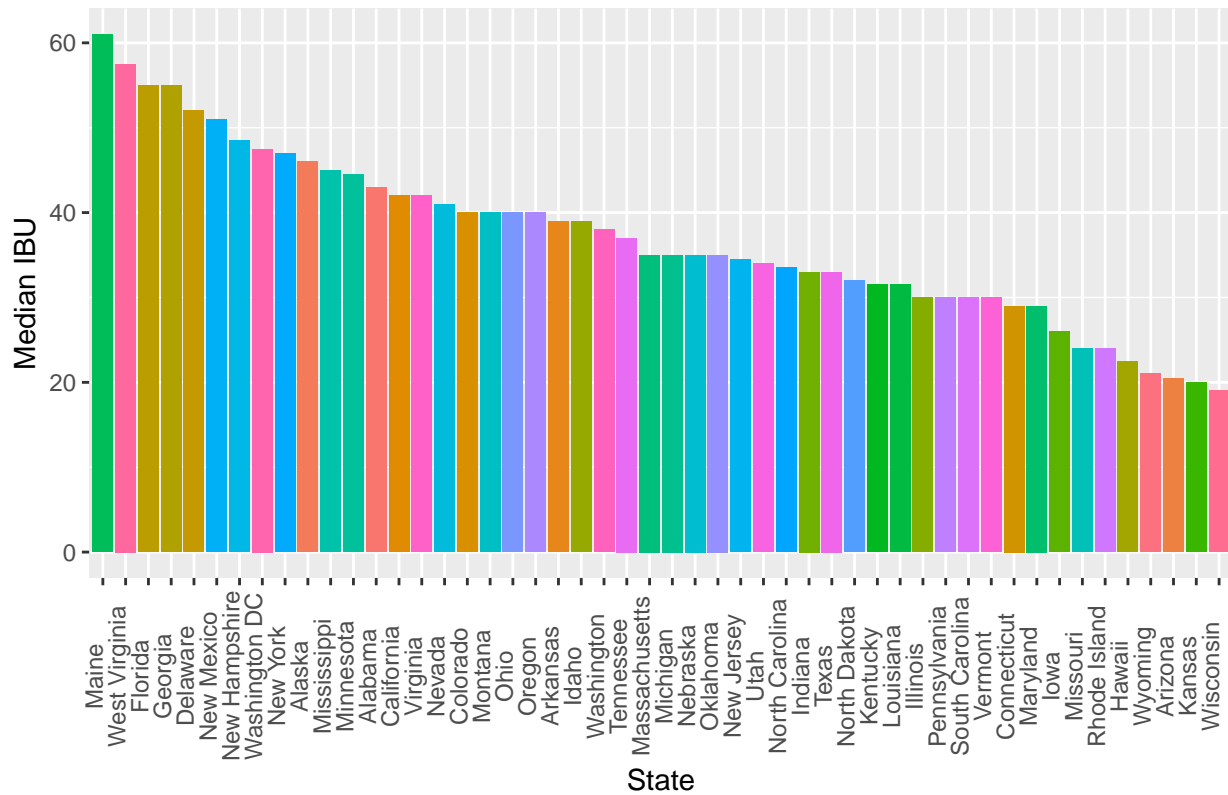
Oregon produces the bitterest single beer, at 138 IBU. That said, science has shown that human taste buds cannot register IBU over 100 units.



Median Alcohol by Volume by State, fig. 7



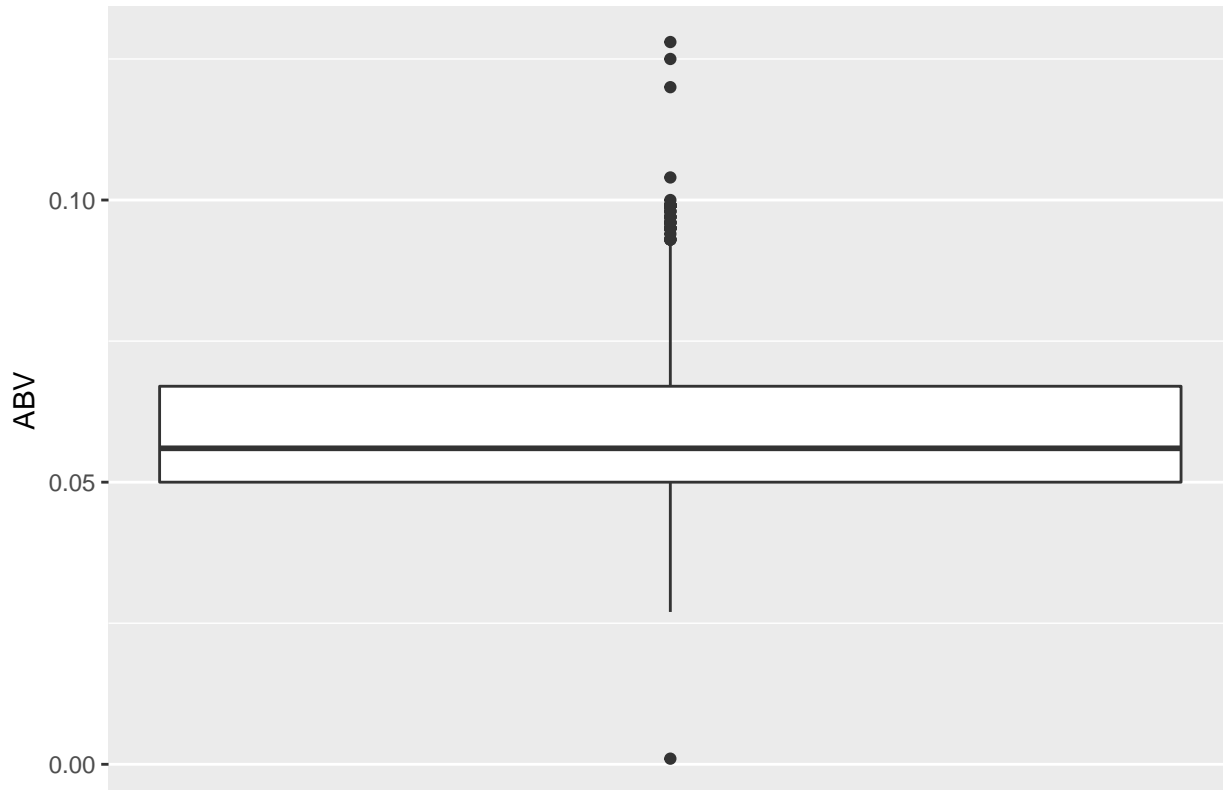
Median IBU by Volume by State, fig. 8



## Summary Statistics for Alcohol by Volume (ABV)

Digging into ABV, Beers in our study range in ABV from 0.1% to 12.8%, with 75% of beers falling between 5% and 6.7%. The median ABV for the beers in our study is 5.6% and the mean is 6.0%

Summary Statistics: Alcohol by Volume, fig. 9



## Recommendations Summary

To recap the opportunities, the American market devours IPA. A-B needs to expand its taste portfolio like its competitors, there are many craft breweries producing beers that could compliment our portfolio of offerings and set us up to create new, non-alcoholic offerings with our ZERO process.

We know from experience it is much easier to penetrate the market through partnership than through in-house development, and competitors have already done this such as Heineken partnership with Lagunitas IPA and Molson-Coors portfolio of craft breweries

## Other References

### Youtube PowerPoint Presentation

<https://youtu.be/X7wWLbDmeDM>

**Github Respository**

**<https://github.com/NicoleABartholow/MSDS6306CaseStudy1>**