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Who is Drinking Wine in the United States? The Demographic and Socio-Economic Profile of U.S. Wine Consumers (1972-2012)

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Abstract

This article presents a historical, empirical, and econometric description of American wine consumers' demographic and socioeconomic characteristics (1972-2012). By the application of a general demand model that specifies the years of change in the structure of wine consumption in the U.S., it is shown that the evolution of wine consumption in the U.S. between 1972 and 2012 has three distinct stages; a first stage of growing wine consumption, a second stage of decline of wine consumption, and a third stage of recovery and substantial growth of wine consumption. With a model identifying the demographic and socioeconomic profile of the average American wine consumer for those years, it was then discovered that wine used to be a product associated with higher income, higher education level consumers; and it is now described as a product consumed by the younger generation, married people, and women.

Keywords: wine, US, consumption, profile

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Introduction

The United States, the third most populous country globally, is expected to reach twice its 1972 population level in the coming decade. Not only has the population almost doubled in size, nowadays the population has become qualitatively different from what it was in 1972 (Shrestha and Heisler 2011). As noted by the Bureau of the Census (2014), "The U.S. is getting bigger, older, and more diverse". The demographic changes that have already occurred since 1972 will reshape the nation in the decades to come; longer lives, fewer babies, more immigrants. It is important to recognize that this inexorable demographic momentum has important implications for the economic and social forces that shape societal well-being, and consumption patterns.

The United States is now the largest consumer and importer of wine in the world, with a prospect for growth. It is still the fourth largest wine producer; and its exports, though slowed, are growing. The United States, with over 330 million people in 2012, and a long tradition of wine production and consumption; is the country to watch over the coming decades. But, what actually happened in the last four decades? How could a country that forty years ago, was certainly not a major wine consumer could become, in recent times, the largest wine consumer in the world?

The historical, demographic, and socioeconomic analysis of American wine consumers is then valid and relevant. Who was in 1972, and is now, drinking wine in the United States? What is the demographic and socioeconomic profile of those wine consumers?

The objective of this article is to define the profile of wine consumers in the U.S. in terms of a set of demographic and socioeconomic variables during the forty years (1972-2012), in which there has been a substantive growth in wine consumption.

In the last few decades wine consumption patterns have undergone some remarkable changes. While in traditional wine producing countries there has been a rapid and significant decrease in domestic demand, new market opportunities have emerged in areas historically lacking a wine culture (Foster and Spencer 2002, Pomarici et al. 2012). The latter is the case of the United States, Northern European countries, and South East Asian countries where wine is being increasingly appreciated and growing in demand, even partially substituting traditional local alcoholic beverages (Cicia et al. 2013).

Some authors (Anderson 2004, Smith, and Mitry 2007) believe that the globalization process is driving to a convergence in wine consumption patterns by creating similar structural models of consumption. Dal Bianco et al. (2013) tested and corroborated this hypothesis of convergence by: analyzing per capita wine consumption in key world markets over the past fifty years, analyzing the dynamics of world wine consumption, and checking for the existence of a macro-tendency towards a common consumption style; despite differences in taxation, economic policies and distribution systems among countries.

This assumption is not surprising at all given that the demand for wine has historically been influenced by social, religious and cultural aspects (Banks and Overton 2010, Lee 2009). The internationalization of local markets has likely diminished these cultural differences among

countries by means of the so-called "taste standardization" process (Aizenman and Brooks 2008), and the United States is not an exception to this situation.

The United States overtook France as the leading consumer country of wine in the world in 2012; it has also become the world's largest importer of wine by volume. In 2012, almost 30 million hectoliters of wine were consumed in the U.S., while in traditional France, consumers drank 28 million hectoliters of wine (O.I.V. 2014). Wine consumption per capita was 105.6 liters in France in 1972 while it was only 6.09 liters in the U.S.; wine consumption per capita was 46.2 liters in France in 2012 and 10.33 liters in the U.S. The U.S. wine consumption has more than doubled, as opposed to the French consumption which has almost been cut in half (See Table 1). All this has happened even though the average cost of wine in the U.S. (in real terms) has increased more than ten times in the same period of time (Wine Institute 2014).

Table 1. Wine consumption in the U.S. and France (1972 and 2012)

	United States		**France**	
	1972	**2012**	**1972**	**2012**
Total Wine Consumption (Millions of Hectoliters)	13	30	55	28
Wine Consumption per Capita (Liters per Year)	6.09	10.33	105.6	46.2

Source. Wine Institute and O.I.V (2014).

Until the mid-eighties, the growth of wine consumption was due to an educated urban population with high purchasing power (Bardaji 1993). From that date, consumption of wine in the U.S. suffered a decline due to various factors, including: the increase of the minimum age for consumption of beverages, which became 21, and the change of labeling laws, forcing producers to note on the label the effects of alcohol consumption and the content of sulfite in wine (Martin de Mulas 2009). It is from the nineties when the consumption of wine began to become increasingly important, and that was caused to a certain extent, by the pressure exerted by industry institutions, i.e. Farm Bill of 1990 and Congressional Committee on Agriculture of 1991 (Bardaji 1993).

The wine market at the beginning of the twentieth century in the U.S. is heterogeneous; 50% of its consumption is concentrated in just six states: California, New York, Florida, Texas, Illinois, and New Jersey; the other 50% of wine consumption is distributed among the other 44 states (The Beverage Information Group 2013) (See Table 2).

