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HONORS THESIS

Millennials and the alcohol industry: Expenditure variations among generations

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Abstract

This paper explores the relationship age cohorts, or generations, have had with regards to alcohol expenditure over time. Articles from popular publications such as Business Insider claim Millennials are “killing” the alcohol industry due to their lack of consumption (Taylor, 2017), but provide little empirical analysis of any academic rigor to make such claims. These claims do matter, as they have implications for the alcohol industry itself as well as investors, law enforcement, the healthcare industry, and policy makers. This paper uses four cross-sectional decadal datasets spanning from 1986 to 2016 from the United States Bureau of Labor Statistics Consumer Expenditure Survey to determine the validity of these claims, while controlling for factors such as income, marital status, race, sex, healthcare expenditure, family size, and others. The question being explored is, “Ceteris paribus, does the Millennial generational expenditure on alcohol differ from previous generations?” Left-censored Tobit I models indicate that Millennials spend more on alcohol than previous generations, as households headed by people in their 20’s spent more on alcohol in 2016 Quarter 1 than in any of the other three years’ first quarters when adjusted for inflation and controlling for demographics, income, and non-alcoholic expenditures, contradicting the claims of these articles. Following the regression analysis is a discussion of the results and their implications for the aforementioned parties.

I. Motivation

Millennials are said to be killing many industries¹, and alcohol is often counted as one of them. The “clickbait” nature of the articles making such claims create a sphere of public knowledge about the topic that could be severely distorted, as statistics are often quoted out of context, embellished, or presented in a disingenuous manner. For example, articles such as “Millennials are Killing the Beer Industry” in Appendix A make the claim that Millennials are “killing” the beer industry because from 2016-2017, national beer penetration fell 1%, while wine and spirits did not move. This is a very small market movement overall, yet it leads the writers of these articles to make such declarations as Millennials killing an entire industry. This trend is not new, and many articles are written from the starting point of Millennials “killing” an industry so that they can garner interest, but in the process it leaves readers (who will be most likely to remember the headline over any contents of the articles) with ideas that do not line up with reality. Such claims so wide-reaching as “Millennials are killing” an industry should not be taken for fact so quickly, especially with subpar data. For this reason, this paper examines the relationship between the alcohol expenditure of Millennials and the generations preceding them. Aside from alcohol being a focal point for many of the aforementioned articles, the alcohol industry is of interest to economists because alcohol is debatably a luxury good² and therefore makes a stronger study into Millennial spending habits than, say, housing or food; and alcohol is a good with several negative externalities, meaning that A. changes in a generation said to have shifting spending habits due to inherent changes in ideals (such as heightened health-consciousness, among others) would be best encapsulated by a study of their relationship with the alcohol industry and B. the results of such a study would be of interest to law enforcement organizations, governments, and healthcare systems with increasingly smaller budgets looking to effectively tailor programs to population segments most at risk.

Section II of this paper will discuss the relevant literature on the subject, broken into subsections of generations, motives for alcohol consumption, Millennial consumption, and Millennials and alcohol. Section III describes the research methodology and models used. Section IV covers data, its source, and the limitations thereof. Section V is a discussion of the results of our models, and Section VI is a discussion of contribution to the literature as well as implications of our results and potential future studies.

¹ See Appendix A

² See Section II d for further information regarding this debate

II. Literature Review

There seems to be some conflict on a consensus regarding Millennials and their economic impacts, and slim academic study of their alcohol expenditure. There are several reasons for this, chief among them being that Millennials as a generational cohort just fully became legal to drink, with the last Millennials turning 21 in 2017. For this reason, it was difficult to do any academic study prior to 2017 as the whole cohort was not yet legally able to purchase alcohol, though some would argue that the cohort still cannot, as the definitions of the generations vary.

Ia. Generations

Generational research is difficult for this exact reason: varying generational boundaries. “Generation” can be seen as an ambiguous term, as it can refer to kinship or social cohorts tied by relative closeness in birth years. This latter definition can also be referred to as an age cohort or “social generation” (Pilcher 1994). For this paper’s purpose, the latter definition is the one to which our usage of the term “generation” refers. Michael Dimock of Pew Research Center wrote on the subject of generational boundaries the Center uses. The birth-year boundaries for each major living generation are 1901-1927 for the Greatest Generation, 1928-1945 for the Silent Generation, 1946-1964 for the Baby Boomers, 1965-1980 for Generation X, 1981-1996 for Millennials, and 1997-2012 for Generation Z (Dimock 2019). While some may now choose to disregard the Greatest Generation as an economic force due to their youngest members now being 92 and their share of the adult population being <2% (Pew 2015), they still will have influence in this study’s regression analysis as they would be retirees in the 1980s, which is where the dataset begins.

