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U.S. Alcohol Affordability and Real Tax Rates, 1950–2011

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Abstract

Background—The affordability of alcoholic beverages, determined by the relationship of prices to incomes, may be an important factor in relation to heavy drinking, but little is known about how affordability has changed over time.

Purpose—To calculate real prices and affordability measures for alcoholic beverages in the U.S. over the period from 1950 to 2011.

Methods—Affordability is calculated as the percentage of mean disposable income required to purchase 1 drink per day of the cheapest spirits, as well as popular brands of spirits, beer and wine. Alternative income and price measures are also considered. Analyses were conducted in 2012.

Results—One drink per day of the cheapest brand of spirits required 0.29% of U.S. mean per capita disposable income in 2011 as compared to 1.02% in 1980, 2.24% in 1970, 3.61% in 1960 and 4.46% in 1950. One drink per day of a popular beer required 0.96% of income in 2010 compared to 4.87% in 1950, while a low-priced wine in 2011 required 0.36% of income compared to 1.05% in 1978. Reduced real federal and state tax rates were an important source of the declines in real prices.

Conclusions—Alcoholic beverages sold for off-premises consumption are more affordable today than at any time in the past 60 years; dramatic increases in affordability occurred particularly in the 1960s and 1970s. Declines in real prices are a major component of this change. Increases in alcoholic beverage tax rates and/or implementing minimum prices, together with indexing these to inflation could be used to mitigate further declines in real prices.

Introduction

The prices of alcoholic beverages are well established predictors of alcohol consumption and related social and health harms, including mortality.^{1,23} However, the closely related

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concept of alcohol affordability has received less attention. A recent study of alcohol demand in New Zealand has found that affordability was a more important determinant of alcohol consumption than real price over the 1988–2011 period,⁴ indicating the need for greater attention to this measure in order to affect health outcomes.

Alcohol affordability has been generally defined in terms of the relationship between the price of alcohol and personal or household income, with the key issues being which price and income measures are the most appropriate. An earlier New Zealand study⁵ used data on average whisky, wine and beer prices and average hourly gross earnings to calculate alcohol affordability as the number of minutes of work required to purchase four 10-gram standard drinks; the number of minutes required declined by 13% (for wine) to 24% (for spirits) between 1999 and 2010. This measure is similar to some commonly used tobacco affordability measures.⁶

In the United Kingdom, the National Health Service (NHS) alcohol affordability index is calculated as real total household disposable income divided by the relative alcohol price index.⁷ Anderson⁸ reports that alcohol affordability increased by 80% from 1965 to 1989 and, in a later paper,⁹ finds that affordability rose by 60% from 1980 to 2006. However, Seabrook¹⁰ criticizes the income measure used by the NHS because it is based on total household income, rather than a more appropriate per capita income measure, and it includes some imputed incomes from housing rentals and insurance policies. Seabrook's alternative affordability index shows only a 5% increase in affordability from 1999 to 2009 as compared to a 27% increase in the NHS measure.

No U.S. studies have directly addressed changes in alcohol affordability over time. Many studies note that the real value of state and federal tax rates in the U.S. have declined dramatically since the 1950s because they are defined in nominal terms, are not adjusted for inflation and are rarely raised.¹ In a recent review of the literature on alcohol prices, Xu and Chaloupka³ note and review these declines and the low value of many state beer taxes. They discuss the few studies on alcohol excise tax pass-through, which find that prices to consumers rise by 1.2–4.2 times the amount of tax.

The current study takes a long-term view of alcohol affordability in the U.S., providing details on various beverage types and quality levels, with a focus on the costs of off-premises drinking as a percentage of mean disposable income. Disposable income is adjusted for taxes paid and represents income available for discretionary purchases. An alternative measure of low income, the upper limit of the lowest quintile of household income, is also utilized. Alcoholic beverage prices vary greatly across contexts, beverage types, and brands, making the choice of any single price or index difficult. Price measures from the Bureau of Labor Statistics (BLS) alcoholic beverage consumer price indexes (CPI), which cover both on- and off-premises beer, wine and spirits prices and combine these into home, away-from-home, and overall alcoholic beverage price indexes are utilized, as are prices of specific brands available over time from two state-controlled retail systems.