Twenty major U.S. states (California, Florida, New York, New Jersey, Texas, Illinois, Massachusetts, Washington, Virginia, Ohio, Michigan, Pennsylvania, Arizona, North Carolina, Georgia, Maryland, Wisconsin, Connecticut, Oregon, Colorado), accounting for 73.8% of the population, concentrated near the 80.9% of total U.S. wine consumption in 2012 (The Beverage Information Group 2013) (See Table 2).

In the U.S., wine is sold with different regulations by state. A state is “Controlled” when the government distributes alcoholic beverages. There are 17 states and a county (Montgomery County, Maryland) that are controlled. Although the formula varies from state to state, generally

the state acts as a wholesaler of spirits and, in some cases, also as wine wholesaler. In twelve states, the government also operates or controls the retailers' facilities. It is considered that a state is "Non-Controlled" when the government does not actively participate in the distribution of wine and / or liquor (The Beverage Information Group 2013). By type of state, 80.5% of the wine consumed in the United States in 2012 was consumed in "Non-Controlled States", whose population corresponds to 74% of the U.S. adult population (The Beverage Information Group 2013) (See Table 2).

Table 2. U.S. Wine Consumption (2012)

30% in only the first six metropolitan coastal areas	**50% concentrated in six states (all "Non-Controlled States")**	**80% concentrated in twenty states (mostly "Non-Controlled States")**	
New York-Newark-Edison	California	California	Michigan
Los Angeles-Long Beach-Santa Ana	New York	New York	Pennsylvania
Chicago-Naperville-Joliet	Florida	Florida	Arizona
Boston-Cambridge-Quincy	Texas	Texas	North Carolina
San Francisco-Oakland-Fremont	Illinois	Illinois	Georgia
Miami-Ft. Lauderdale-Miami Beach	New Jersey	New Jersey	Maryland
		Massachusetts	Wisconsin
		Washington	Connecticut
		Virginia	Oregon
		Ohio	Colorado

Source. The Beverage Information Group (2013)

California was the state with the highest consumption (18.2%) by volume in 2012, well away from Florida which ranks second with 8.2% (The Beverage Information Group 2013). As for per capita consumption in 2012, the first position was the District of Columbia, with a consumption of almost 26 liters per capita; and New Hampshire in second place consuming nearly 20 liters per capita (Kiersz 2013). At the other end, West Virginia and Mississippi - with respectively 2.4 and 2.8 liters per capita - were the states with the lowest wine consumption per capita (Kiersz 2013) (See Figure 1).

Wine was consumed in the major metropolitan areas of the country, where much of the population is concentrated. About 62% of the total national wine consumption in 2012 was done in thirty-five major metropolitan areas, and over 30% in only the first six metropolitan areas (New York-Newark-Edison, Los Angeles-Long Beach-Santa Ana, Chicago-Naperville-Joliet, Boston-Cambridge-Quincy, San Francisco-Oakland-Fremont, and Miami-Ft. Lauderdale-Miami Beach) (The Beverage Information Group 2013). The consumer of wine in the U.S. is mainly in near-coastal states, and in particular, in large metropolitan areas (Table 2).

The New Strategist Editors in their "The Who's Buying Series - Who's Buying Alcoholic and Non-Alcoholic Beverages" (2011) described that in the U.S., wine at home was best consumed in 2010 by a customer group of householder's aged 45 – 74, married without children, non-Hispanic whites, located in the northeast and west region, and college graduates. They also described that wine at restaurants and bars were best consumed by a customer group of

householder's aged 35 to 64, married without children, or married with adult children (above 21), Asians, households in the northeast, and college graduates.

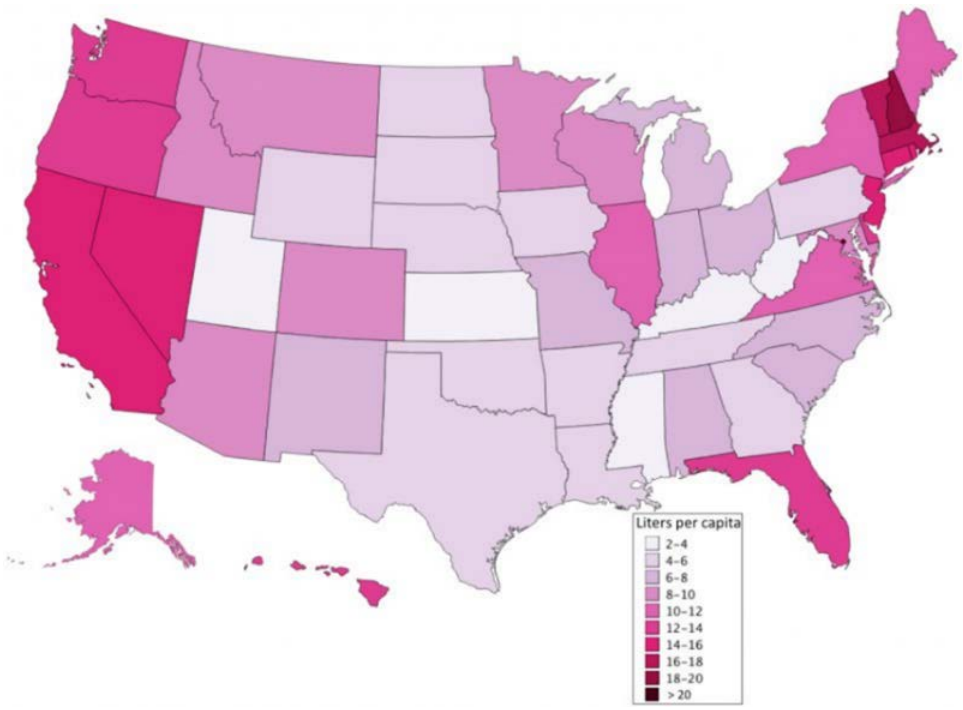

Figure 1. Wine consumption per capita in the U.S. (per state, in liters, 2012)
Source: Kiersz (2013).