Social generations do exist, but they are inherently generalizations and the creation of demographers and social scientists, rather than something natural. The factors involved with generational differences (and thereby labelling and boundary defining) fall into a few major categories, these being the life cycle, period, and cohort effects. They can be quickly summarized as life cycle/age (years since birth), period (year), and cohort (year of birth) (Dinas and Stoker 2014). The life cycle, or age, effect is the effect of age, or stage in the life cycle, on a generation’s patterns of action. The life cycle effect being at play generally means that a generation’s actions may not be entirely or even majorly based on their generation, but just that they are younger or older at the current point in time. The life cycle effect is central to this paper, and is why the data must cover a thirty year span, as measuring the current expenditure of today’s Baby Boomers and Generation Xers would likely not accurately depict how they spent money on alcohol in the days when they were the age of the current Millennials, since their

current stage in the life cycle is not one commonly associated with high alcohol consumption. The period effect is the imprint left on a generation based on political, social, economic, and military forces during their lives. Things such as Watergate and the Vietnam War, for example, occurred during the formative years of the Baby Boomers, which has strongly affected their trust in the government and support for war (Pew 2015). The final effect, the cohort effect, is similar to the period effect but more broadly applied. It is a method for pinpointing why some generations may have different outlooks based on their experiences as a whole. It serves generally as a reason for differences, rather than a descriptor in its own right. The cohort effect is involved when looking at the difference between, say, Baby Boomers and Millennials regarding the Vietnam War. The latter was not alive during the war, and therefore cannot have any memory of it. They would only know what they have learned about it (Pew 2015). Parsing out these effects in isolation is difficult, as they are all inherently related. They are linear functions of each other such that $\text{Age} = \text{Period} - \text{Cohort}$ (Winship and Harding 2008).

Ib. Motives for Alcohol Consumption

Motives for alcohol consumption can fall into three general categories: social, enhancement, and coping. Among young people, most report drinking for social reasons, while some indicate enhancement and few indicate coping (Kuntsche et. al 2005). This is not to say that younger generations don't use alcohol as a coping method, though. One study has found that Millennials are more likely to respond to economic stress (joblessness, poor economic conditions, low wage, etc.) by drinking than Baby Boomers or Xers do (Brown et. al 2015). There is a significant drawback of this paper in that it was only a single year of data (aside from that it was survey data conducted over RDD telephone, which creates sample selection bias issues), meaning that it may just be that young people use alcohol as a coping mechanism more frequently and not necessarily that the Millennial generation has a higher inherent propensity than other generations to more frequently use alcohol as a coping mechanism on average that would stick with them through age. They do find that the Millennial cohort does currently use alcohol as a coping mechanism for economic stress more frequently than other generations do today, which is significant because Millennials are facing more economic stress than other generations (Kurz, Li, and Vine 2018) and this could affect the purchasing rate and consumption rates heavily, as well as what is bought. If one is drinking due to stress, it is likely for the purpose of intoxication rather than for enjoyment, which would mean the alcohol consumed would likely be low-priced spirits as opposed to beer or wine (Brown et. al 2015). Beer, as well as spirits, tend to be thought of as "going out", "party", "trendy", or "fun" drinks, whereas wine is a "comfortable" drink, not much consumed as part of going out (Marinelli et. al 2014). The association of alcoholic beverages

with specific settings can help to determine the motivations of a given drinking person. The setting itself can do much the same.

Ic. Millennial Consumption

Millennials' consumption patterns in general (including, but not limited to alcohol) have been studied/scrutinized since the generation began emerging as an economic force, which coincides with their coming of working age, yet little has been studied with academic rigor. The Federal Reserve's Finance and Economics Discussion Series is one such study conducted with academic rigor. The paper looks at the spending profiles of Americans across generations, and seeks to determine whether or not, *ceteris paribus*, there is a fundamental difference in Millennial expenditure compared to other generations (sharing a similar premise with this paper, but differing in that they do not focus on alcohol expenditure nor mention it in the paper's body). Millennials face different economic conditions than the recent generations before them had. Millennials came of age during the worst economic crisis since the Great Depression, and that has left a significant impact on their spending habits as well as their economic standing. Millennials have a significantly lower net worth and significantly higher debt levels than the preceding generations did at the age of Millennials today (Kurz, Li, and Vine 2018). The study finds that when age, income, and other controlling factors are taken into account, Millennials don't spend less than their preceding generations (though average incomes could be seen as a defining characteristic of a generation). Overall, there is little evidence that Millennials favor consuming less, but the paper looks into whether or not they consume differently, as well. Shifts in the Millennials' market basket occur primarily in three places: housing, healthcare, and education, all seeing substantial increases. These three are all rapidly inflating in price and are outpacing the inflation rate, meaning that Millennials are spending more to get the same, or less than, the amount of goods previous generations did in these three places. The paper notes that clothing sees a decrease, likely due to the cheapness and availability of imports. Food expenditure relatively increases, but this is likely due to the lower real earnings of Millennials (Kurz, Li, and Vine 2018). Millennials, therefore, are not spending less out of their own choice, but rather because there is less for them to spend. There are other factors, such as the explosion of choices in the current economy, that affect Millennials' purchasing decisions, but overall there seems to be no fundamental rewiring of consumers with the advent of Millennials (Lobaugh, Stephens, and Simpson 2019). This is, of course, focused on the broad view of Millennials and their expenditure, and does not necessarily reflect their alcohol expenditure or expenditure in any specific industry.

IId. Millennials and Alcohol

Millennials are noted to differ on the method of consumption. Millennials are said to be relatively drinking more wine than other generations, as well as drinking less overall compared to other generations (Taylor 2017). Goldman Sachs claims that beer market penetration had dropped by one percent in 2017, from 26 to 25%, and wine and spirits held steady at 23% and 14%, respectively. For this reason, they downgraded two beer stocks, Boston Beer Company and Constellation Brands (Franck 2017; Taylor 2017). However, since the publishing of that article, Boston Beer Company's stock has risen sharply, due in large part to growth in alcoholic beverages that do not fall under the labels of beer, wine, or spirits. Brands such as Twisted Tea, Angry Orchard cider, and Truly seltzers have driven much of the growth for the company, and these brands are popular with younger people, for a variety of reasons ranging from flavor to health reasons (DiPalma 2019). While other factors for stock growth such as acquisitions and mergers with brands such as Dogfish Head (Symington 2019) can confound the impact of the non-beer alcoholic beverages, it is clear that alternative alcoholic beverages do prove to be strong factors in the alcohol market. Of course, since beer, wine, and spirits do still control 25, 23, and 14% of the market, respectively, as of 2017, these three are still the center of the alcohol market for all ages. Still, for the first time in decades, beer only holds a plurality among Americans, down from a previous supermajority (Chaudhuri and Gasparro 2018).

Millennials may not necessarily be moving away from beer, but could be moving to craft beer in place of the larger brands. The number of breweries in the United States sextupled between the years 2016 and 2017, from 900 to 5400, and the new breweries are mostly small batch operations brewing less than 100,000 barrels a year (Maloney 2017). This could partially explain why larger brands are losing market share, and also partially explain the losses larger beer brands are facing that drive the "Millennials are killing" articles. The market for beer appears to be moving along the competition spectrum from oligopoly closer to monopolistic competition, though it still leans closer to oligopoly. There are very low barriers to entry into the market, and this is why there was such a significant six-fold increase in the number of breweries. In 2018, the US Beer industry had a five firms concentration ratio of 80%, down from 90.4% in 2008 (NBWA 2019), with the largest firm, AB InBev, controlling 40.8% of the market in 2018 and 48.8% of the market in 2008.³ This is still an oligopoly, but the rise of independent craft brewers and medium-sized breweries seems to be making a strong impact on the market and weakening the hold of the largest firms.

³ See Appendix C

Craft beer, though, is also said to be slowing its growth or even losing ground. This may not be due to people consuming less craft beer, but perhaps due to a lack of supply of key ingredients, in this case hops. Due to the now-fluid nature of the beer industry, as well as the labor- and time-intensive nature of the hops plant, it is becoming difficult for these new small craft breweries to source their hops. They often request a less popular variety of hops, or one that is difficult or expensive to produce, and they tend to purchase low volumes, which hurts economies of scale. Now, farmers are increasingly unwilling to enter contracts with small brewers, citing fears of the brewery not lasting long enough to purchase the crop after it is grown, as well as the issues previously stated (Mickle 2016).

Several studies have sought to understand Millennials' consumer behavior regarding alcohol. One Tuscan study used the semantic differential approach to determine the connotations each type of alcoholic beverage has among Millennials. They found the following types of alcoholic beverages to be associated with these words:

Beer and Spirits: Young, social, euphoric, happy, appealing, trendy

Wine: Quality, pleasure, comfortable

FABs⁴ and Soft Drinks: Appealing, quality, pleasant, happy, euphoric, status, trendy

It is important to note that this may not necessarily be the case in America, as there are vast cultural differences between Italian and American drinking culture. Interestingly, however, the Italian youth are moving towards drinking in a manner that is more in line with American drinking. This is to say that they are drinking more beer and forgoing wine (inverse of Americans), and drinking outside of meals more frequently. Possible reasons include emulation of American, British, and German media where alcohol is used to party and socialize (Marinelli et. al 2014).

Another study, conducted in Greece, determined Millennials were indeed drinking less than previous generations, and this was hurting the sales of alcohol brands. However, the major reason for the loss in sales was a lack of funds with which to purchase alcohol. Greek Millennials simply did not have the money to drink as much as previous generations, and since alcohol is a luxury good (Morin and Taylor 2009)⁵, it stands to reason that it would be among the first things

⁴ FABs are flavored alcoholic beverages. Beverages such as spiked seltzers, malt liquor, or hard cider fall under this category.

⁵ Though the source provided does provide limited evidence to the luxury status of alcohol (as cutting spending on alcohol was a method of saving money during the recession), there is debate on alcohol's status as a luxury good. Beer has a price elasticity of -.3, while liquors are said to have a price elasticity of -1.5. Wine was said to be inconclusive (Ornstein & Levy 1983, Ruhm et. al 2011). However, the methodology of calculating the price elasticity of alcohol is difficult and seems to be inherently flawed due to a lack of consensus on the proper methods of measurement (Ruhm et. al 2011). Combined with the ambiguity of the term alcohol (as it is apparent that beer

cut or reduced in a budget. As for brands losing profits, there are also concerns of international homogenization (similar to the Tuscan study) and more choices leading to market crowding (Armira et. al 2016).

The vastly increasing amount of choices in the alcohol market creates difficulty in selecting what to drink. The selection process for Millennials differs from that of previous generations. Millennials are noted to value experiences with the product and brand familiarity when making purchase decisions (Geringer et. al 2014). Millennials are more likely than older generations to make their purchasing decisions based off of the recommendations of friends, as well as “shelf-talkers.” Older generations, on the other hand, generally seek out the experience of experts and store personnel when making an alcoholic beverage purchase decision (Atkin and Thach 2012). These information-gathering strategies to make a purchase decision seek to reduce the risk of making a bad or socially unacceptable purchase (Spawton 1991). The purchasers are generally seeking greater social benefits from their purchase, in an effort to impress their peers and appear knowledgeable and cultured (Orth 2005).