Comparing with prior research in the areas of wine consumer demographics and wine consumer behavior, the extant academic literature has focused primarily on wine consumer behavior, being that wine consumer demographics is a novel area of research; there has been limited demographic profiling of the wine consumer in academic literature.

The existing academic literature of wine consumer behavior in the U.S. has been analyzed, and as mentioned before, the globalization of the wine industry and its implications for the U.S. wine industry and its consumers has been an important topic of research (see for example: Silverman et al. 2003; Cholette et al. 2005, Hussein et al. 2008).

Some other academic literature focuses in empirical studies that examine U.S. and international wine consumers' behavior and characteristics. This vast literature deals with consumers' responses to price changes (Antoniolli et al. 2011, Estrella Orrego et al. 2012, Caracciolo et al. 2013); the influence of specific geographical traits and other qualitative wine characteristics on consumer preference (Lockshin et al. 2006, Gallet 2007, Tempesta et al. 2010); ways in which differences between products are communicated to the public (Boatto et al. 2011, Sam and Thompson 2012); and the launch of promotional campaigns to boost wine consumption in emerging wine consuming countries (Pappalardo et al. 2013).

Some other authors like Olsen et al. (2003), Thach and Olsen (2004), and Nowak et al. (2006) examined how different consumer characteristics impact wine choice, wine life-cycle, and brand equity. Thach and Olsen (2006) described the perception and attitude of 108 echo boomers, also known as the millennium generation; and Atkin and Thach (2012) studied the millennium generation and their information search procedures in wine choice. In the same line of research, Olsen et al. (2007) described how four different cohorts of core U.S. wine consumers, the Millennials, Gen Xers, Baby Boomers, and Traditionalists, were first introduced to wine, and their current wine consumption preferences.

An interesting work of literature that focuses on empirical results in order to understand the behavior characteristics of American wine consumers is a study sponsored by Constellation Wines. This study mapped a segmentation of U.S. wine drinkers; it was found that premium wine consumers in the U.S. can be categorized into six segments: enthusiast, image seeker, savvy shopper, traditionalist, satisfied sipper, and overwhelmed (Constellation Wines 2005).

If the existing academic literature of wine consumer demographics is analyzed, it is interesting to see that wine consumption dynamics are continuously monitored by international organizations such as the O.I.V. (Organisation Internationale de la Vigne et du Vin – International Wine Organization), the F.A.O. (Food and Agriculture Organization), and the W.H.O. (World Health Organization), but few studies have empirically investigated the demographics of wine in a certain geographical area and its historical evolution.

There have been only a few rigorous academic studies of wine consumers and the determination of their demographic and socioeconomic profile, some in Australia and New Zealand (Bruwer, et al. 2002, Thomas and Pickering 2003, Johnson and Bruwer 2003, Bruwer and Li 2007), in Argentina (Yvon 2007), in South Africa (Ndanga et al. 2009), in China (Camillo 2012), in Chile (Palma, et al. 2014), and particularly very few in the U.S. (Bardaji 1993, Hussain et al. 2006). These papers employ different techniques to understand domestic consumer demographics and to provide with a description of wine consumer profiles, mainly using psychographic variables, and qualitative analysis.

There has been a severe paucity of econometric analysis of the determinants of the demographic and socioeconomic profile of wine consumers in the U.S. Only recently, and being probably the first study of this kind, Hussain et al. (2006) studied 122 wine consumers from Northern California using an econometric analysis with the aim of understanding the determinants of their consumption patterns. Hussain et al. (2006) used some demographic variables (age, gender, income, occupation, race), as well as behavioral variables (uses, benefits, influences, consumption volume, expenditure on wine), and knowledge level related to wine consumption. They then extrapolated their results, consumer characteristics, and the determinants of wine consumption, to the overall population of wine consumers of the U.S., a practice that this article tries to improve.

Consumer demand for a wide variety of wines — both American and imported—has exploded in recent years in the United States (Gallego 2014). As a result, new specialty wine varieties (such as “Moscato”) have been introduced, and retailers now offer many wine-related products, such as sparkling wine and wine coolers. As a result of the upsurge in consumer demand, many food

retail outlets, including conventional supermarkets and mass merchandisers, have added wine to their shelves, increasing consumer access to the product (Constellation Wines 2005). As the wine market grows, a natural question arises: who is buying wine? Gaining insight into this issue is more than just an intellectual exercise, as retailers and members of the wine industry (for example, farmers, wineries, distributors) can increase their profits by understanding who buys their wines.

This article presents a historical, empirical, and econometric description of American wine consumer's demographic and socioeconomic characteristics within the years 1972 and 2012. Data analyzed and correlated correspond to official U.S. Bureau of the Census variables (age, gender, race and ethnicity, household income, level of education, and national income - GDP), and U.S. Wine Institute variables (wine consumption in volume and per capita, and production). In this article, wine has been treated as a homogeneous good, while acknowledging that there are several wine categories; the data set on "wine consumption in volume" by the U.S. Wine Institute does not discriminate by type of wine, it only accounts the total liters of wine consumed during a year.