There are some concerns that Millennials and other generations will substitute alcohol with marijuana as it becomes legal. It is far too early to conclusively prove anything either way, but it is known that there is a substitutability among intoxicants based on their anticipated effects. (Klee et. al 1990). For this reason, there is substitutability among beer, wine, liquor, and FABs to a degree since they all will induce inebriation at similar rates per unit. Consumers may have preferences, brand loyalty, etc. but will largely substitute based on availability. Marijuana, however, may not be substitutable, as the anticipated effects of alcohol and marijuana vary greatly. Much more time and study is necessary to determine whether or not consumers will substitute alcohol for marijuana. The goods could just as equally be complements. Presently, however, in the three states where marijuana has been recreationally legal the longest (Washington, Oregon, and Colorado), there has been no significant change in beer, wine, or liquor sales that are inconsistent with national trends. Beer has decreased, spirits have increased, and wine is somewhat stagnant, but these are consistent with national trends (Ozgo 2019).

III. Research Methodology

The methods used for analysis were a series of regressions to determine the factors of alcohol expenditure in American adults, and the differences in such expenditure by age group. We run

markedly differs from liquors in elasticity, yet both are alcoholic beverages) and the inconclusiveness of wine, this study will regard alcoholic beverages in general as a luxury, and the author believes this term to be fitting despite beer’s elasticity.

four cross-sectional models on four observed quarters, those being 1986, 1996, 2006, and 2016 Quarter 1. Our basic model is that alcohol expenditure is a function of expenditure on other goods, income, educational attainment, and demographics. The combination of these gives us the following model.

$$Y(\text{alcohol}) = \beta_0 + \beta_1 x_{i1}(\text{food}) + \beta_2 x_{i2}(\text{housing}) + \beta_3 x_{i3}(\text{health}) + \beta_4 x_{i4}(\text{other}) + \beta_5 x_{i5}(\text{income}) + \beta_6 x_{i6}(\text{education}) + \beta_7 x_{i7}(\text{family_size}) + \beta_8 x_{i8}(\text{age}) + \beta_9 x_{i9}(\text{region}) + \beta_{10} x_{i10}(\text{sex}) + \beta_{11} x_{i11}(\text{race}) + \beta_{12} x_{i12}(\text{earning_composition}) + \beta_{13} x_{i13}(\text{marital_status}) + u_i$$

Where alcohol, food, housing, health, other, and income are measured in 2016 US Dollars⁶, education by level achieved (high school, college, etc.), family size is measured in members of the household, age is in decadal bins, and region, sex, race, earning composition, and marital status are series of binary variables elaborated on and shown as they were ran in the model in the definitions table in Appendix B.

Alcohol expenditure being the dependent variable creates problems for running OLS models. The major issue is that in any given year alcohol expenditure by a household can equal zero, and this is the case for about half of the observed households in our dataset. To illustrate the issue, let y be alcohol expenditure with the following characteristics: y takes on the value zero with positive probability but is a continuous random variable over strictly positive values. The amount of expenditure on alcohol by a household can be thought of as a household solving an optimization problem; They are trying to maximize their utility given budget constraints. We can model the household's utility maximization in the following function:

$$\max u = u(f, a, h_1, h_2, c) \text{ s. t.}$$

$$B = fp_f + ap_a + h_1 p_{h1} + h_2 p_{h2} + cp_c$$

Where u = utility, B = budget constraints f = food, a = alcohol, h_1 = housing,

h_2 = healthcare, c = consumer goods, and p = price.

It is entirely possible that a household would gain no utility from alcohol, either due to lack of time to consume it or a distaste for it (physically or mentally/morally), and would spend zero dollars on it. We can observe every household's expenditure, but we cannot assume it is linear with so many zeros. For this reason, to get an unbiased model, we censor all results that equal or are less than zero, as counting them would tell us little about the population of interest, but removing them from the sample entirely is throwing away data, and creating bias. Therefore we

⁶ Inflation adjustments for these variables' values were calculated using the Consumer Price Index provided by the Bureau of Labor Statistics

elected to use a left-censored Tobit I model. This model is such that, for a randomly-selected observation i from the population,

$$y_i^* = x_i\beta + u_i \quad u_i | x_i \sim \text{Normal}(0, \sigma^2)$$
$$y_i = \max(0, y_i^*)$$

Considering we are running four cross-sectional models, we can compare the amounts of censored observations in each regression in addition to the coefficients of each model, so as to observe the amount of households that purchased alcohol in each observed year's first quarter.

IV. Data

Data used in the regressions is sourced from the Consumer Expenditure Survey (CEX), organized and collected by the United States Department of Labor Bureau of Labor Statistics. Specifically, the data used comes from quarter one of the 1986, 1996, 2006, and 2016 family interview surveys. The reason for beginning with 1986 is that it was the first year in which data was available, and the other three years are decadal intervals following that first year. The Consumer Expenditure Survey is conducted quarterly to determine how American households receive and spend their money, with 10000 households being surveyed each wave. This data is then coded, and special care is taken to maintain the anonymity of the participants. The sample consists of respondents that are queried four times before leaving the sample, so that they answer for four quarters straight, and will not be in the survey for more than a year (so, for example, respondents of 1996 will not re-enter the survey in 2006, therefore it is not possible to see how specific individuals changed throughout their lives), though this study will only use data from Quarter 1 of each year, so controlling for this is not necessary. This data is public on the Bureau of Labor Statistics' website. The dataset itself is large enough that the results will be representative of the population, with 6426 respondents to the 2016 survey (a 64% response rate). Data is collected from all fifty states, though not necessarily evenly, as results can vary based on if certain states see greater or fewer respondents. An example provided by the BLS is that in 2017 they received 1500 successful completions from New York, which is disproportionate compared to New York's total percentage of the US population.⁷

As with every dataset, there are certainly limitations. Due to the longevity of the Consumer Expenditure Survey, questions are added and subtracted from the survey constantly. This leaves data incomplete, and some data isn't usable due to it not appearing in all of the necessary years. For example, to better the accuracy of the equation and to capture an often-cited growing portion

⁷ https://www.bls.gov/cex/research_papers/pumd-understanding-constraining-considerations.htm

of Millennials' spending, a student loan component was originally included. The question is, unfortunately, less than a decade old, and therefore cannot be used to compare student loan debt burdens as a factor in alcohol expenditure. Similarly, it would be ideal to have consistently asked questions going back further, but the survey was standardized in 1996 and usable data only goes back to the 1980's, which means that the oldest baby boomers in the selected sample are already 50 when they are captured at their youngest, and the youngest baby boomers are 32. Generation X and Millennials, however, are captured throughout their entire adulthood. In an ideal dataset, there would be data going back twenty years further. Of course, there is always the wish for a larger number of respondents and a more proportionate geographic/demographic distribution across the United States, but this is the case of most data, and the CEX data is rather representative of the United States already. Another issue is in adjusting for inflation, as different goods experience inflation at different rates, meaning that adjustments for inflation using the consumer price index may not be entirely accurate in capturing the true inflation of each good.

The dataset, like many others, is limited by it being self-reported data. There is inherently estimation and inaccuracy involved when people are self-reporting, as people cannot know exactly how much they spend on every individual item asked in the survey, and as such these errors are not unique to the CEX. For example, people might be able to know their income as they generally know their salaries, but they would be extremely unlikely to accurately know exactly how much they spent on food in the previous quarter. This is, of course, operating under the assumption that people are being fully truthful in their reporting. Even in fully anonymous questionnaires, there is no guarantee that self-reporters will be completely truthful. People may exaggerate their income since high incomes are desirable, or may under-report their alcohol expenditure since high alcohol expenditure is not desirable or embarrassing, or they do not want to admit the amount to themselves or other members of the household (Northrup 1996). The final limitation is that the data is at the household level, instead of the individual level, which would combine the drinking of all members of the household. In an ideal dataset, it would be at the individual level. Even with these limitations, the dataset as a whole is sufficient for its purpose.

Table 1: Summary Statistics

Summary Stats	2016		2006		1996		1986	
	Total	Sample	Total	Sample	Total	Sample	Total	Sample
Real Alcohol Expenditure	73.36 (202.12)	159.42 (273.99)	71.99 (191.19)	180.29 (268.38)	51.9 (125.76)	115.94 (167.07)	73.26 (146.21)	142.56 (178.11)
Real Food Expenditure	1286.65 (1089.92)	1501.75 (1183.12)	1166.4 (1078.63)	1386.27 (1124.03)	900.28 (903.78)	1045.36 (895.9)	877.89 (819.54)	1016.94 (952.79)
Real Housing Expenditure	2878.47 (3230.25)	3559.99 (4058.17)	2953.52 (3443.93)	3753.59 (4499.2)	1889 (2132.37)	2309.41 (2518.29)	1877.9 (2228.16)	2277.94 (2604.11)
Real Health Expenditure	701.46 (1204.33)	808.62 (24)	503.86 (930.81)	571.64 (986.64)	290.5 (1167.27)	316.15 (728.37)	264.27 (688.03)	262.97 (631.76)
Real Other Expenditures	3891.58 (6679.02)	5050.50 (7736.71)	4387.91 (6815.91)	6001.57 (8306.11)	2813 (4517.97)	3652.14 (4913.84)	2725.1 (3857.33)	3512.6 (4470.48)
Real Income	60866.73 (86459.38)	82530.88 (109321.4)	59783.21 (71175.33)	81305.54 (86113.12)	45605.09 (56592.49)	59720.72 (67100.97)	39270 (46800.64)	50531.54 (51967.4)
Less than High School	.04 (.19)	.02 (.13)	.06 (.23)	.03 (.16)	.08 (.27)	.03 (.18)	.11 (.31)	.05 (.22)
Some High School	.08 (.28)	.05 (.21)	.1 (.29)	.05 (.23)	.11 (.32)	.08 (.27)	.15 (.35)	.1 (.3)
High School Diploma	.24 (.43)	.18 (.39)	.25 (.44)	.22 (.41)	.32 (.47)	.28 (.45)	.3 (.46)	.29 (.45)
Some College	.22 (.41)	.21 (.41)	.22 (.41)	.23 (.42)	.19 (.39)	.2 (.4)	.23 (.42)	.27 (.45)
Associates Degree	.09 (.29)	.09 (.29)	.1 (.3)	.11 (.31)	.06 (.24)	.08 (.27)	.11 (.32)	.15 (.36)
Bachelors Degree	.21 (.4)	.28 (.45)	.17 (.38)	.23 (.42)	.15 (.36)	.21 (.41)	.1 (.3)	.13 (.34)
Masters or Greater	.12 (.33)	.17 (.38)	.08 (.26)	.11 (.31)	.05 (.23)	.07 (.26)	.01 (.08)	.0004 (.02)
Family Size	2.44 (1.48)	2.44 (1.37)	2.54 (1.54)	2.54 (1.46)	2.54 (1.55)	2.54 (1.46)	2.56 (1.52)	2.56 (1.41)
Male	.47 (.5)	.52 (.5)	.47 (.5)	.56 (0.49)	.6 (.49)	.69 (.46)	.66 (.47)	.73 (.44)
White	.83 (.38)	.86 (.34)	.82 (.38)	.88 (.33)	.84 (.37)	.9 (.3)	.86 (.35)	.9 (.3)
Age	51.4 (17.67)	48.67 (16.51)	48.7 (17.19)	45.83 (15.38)	46.82 (17.76)	43.24 (15.13)	45.7 (18.05)	42.21 (15.96)
Observations:	6426	2957	7786	3109	3670	1643	4007	2059