This article does not provide a formal hypothesis; but explains, and empirically explores, how different demographic and socioeconomic characteristics of American consumers influence wine consumption.

The article is structured as follows. Section one presents the methodology applied to define 1) the general demand model that specifies the years of change in the structure of wine consumption in the U.S. from 1972 and until 2012 (forty years), and 2) the model to identify the demographic and socioeconomic profile of the average American wine consumer for those years; considering intrinsic individual variables like age, gender, race, ethnicity, education level, household income, family structure, and beer consumption per capita since it is a traditional substitute product of wine. Section two provides the econometric results, and an analysis of the wine consumer demographic and socioeconomic profile in the U.S. Finally, the conclusion, and the references are presented.

U.S. Wine Consumers: Applied Methodology to Determine a Demographic and Socioeconomic Profile

The evolution of wine consumption in the U.S. between 1972 and 2012 shows three distinct stages: the first stage of growing wine consumption goes from the beginning of the seventies until the mid-eighties; the second stage of decline of wine consumption goes up to the mid-nineties; and the third stage is of recovery and substantial growth of wine consumption and goes from the mid-nineties until the end of the period of analysis, 2012 (Bardaji 1993 and Gallego 2014).

To identify if the determinants of those changes were the traditional variables of price and income, or if the determinants were related to a change on the consumer profile, a general model of demand for wine consumption is specified and estimated. Its analytical expression is:

(1) $DV_t = f(Wine\ Price_t, GDP_t, Beer\ Price_t)$

Where *DVt* is the quantity demanded of wine and as a substitute product, beer is selected. In the general demand function for wine consumption, the fundamental variables are the price of wine, the income, and the price of a substitute good. In this case the price of beer has been chosen as the price of the substitute good. Beer is the most consumed alcoholic beverage in the U.S. in the period of analysis. According to the theory of demand, an inverse relationship between quantity demanded of wine and the price of wine should exist, and a positive relationship between quantity demanded of wine and income or the price of beer should be expected. Between the types of demand function identified in Caraballo (2003), i.e. linear, exponential and potential, the suitable functional form for the sample data used in this paper is the exponential. Caraballo (2003) notes the exponential functional form is the best to use from a practical point of view, and Mahía (2004) adds that the parameters of a model in logarithms are especially useful for studying the demand. Econometric tests will show that in this case the exponential function is also the most suitable. Thus, the analytical expression of the model (1) is:

(2) $DV_t = \alpha_0 WinePrice_t^{\alpha 1} GDP_t^{\alpha 2} BeerPrice_t^{\alpha 3} e^{ut}$

The Chow test (Table 3) showed the presence of three structures in model (2), coinciding with the changing trends in wine consumption mentioned before. The estimate of a single model in the presence of two or more structures cannot capture these different realities. Compared with the results obtained with estimated models for each of the separate sub-samples, these results would be biased and inconsistent, that is, results would be far from the actual values of the existing sets of parameters (Pulido and Perez 2001). However, the reasons for these changes were not due to price changes (of wine or its substitute good) or income; the contrast of Harvey-Collier (Table 3) did not indicate variations of these parameters in the period. Therefore, the structural change has been marked each time by variables other than the fundamentals of a demand function, variables such as the socioeconomic characteristics of consumers. Following authors like Bardaji (1993), FOCIR (Fondo de Capitalización e Inversión del Sector Rural) (2005), Hussain et al. (2006), and Dettmann and Dimitri (2010); this article proposes a model that captures the evolution of the characteristics of U.S. wine consumers at each stage; to avoid biased, inconsistent and inefficient parameters and errors in the application of contrasts. Mahía (2011) indicates that the estimation of a single model cannot capture the various trends that present the endogenous variable; therefore the model is specified for each stage and is as follows:

(3) $DV_t = f(age_t, gender_t, race_t, education_t, household\ income_t, marital\ status_t, beer\ consumption_t$

Model (3) is estimated for each subsample identified by the Chow test, i.e. one for the period 1972-1984 (Model 3a), one for the period 1985-1993 (Model 3b), and the last for the period 1994-2012 (model 3c). For the detection of the functional form (3a, 3b and 3c), the Box-Cox technique was used. This technique, as Arrufat (1997) points out, allows testing hypotheses referred to the appropriate functional form. In order to understand wine consumption in the U.S. and determine a demographic and socioeconomic profile of American wine consumers, the variable "Wine Consumption" is dependent on a set of intrinsic demographic and socioeconomic consumer characteristics or exogenous variables, such as age, gender, race, education level, marital status, and the consumption of beer, a substitute product. The same approach has been used in studies such as Camillo (2012) for the Chinese consumer of wine and Hussain et al.

(2006) for the San Francisco wine consumer. The expected sign for age, education level, household income, and marital status is positive according to Bardaji (1993). According to Hussain et al. (2006) white people drink more wine and women drink more wine than men in the U.S.

The functional form of model (3a) for the first period (1972-1984) resulted on the application of the exponent (0) to the endogenous variable:

$$(3a) \quad lDV_t = \beta_0 + \beta_1 age_t + \beta_2 gender_t + \beta_3 race_t + \beta_4 education_t + \beta_5 household\ income_t + \beta_6 marital\ status_t + \beta_7 beer\ consumption_t + u_t$$

t=1972-1984 (first period)

For the second period the exponent (-1) was applied on the dependent variable and the exogenous constant variables.

$$(3b) \quad \frac{1}{DV_t} = \beta_0 + \beta_1 age_t + \beta_2 gender_t + \beta_3 race_t + \beta_4 education_t + \beta_5 \frac{1}{household\ income_t} + \beta_6 \frac{1}{marital\ status_t} + \beta_7 \frac{1}{beer\ consumption_t} + u_t$$

t=1985-1993 (second period)

For the third period, the exponent (-1) was also applied.

$$(3c) \quad \frac{1}{DV_t} = \beta_0 + \beta_1 age_t + \beta_2 gender_t + \beta_3 race_t + \beta_4 education_t + \beta_5 \frac{1}{household\ income_t} + \beta_6 \frac{1}{marital\ status_t} + \beta_7 \frac{1}{beer\ consumption_t} + u_t$$

t=1994-2012 (third period)

The selected functional form of the general demand model (1) was the exponential (2). The reasons are, first, because the Sum of the Squared Residuals (SSR) was lower in the exponential form than in the linear form (0.547301 versus 1.71e+18); and second, because the Ramsey's RESET contrast (squares and cube: F = 1.046142, p = 0.353; squares only, F = 0.066045, p = 0.799; cubes only, F = 0.060445, p = 0.807) indicated the correct specification of the exponential function with an associated p-value greater than 0.05 and the non-need to prove with the potential formulas. On the other hand, it has been implemented a robust estimate in model (2) due to the existence of autocorrelation (Durbin-Watson d-statistic (4, 40) is 0.1436572) and heteroskedasticity (White heteroskedasticity contrast, LM is 25.5185 with a p value of 0.00244808).

This one is a model without collinearity, as shown with the reciprocal condition number close to zero (7.9829705e-006). On the other hand, the Chow test for 1985 and 1994 showed, with a probability of less than 0.05, a structural change in the endogenous variable but not on the slope coefficients.

Table 3. Chow test and Harvey-Collier test

Chow test and Harvey-Collier test	
Chow Test of the structural change in the observation 1985	Chi-squared (4) = 212.221 (p = 8.84249e-045)
Chow Test of the structural change in the observation 1994	Chi-squared (4) = 269.295 (p = 4.52665e-057)
Harvey-Collier t(35) = 1.58018	P(t(35) > 1.58018) = 0.123062

This result implies biased, inconsistent and inefficient parameters and errors in the application of contrasts; the estimated model is invalidated (Mahía 2011). Hence we do not focus on the contrast of individual significance (t-test) or joint significance (F-Snedecor). On the other hand, the Harvey-Collier contrast indicated the stability of the estimated coefficients in the whole period; the price of wine, the GDP, or the price of the substitute good, do not explain the changing trends in wine consumption.

As a solution to the structural change, the sample is divided into the three sub-sample periods marked by the Chow test: 1972-1984, 1985-1993, and 1994-2012. As exogenous variables a set of socioeconomic factors are chosen, factors that largely define the U.S. wine consumer profile (models 3a, 3b, 3c).

The variables specified for this study are presented in Appendix A1 and the statistical descriptors in Table 4. Because the time period spans forty years, the dispersion is found in the variables.

Table 4. Statistical Descriptors

Variables	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Wine Consumption	40	2.10e+09	4.97e+08	1.31e+09	3.24e+09
Wine Price	40	9.06675	3.569833	3.043383	13.3671
GDP	40	9.03075	2.942433	4.85	13.67
Age	40	3.025	1.270726	1	5
Gender	40	1.525	0.5057363	1	2
Race	40	1.825	0.3848076	1	2
Education	40	1.725	0.4522026	1	2
Household Income	40	65321.34	7732.906	53467	76180
Marital Status	40	53.00175	4.078855	46.3	59.12
Beer Consumption	40	2.20e+10	2.26e+09	1.61e+10	2.49e+10
Beer Price	40	3.715039	0.223163	3.375521	4.204248

U.S. Wine Consumer Demographic and Socioeconomic Profile: Results and Implications

To identify the profile of the U.S. wine consumer in each period the Box-Cox technique is applied. In the period 1972-1984 the p-value associated with the LR test (see Appendix, Table A2) for the exponent (1) shows, in most cases, that there is no need to make any transformations, although the exponents (-1 and 0) could be suitable alternatives. The Box-Cox procedure was also identified through the models lhsonly, rhsonly, and lambda, as well as other exponent values (see Appendix, Table A3). All options were estimated and the functional form with a lower Sum of the Squared Residuals (SSR) (See Appendix, Tables A2 and A3) was selected. Thus, a transformation on the endogenous variable with a power of (0) was applied. In the period 1985-1993 the LR contrast identified as valid the exponents (-1, 0, 1), and the theta and rhsonly models also identified other exponents. The Sum of the Squared Residuals (SSR) drew exponent (-1) as the most suitable, both on the endogenous variable and on the exogenous ones. Finally, for the period 1994-2012 the results of the LR test and those from the lhsonly, rhsonly, and lambda models as well as the Sum of the Squared Residuals (SSR) also showed exponent (-1) was the most suitable.