Prior to running the regressions, it is important to note from the summary statistics that it appears real alcohol expenditure peaks in 2006 and then drops slightly in 2016 among households that spent at least one dollar on alcohol, but the average expenditure among the whole population is greatest in 2016. This is likely due to the proportion of households spending on alcohol is greatest in 1986 (which had an average whole population expenditure approximately ten cents less than 2016, but a lower alcohol expenditure among drinking households), and then declines until rebounding in 2016. It seems, then, that what would be optimal for alcohol-producing firms is the highest average alcohol expenditure among the total population, as it combines the amount spent with the ratio of consuming households, in which 2016 is the highest. Of course, averages can be deceiving and can be confounded by many things, and this is for all ages, and not just age20s; For that, we turn to the regression models.

V. Results

Table 2: Tobit Model Results by Year

Variable	1986	1996	2006	2016
Real Food Expenditure	0.05045***	0.04032***	0.05461***	0.07174***
Real Housing Expenditure	0.0099***	0.00566***	0.00608***	0.00779***
Real Health Expenditure	-0.00355	0.00218	-0.00116	0.00289
Real Other Expenditures	0.00837***	0.004***	0.00069***	0.00038
Real Income	0.00042***	0.0004***	0.00061***	0.00036***
Education (Omitted: Primary)				
Some High School	22.6309	4.80578	-34.19685	82.21524**
High School	46.78955***	25.38546*	16.64025	71.28538**
Some College	82.03486***	34.84682**	58.40669***	118.6529***
Associates	81.06685***	36.12088*	40.99423***	107.2413***
Bachelors	67.59232***	74.51649***	76.26458***	163.992***
Masters +	-222.6025**	21.87145	71.8766***	162.3633***
Family Size	-30.57728***	-26.70242***	-43.60801***	-42.32638***
Age Bins (Omitted: 80-89 Year Olds)				
20-29 Year Olds	94.60102***	111.9927***	184.8154***	177.7472***
30-39 Year Olds	78.30084***	127.3485***	155.9292***	131.1981***
40-49 Year Olds	42.04171**	87.35784***	141.4662***	88.25478***
50-59 Year Olds	20.16493	65.21218***	94.13418***	98.36874***
60-69 Year Olds	31.3664	65.03883***	99.09342***	76.06361***
70-79 Year Olds	38.21326*	35.04847	54.05976**	78.13535***
Geographic Fixed Effects				
Male	77.57644***	45.71546***	83.65754***	45.15***
White	39.28943***	64.63221***	95.65224***	64.4382***
Household Earning Composition (Omitted: No-Earner Households)				
One-Earner Household	55.05707***	39.38218***	49.19583***	76.89314***
Two-Earner Household	46.89695***	56.79702***	69.46353***	133.7988***
>Two-Earner Household	72.66172***	68.45476***	105.3301***	137.3611***
Marital Status (Omitted: Never Married)				
Married	-35.39112*	-42.72454***	-24.6447	-7.93933
Widowed	-5.44832	-51.53426***	-66.23997**	20.8025
Divorced	20.22742	-24.71471*	-2.4005	-4.10569
Separated	12.35146	-54.47189*	-20.29536	-71.72227**
Constant	-259.7097***	-240.7087***	-442.9392***	-485.8835***
Observations (Uncensored)	2059	1643	3109	2957
Observations (Censored)	1948	2027	4677	3469

Looking at the results of our Tobit models, we see some consistency across all four studied years. In general more education of the reference person leads to more alcohol expenditure of the household; more income leads to greater alcohol expenditure; alcohol expenditure tapers off as age increases; white household heads and male household heads lead to more expenditure on alcohol by the household; being married at any point, regardless of current marital status, generally leads to lower alcohol expenditure; and food, housing, and general expenditures correlate strongly with higher alcohol expenditure. Interestingly, health expenditure is not correlated with alcohol expenditure at any level.

The purpose of this model is to determine whether or not people are drinking less alcohol today than in times previous. Looking at the coefficient of age20s, we can see that the coefficient

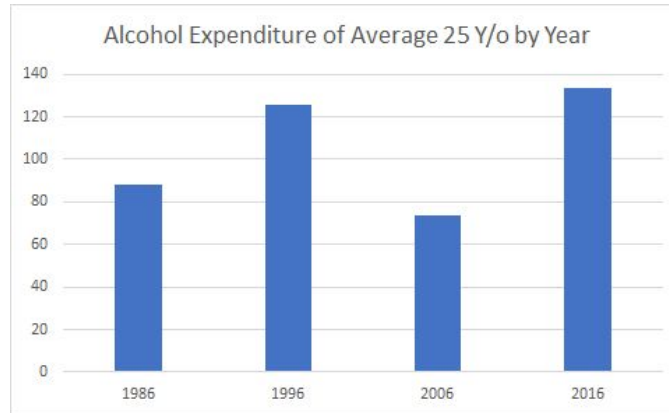
grows rapidly from 1986 (\$94.60) to 1996 (\$111.99) and 2006 (\$184.81), then decreases slightly in 2016 (\$177.75). Combining this with the generational makeup of people in their 20's in these years, shown in Table 1, we see fairly clear proof that Millennials are not “killing” the alcohol industry, as they are purchasing far more alcohol than previous generations, however there is still a slight 3.88% decline in the coefficient of age20s between 2006 and 2016.