The Ramsey's RESET contrast (see Appendix A4), with a p-value greater than 0.05, indicated the correct specification of the three models, therefore the estimated models were valid. The F-Snedecor, with a p-value less than 0.05, is a representative measure of the overall ability of all explanatory variables of the endogenous variable. They are models without multicollinearity as shown by the fact of an Inflation Variance Factor with a value of less than ten. Furthermore, the Breusch-Pagan, with p-values greater than 0.05, is showing no heteroskedasticity within the models and therefore random perturbations keep the same dispersion for all observations. The Breusch-Godfrey test also indicates no heteroskedasticity. Finally, the Sum of the Squared Residuals (SSR) is close to zero and follows a normal distribution.

As for the individual significance of the estimated parameters of models 3a, 3b, and 3c, as shown in Appendix A4, it is important to note that in the first period, 1972-1984, marital status with a significance level of 10%, and household income with a significance level of 1%, are the only variables that are significant and positively influenced the increased consumption of wine.

As for the second period, 1985-1993, to the above variables, education level should be added; all variables had a significance level of 1% and also favored wine consumption. These results are the same as the results presented in Bardaji (1993).

It is in the most recent period (1994-2012), when marital status (married), with a significance level of 1%; gender (women), with a significance level of 5%; and age (younger generations), with a significance level of 1%, identify the American wine consumer and show the variables that influence the increased consumption of wine in the U.S. Different studies of the U.S. wine market profile characteristics, i.e. Martin de Mulas (2009) and Thach (2014), concluded the same. Others like Hussain et al. (2006) agree on the newly significant importance of the younger population on wine consumption in the U.S., but instead their results did not show the importance of marital status (married). It is noteworthy that household income has ceased to be a

relevant factor; although and as per Gallego (2014) large consumers remain those with higher family income.

In the forty year period of this study, 1972-2012, it is observed that in the mid-90s there was a change in the American wine consumer profile, moving from a predominantly older individual with higher income and higher level of education to a consumer with a more younger, more feminine profile, where income or educational level were not significant factors. The marital status (married) remained a significant factor in the forty years of the study.

This article results corroborate what the Wine Market Council identified in their "The U.S. Wine Market Consumer Trend & Analysis Report" (2014): 1) women are more into wine than men; women more habitually drink wine than men; and women drink more table, imported, sparkling, and fortified wine than men; and 2) younger generations are becoming to be important consumers of wine. Generation X and Millennials, which represent 20% and 28% respectively of habitual wine consumers in the U.S., consume more wine than the wine consumed by the Baby-Boomers at their age, pointing to a sustainable growth of wine consumption (Wine Market Council 2014).

Race is not significant in any period; this represents a different result of what Hussain et al. (2006) pointed out when they described the San Francisco wine consumers as more White (considering the San Francisco wine consumers as to be representative of the American average consumer).

Beer was not significant as a substitute for wine, either in the general demand model or in the three models or profiles. This information corroborates what the Wine Market Council states in their Report (2014); the United States is a beer consumption country with beer having an 81% of the market share. However, it is interesting to see that the segmentation of the beverages market in the U.S. shows that in 2012, almost 100 million consumers (44%) chose wine as their first choice of alcoholic beverages compared to around 80 million (35%) of Americans that informed they were abstemious, and almost 50 million consumers (22%) that chose beer and spirits as their preferred alcoholic beverage (Wine Market Council 2014).

Even though the wine culture of the U.S. remains new, heterogeneous, and concentrated, wine consumption in the U.S. has had an increasing rate and is expected to continue to increase, becoming a more popular product, closer to the younger generations, and women.

Conclusion

"Who was then and is now drinking wine in the United States? What is the demographic and socioeconomic profile of those wine consumers?" were the relevant questions this article presented in its introduction. Interestingly enough, it is now evident that wine in the United States is a beverage that is becoming more popular, more democratic. Forty years ago, it used to be a product associated with higher income and higher education level consumers. It is now described as a product consumed by the younger generation, married people, and women.

Through a forty-year period, using an econometric analysis of demographic and socioeconomic variables of the United States population, this article tested the fact that the United States wine market and its patterns of wine consumption are changing. U.S. wine consumers follow a demographic trend that shows them younger, probably an interesting contradiction to certain stereotypes of wine connoisseurs.

Previous studies in the field employ different techniques to understand domestic consumer behavior, and to provide a description of wine consumer profiles; they mainly use psychographic variables, and a qualitative analysis. This article contributes to the field by the definition of a demographic and socioeconomic profile of wine consumers in the U.S. through a quantitative, econometric analysis, probably the first study of its kind.

Interestingly, though, this article contributes to the body of knowledge of wine consumer demographics in relation to wine consumption. American wine consumers have attracted extensive attention from wine retailers and hospitality operators; by investigating their consumer demographic and socioeconomic characteristics, this article provides stakeholders with first-hand information on wine consumption demographic characteristics in the U.S. and helpful insights on how to improve marketing strategies and increase sales. In the context of change in demographics and consequently in consumption patterns in the U.S., it is interesting to study the changes of the demographic and socioeconomic profile of consumers, as it is one of the most important tools within an organization to portray people who consume a product (Martinez and Chang 2007).

One approach to discovering who buys wines in the United States is to develop a profile of the wine consumer by analyzing socioeconomic and demographic data, with the intent of identifying which consumers are more likely to buy wine. This is the case of this article, the first effort to quantify the demographic profile of wine consumers in the United States using U.S. Bureau of the Census data. Most studies attempting to profile wine consumers rely on surveys conducted by the industry, academic researchers, or marketing consulting companies.