In order to more test whether or not Millennials are spending more, and to put it in more intuitive terms, we took the mean of all of the currency-based variables (expenditures and income) in each year, as well as the proper combination of binary variables to create a generic white 25-year-old unmarried male living with one other earning person, shown in Table 3, and solved the model for these values, shown in Table 4.

Table 3: Values Inserted in Regression Equation

Variable	1986	1996	2006	2016
Real Food Expenditure	669.56	755.49	997.89	1144.56
Real Housing Expenditure	1663.87	1521.89	2393.44	2668.75
Real Health Expenditure	103.62	132.47	225.28	323.55
Real Other Expenditures	2422.68	2678.62	3515.5	3002.86
Real Income	36896.63	39118.14	43257.59	46468.26
Some High School	0	0	0	0
High School	0	0	0	0
Some College	0	0	0	0
Associates	0	0	0	0
Bachelors	1	1	1	1
Masters +	0	0	0	0
Family Size	2.09	1.99	2.08	2.07
20-29 Year Olds	1	1	1	1
30-39 Year Olds	0	0	0	0
40-49 Year Olds	0	0	0	0
50-59 Year Olds	0	0	0	0
60-69 Year Olds	0	0	0	0
70-79 Year Olds	0	0	0	0
Geographic Fixed Effects	0	0	0	0
Male	1	1	1	1
White	1	1	1	1
One-Earner Household	0	0	0	0
Two-Earner Household	1	1	1	1
>Two-Earner Household	0	0	0	0
Married	0	0	0	0
Widowed	0	0	0	0
Divorced	0	0	0	0
Separated	0	0	0	0
Constant	1	1	1	1

Table 4: Generic 25 Y/O Household Alcohol Expenditure by Year



From these results we see that our 25 year old household spent the most in 2016, followed by 1996, 1986, and 2006. Combining this with the generational compositions of vicenarians, shown in Table 5, this would suggest that Millennials, which make up the entirety of 2016’s vicenarians, are spending more than ever. The wholly Gen X 1996 also spent a high amount. 2006, having both generations in its vicenarians, should also have high expenditure, but they spend little more than half of 2016. 2006 also had the lowest percentage of people drinking in the dataset, with slightly less than 40% of households reporting to have spent at least one dollar on alcohol. This suggests that the youngest of Generation X and the oldest Millennials spent very little on alcohol. The reason why is unclear, but it is very clear that Millennials are not “killing” the alcohol industry.

Table 5: Generational makeup of vicenarians by year

Year	Generation in 20’s
1986	21: Gen X 22-29: Baby Boomers
1996	21-29: Gen X
2006	21-24: Millennials 25-29: Gen X
2016	21-29: Millennials

VI. Conclusions and Recommendations

Our study helps to fill the noticeable gap in the academic literature surrounding generational expenditure regarding Millennials. This gap, especially in alcohol expenditure, is largely the product of Millennials being too young to drink until 2017, when the last Millennials turned 21. This paper is one of what will likely prove to be many studies on Millennials and their expenditure habits as the generation ages. Our results show that the average 25 year old household spends more on alcohol now than anytime in the past thirty years. This means that Millennials are not killing the alcohol industry. However, regardless of the actual expenditure on alcohol in which generations are partaking, companies may be experiencing losses in some or all of their products. Beer may be getting substituted with wine or spirits or flavored alcoholic beverages, which means that a beer company would not be content with knowing the average consumer has spent 51% more than a consumer 30 years ago, or has more than doubled their spending from 10 years ago. From the available literature, and from conventional economic theory, we can conclude that if consumers are substituting one form of alcohol for another, the firm should respond by producing the product their consumers want. There have been some products in the alcohol industry that blossomed quickly and then faded such as hard sodas and hard ciders (Furnari 2019), but these products fit into niches and still sell rather well. However, product development is a significant financial cost, and production of another product not only has financial costs in ingredients and machinery that need to be switched out, but also the opportunity cost associated with not being able to produce the beer/wine/spirits that would have otherwise been produced (assuming no newly built factories or hired workers, which would have significant financial costs). Also, while different alcohols may be substitutable (Klee et al 1990; Moore 2010), the process for making each one varies greatly. There may be a lack of capital or skilled labor at an alcohol-producing firm to produce another form of alcohol.

Larger firms have greater resources to be able to shift/expand production and create new product lines/purchase competitors that allow themselves to sell in various alcoholic markets. This has allowed many of these firms to remain relevant and grow despite shifts in demand for some of their original products. Boston Beer Company is one such example of this mentioned in the literature review, but others such as AB InBev have been and are continuing this model, particularly in the growing hard seltzer industry. AB InBev has launched both Bud Light Seltzer and Natural Light Seltzer, Boston Beer has Truly, and other companies with more specialized products such as Drink Four Brewing Company have 4Loko Hard Seltzer, as well as Mark Anthony Brands which owns White Claw. Seltzer is likely not a fad (Furnari 2019), and ticks many of the boxes that other alcohols don't for young people, such as healthiness and being light. Overall, it seems that the best conclusion to draw from our results for firms is to continue to keep up with other firms and the shifting demands of consumers as time goes on.

For governments, healthcare, and temperance organizations that seek to limit alcohol consumption, our results do not conclusively prove that young people are purchasing more units of alcohol, but that they are spending more. This distinction matters little when considering the health of the industry, but matters significantly when trying to reduce the amount of alcohol consumed. People may be consuming less and buying more expensive alcohol. In any case, as noted in Section VI and Appendix C, it is clear that the average alcohol expenditure per person is actually declining per drinker, but the amount of drinkers is increasing. This means that more is being spent on alcohol in general, but each individual is drinking less. For those concerned with temperance and moderation, this should be taken as improvement. Also, for these organizations, the coefficients from the model should provide some guidance insofar as things positively/negatively correlated with alcohol expenditure and their change over time.

As indicated by the relatively low r^2 values, there are certainly components that can be added to the model to improve its overall accuracy. Future studies can explore what these components might be in greater depth, but Section V has already covered the components of the model we believe are missing. Future studies with data currently inaccessible to us could improve the model with data segmented by alcohol type, explore the macroeconomic effects of changes in alcohol expenditure, or control for marijuana or other intoxicants.

Appendices

A. Table of a selection of articles claiming Millennials are killing industries

Article Title	Publication	Year
Millennials' new drinking habit is stealing customers from beer companies	Business Insider	2016
Millennials are killing the beer industry	Business Insider	2017
Millennials are killing chains like Buffalo Wild Wings and Applebee's	Business Insider	2017
Millennials are killing a \$1 billion diet staple (light yogurt)	Business Insider	2016
Are Millennials Killing Wine? An Exposé.	Quench	2016
Millennials are Killing Lunch	Fortune	2017
Millennials are killing bar soap	MarketWatch	2017
Millennials are killing the golf industry	Business Insider	2016
Why Have Millennials Fallen Out of Love With Diamonds?	Daily Beast	2016
Millennials don't like motorcycles, and that's killing Harley's sales	CNBC	2017
Millennials are killing department stores	USA Today	2017
How Millennials Killed J.Crew	Nylon	2017
How Millennials Ended the Running Boom	Wall Street Journal	2016
Millennials Are Fine Without Fabric Softener; P&G Looks to Fix That	Wall Street Journal	2016
"Promiscuous" Millennials Are Killing McDonald's	The Gothamist	2014
Millennials are killing the movie business	New York Post	2016
How Europe's Millennials Killed the EU	The National Interest	2016
Millennials killed the suit, but created a culture	New Boston Post	2016
The Millennial Trends That Are Killing Cable	Forbes	2015

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B. List of variables with full definitions

Variable	Definition
Real Alcohol Expenditure	Amount spent on alcohol in observed quarter, expressed in 2016 USD
Real Food Expenditure	Amount spent on food in observed quarter, expressed in 2016 USD
Real Housing Expenditure	Amount spent on housing in observed quarter, expressed in 2016 USD
Real Health Expenditure	Amount spent on healthcare in observed quarter, expressed in 2016 USD
Real Other Expenditures	Amount spent on things aside from the above-defined variables in observed quarter, expressed in 2016 USD
Real Income	Annual pre-tax income in year of observed quarter, expressed in 2016 USD
Primary	1 if Educ_Ref=00 or 10, 0 otherwise
Some High School	1 if Educ_Ref=00, 0 otherwise
High School	1 if Educ_Ref=00, 0 otherwise
Some College	1 if Educ_Ref=00, 0 otherwise
Associates	1 if Educ_Ref=00, 0 otherwise
Bachelors	1 if Educ_Ref=00, 0 otherwise
Masters +	1 if Educ_Ref=00, 0 otherwise
Family Size	Amount of people in the household
20-29 Year Olds	1 if age=20 to 29, 0 otherwise
30-39 Year Olds	1 if age=30 to 39, 0 otherwise
40-49 Year Olds	1 if age=40 to 49, 0 otherwise
50-59 Year Olds	1 if age=50 to 59, 0 otherwise
60-69 Year Olds	1 if age=60 to 69, 0 otherwise
70-79 Year Olds	1 if age=70 to 79, 0 otherwise
80-89 Year Olds	1 if age=80 to 89, 0 otherwise
Northeast	1 if Region=1, 0 otherwise
Midwest	1 if Region=2, 0 otherwise
South	1 if Region=3, 0 otherwise
West	1 if Region=4, 0 otherwise
Male	1 if reference person is male, 0 otherwise
White	1 if reference person is white, 0 otherwise
One-Earner Household	1 if Amount of earners = 1, 0 otherwise
Two-Earner Household	1 if Amount of earners = 2, 0 otherwise
>Two-Earner Household	1 if Amount of earners > 2, 0 otherwise
Married	1 if Reference person is married, 0 otherwise
Widowed	1 if Reference person is widowed, 0 otherwise

Note: Primary, 80-89 Year Olds, West, No-Earner Household, and Never Married are the omitted variables in the model

C. Beer market by producer

<u>Brewer/Importer</u>	<u>2008 Share</u>	<u>2018 Share</u>
Anheuser-Busch Inbev	48.8%	40.8%
MillerCoors, LLC	29.4%	23.5%
Constellation	5.3%	9.9%
Heineken USA	4.2%	3.5%
Pabst Brewing	2.7%	2.1%
<u>All Other Domestic and Imports</u>	<u>9.6%</u>	<u>20%</u>
Total	100%	100%

Source: *Beer Marketer's Insights, 2019*

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