This article presents a historical, empirical, and econometric description of American wine consumers' demographic and socioeconomic characteristics within the years 1972 and 2012. It is observed that in the mid-90s there was a change in the American wine consumer profile, moving from a predominantly older individual with higher income and higher level of education; to a consumer with a more younger, more feminine profile, where income or educational level were not significant factors. Wine in the U.S. in the twenty-first century became more popular, more democratic.

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Appendix

Table A1. Variables of the Empirical Model for the three sub-time periods (1972-2012)

Variables	Typology	Description
Wine Consumption (*Dependent Variable, DV*)	Continuous	U.S. Wine Consumption (Total - Liters) **Source.** Wine Institute (2014)
Wine Price	Continuous	U.S. Wine Unit Price per Liter (USD constant 2005 inflation-adjusted) **Source.** Wine Institute (2014)
GDP	Continuous	U.S. Real GDP in Trillions (USD constant 2005 inflation-adjusted) **Source.** Bureau of the Census (2014)
Age	Discrete	1. If the higher rate of variation within the U.S. population is happening between the range of people of 21 to 30 years 2. If the higher rate of variation within the U.S. population is happening between the range of people of 31 to 40 years 3. If the higher rate of variation within the U.S. population is happening between the range of people of 41 to 50 years 4. If the higher rate of variation within the U.S. population is happening between the range of people of 51 to 60 years 5. If the higher rate of variation within the U.S. population is happening between the range of people of 61and more years **Source.** Own calculations following data from the Bureau of the Census (2014)
Gender	Discrete	1. If the higher rate of variation within the U.S. population is masculine 2. If the higher rate of variation within the U.S. population is feminine **Source.** Own calculations following data from the Bureau of the Census (2014)
Race	Discrete	1. If the higher rate of variation within the U.S. population is racially White 2. If the higher rate of variation within the U.S. population is racially Black and/or Hispanic **Source.** Own calculations following data from the Bureau of the Census (2014)
Education	Discrete	1. If the higher rate of variation within the U.S. population is from people with High School education 2. If the higher rate of variation within the U.S. population is from people with University (Bachelor's or higher) education **Source.** own calculations following data from the Bureau of the Census (2014)
Household Income	Continuous	U.S. Average Real Household Income (USD constant 2012 inflation-adjusted). **Source.** Bureau of the Census (2014)
Marital Status	Continuous	U.S. Married Couples (Millions) **Source.** Bureau of the Census (2014)
Beer Consumption	Continuous	U.S. Beer Consumption (Total - Liters) **Source.** Beer Institute (2014)
Beer Price	Continuous	U.S. Beer Unit Price per Liter (USD constant 2005 inflation-adjusted) **Source.** Beer Institute (2014)

Table A2. LR statistic

	LR statistic	Restricted log likelihood	LR statistic chi2	P-value Prob > chi2	SCR
Period 1972-1984					
Model (lhsonly) left-hand-side Box–Cox model	theta = -1	-229.1447	7.14	0.008	
	theta = 0	-227.20531	3.26	0.071	0.05498
	theta = 1	-225.83579	0.52	0.470	5.3e+07
Model (rhsonly) right-hand-side Box–Cox model	lambda = -1	-223.96543	0.09	0.759	4.8e+07
	lambda = 0	-223.93233	0.03	0.867	5.3e+07
	lambda = 1	-223.91845	0.00	0.989	5.3e+07
Model (lambda) both sides Box–Cox model with same parameter	lambda = -1	-229.47848	13.29	0.000	
	lambda = 0	-225.7784	5.89	0.015	
	lambda = 1	-223.91845	2.17	0.141	5.3e+07
Model (theta) both sides Box–Cox model with different parameters	theta=lambda=-1 theta=lambda=0 theta=lambda=1	Could not calculate numerical derivatives - discontinuous region with missing values encountered			
Period 1985-1993					
Model (lhsonly) left-hand-side Box–Cox model	theta = -1 theta = 0 theta = 1	could not calculate numerical derivatives - discontinuous region with missing values encountered			
Model (rhsonly) right-hand-side Box–Cox model	lambda = -1	-169.65811	0.10	0.751	1,23e+16
	lambda = 0	-169.69163	0.17	0.682	1,26e+16
	lambda = 1	-169.78511	0.35	0.552	1,28e+16
Model (lambda) both sides Box–Cox model with same parameter	lambda = -1 lambda = 0 lambda = 1	Could not calculate numerical derivatives - discontinuous region with missing values encountered			
Model (theta) both sides Box–Cox model with different parameters	theta=lambda=-1	-169.09616	0.35	0.554	6,78e-22
	theta=lambda=0	-169.31783	0.79	0.373	0,002954
	theta=lambda=1	-169.78511	1.73	0.189	1,28e+16
Period 1994-2012					
Model (lhsonly) left-hand-side Box–Cox model	theta = -1	-372.48123	0.07	0.790	1.8e-11
	theta = 0	-373.04864	1.21	0.272	.04481
	theta = 1	-375.26817	5.64	0.018	
Model (rhsonly) right-hand-side Box–Cox model	lambda = -1	-376.01193	8.85	0.003	
	lambda = 0	-375.6148	8.06	0.005	
	lambda = 1	-375.26817	7.36	0.007	
Model (lambda) both sides Box–Cox model with same parameter	lambda = -1	-372.97322	0.12	0.729	1.8e-11
	lambda = 0	-373.36933	0.91	0.340	.04557
	lambda = 1	-375.26817	4.71	0.030	
Model (theta) both sides Box–Cox model with different parameters	theta=lambda=-1 theta=lambda=0 theta=lambda=1	Could not calculate numerical derivatives - discontinuous region with missing values encountered			

Table A3. Exponents from the Box-Cox procedure

	Exponent	Coef. Std.	Err.	z	P>z	Log likelihood	SCR
Period 1972-1984							
Model (lhsonly) left-hand-side Box–Cox model	/theta	1.584516	0.7869773	2.01	0.044	-225.57532	1.9e+13
Model (rhsonly) right-hand-side Box–Cox model	/lambda	1.083179	6.115268	0.18	0.859	-223.91835	
Model (lambda) both sides Box–Cox model with same parameter	/lambda	2.128535	.6790899	3.13	0.002	-222.83428	1.6e+17
Model (theta) both sides Box–Cox model with different parameters	/lambda	could not calculate numerical derivatives - discontinuous region with missing values encountered					
	/theta						
Period 1985-1993							
Model (lhsonly) left-hand-side Box–Cox model	/theta	could not calculate numerical derivatives - discontinuous region with missing values encountered					
Model (rhsonly) right-hand-side Box–Cox model	/lambda	-1.665415	4.20e-08	-4.0e+07	0	-169.60792	7.8e+07
Model (lambda) both sides Box–Cox model with same parameter	/lambda	could not calculate numerical derivatives - discontinuous region with missing values encountered					
Model (theta) both sides Box–Cox model with different parameters	/lambda	-.0671596	3.41e-06	-2.0e+04	0	-168.92124	2.6e-11
	/theta	-1.05135	2.28e-07	-4.6e+06	0		
Period 1994-2012							
Model (lhsonly) left-hand-side Box–Cox model	/theta	-.8074698	.6481569	-1.25	0.213	-372.4459	9.4e-10
Model (rhsonly) right-hand-side Box–Cox model	/lambda	18.98895	6.049618	3.14	0.002	-371.58686	
Model (lambda) both sides Box–Cox model with same parameter	/lambda	-.7550119	.7774287	-0.97	0.331	-372.91341	2.8e-09
Model (theta) both sides Box–Cox model with different parameters	/lambda	could not calculate numerical derivatives - discontinuous region with missing values encountered					
	/theta						

Table A4. Model Estimation and Results

	Period 1972-1984	Period 1985-1993	Period 1994-2012
Const	15.6342 (0.671779)***	5.06165e-09 (4.66025e-010)*	-1.28298e-09 (1.44653e-010)***
Race	0.0245376 (0.0190782)	-7.75487e-011 (2.3083e-011)	4.21294e-013 (6.89947e-012)
Education	0.0212466 (0.0307104)	5.87594e-011 (1.34194e-011)*	-3.84081e-013 (9.70879e-012)
Gender	-0.0231891 (0.0161792)	-3.92492e-011 (1.41398e-011)	1.83723e-011 (7.46714e-012)**
Age	0.0287153 (0.0260174)	3.01334e-011 (1.82351e-011)	-1.73288e-011 (4.18801e-012)***
Marital status	0.0859141 (0.0158237) ***	-3.31147e-07 (3.61011e-08)*	1.05674e-07 (1.02017e-08)***
Household income	1.91997e-05 (8.65901e-06)*	0.000100991 (1.86187e-05)*	-4.82821e-06 (7.30785e-06)
Beer consumption	1.51007e-011 (1.17731e-011)	5.28591 (8.46592)	-1.15972 (6.3881)
R-square	0.981507	0.969249	0.970236
Corrected R-square	0.949145	0.753990	0.951295
F(7, 4)	3765.875, p=1.81e-07	5.11e+11 P=1.08e-06	136.2213 P= 8.47e-10
SSR	0.005789	6.78e-22	3.84e-21
Breusch-Godfrey	chi2= 3.349, p= 0.0672	chi2=0, p=1	chi2=0, p=1
RESET Contrast	(squares and cubes) F = 0.698777, p = 0.589 (only squares) F =0,890146, p = 0.415 (only cubes) F =0.893248, p = 0.414	There are not enough degrees of freedom	(squares and cubes) F = 0, p = 1 (only squares) F = 0, p = 1 (only cubes) F = 0, p = 1
Inflation Variance Factor (IVF)	race 1.632 education 2.560 gender 4.019 age 5.591 marital status 9.289 h. income 5.692 beer cons 11.301	race 1.384 education 6.676 gender 6.554 age 10.313 marital status 8.901 h. income 7.745 beer cons. 10.301	race 1.892 education 1.271 gender 1.587 age 2.284 marital status 7.115 h. income 2.929 beer cons. 9.368
Breusch-Pagan Contrast	LM = 5.69681 With p-value = P(Chi-square (7) > 5.69681) = 0.575563	LM = 5.24794 With p-value = P(Chi-square (7) > 5.24794) = 0.629734	LM = 19 With p-value = P(Chi-square (8) > 19) = 0.0148596
Normality of residuals Contrast	Chi-square(2) = 0.0446073 With p-value = 0.977943	Chi-square(2) = 1.049 With p-value = 0.59177	Chi-square(2) = 0.586 With p-value = 0.7461

Note. Within parentheses Typical Deviation of the coefficient estimates

*Denotes significance at the 10-percent level.

**Denotes significance at the 5-percent level.

***Denotes significance at the 1-percent level.