Alcoholic beverages are complex multi-attribute and heterogeneous goods consisting of not only ethanol but also, in some cases, higher-quality ingredients, complex fermentation or distillation processes, aging processes, packaging materials, shipping procedures, secret recipes, and brand value created by marketing and advertising. Additionally, on-premises prices include glassware, service, access to the premises and often many other amenities. These additional attributes add to the cost and to what consumers are willing to pay but are separate from the alcohol itself.^{11,12}

In this framework, the price of alcohol per se is best represented by the price of the lowest-priced brand of each beverage type for off-premises consumption. The price of the most

popular brand is another alternative focused on popular products that most drinkers would consume or recognize. These may be best represented by the BLS alcohol price indices or the prices of popular brands, such as Bacardi Rum in the U.S. Prices should be measured in terms of a standard drink (0.6 ounces or 14 grams of ethanol) to control for differences in percentage alcohol by volume (%ABV) within a beverage type and for comparison across beverage types. Affordability for each brand or drink type is calculated as the percentage of each income measure required to purchase 1 drink per day.

Methods

Prices

The overall CPI and the alcoholic beverage CPIs were obtained from the Bureau of Labor and Statistics (BLS). The CPI for all alcoholic beverages was available from 1953 to present, whereas the CPIs for specific categories of on- and off-premises beer, wine and spirits were available for shorter periods (Table 1).

The current study identified two government monopoly states that had price lists of their alcohol brands available. Spirit prices were gathered from the Pennsylvania Alcohol Beverage Control Wine & Liquor Quarterly and were available from 1950 to 2011 and include federal and state alcohol taxes. Beer and wine prices were collected from the Washington Alcohol Beverage Control Price List and were available from 1978 to 2011 and include sales tax as well as federal and state alcohol taxes.

Because of the varying bottle sizes and %ABV for each brand, beverage volume was converted (for the current study) into standard drinks (0.6 ounces of ethanol), and the price per standard drink was calculated for each brand. Since alcohol drinks come in a varying range of container sizes (and with price per standard drink varying and typically lower for larger sizes), size was taken into account when selecting brands for comparison. Preference was given to larger sizes and to maintaining a consistent size or changing bottle size only once. Bottle sizes used for spirits were mainly a “fifth” (0.757L) and 1.75L. For wine, 1.5-L, 1-gallon, and 4-L bottle sizes were used. Beer prices were mainly for 6-packs of 12-ounce cans or bottles.

Brand choices for the current study were primarily determined by availability over time and product popularity. In the spirit category, both the cheapest available brand and one of the most popular brands were used, which are representative of other cheap and popular brands. Cheap spirit brands chosen are detailed in Appendix A (available online at www.ajpmonline.org) where information on brand, type, %ABV, and container size are presented. For the popular spirit brand, the choice was Bacardi Silver/Light/Superior rum sold in a 4/5-quart bottle (1950–1975) and 1.75-L (1980–2011) containers.

The choice for wine prices was Gallo Hearty Domestic Burgundy 1-gallon size (1978–1980) and 4-L size (1985) and Carlo Rossi’s Domestic Burgundy in 4-L bottles (1990–2011). In the beer category, the choice was Guinness extra stout and Rainier Ale. Also utilized were mean prices across all areas and observations for 1995 from the American Chamber of Commerce Research Association (ACCRA),¹³ as baseline prices for extrapolation using the “At Home” spirits, beer, and wine CPIs. Brands measured by ACCRA are J&B Scotch, Budweiser, and Gallo Chablis Blanc. These prices include all alcohol excise taxes and markups but not sales taxes.

Income

Per capita disposable income includes personal income from all sources such as wages, dividends and interest less personal taxes assessed on income and property. This measure is

available from the Bureau of Economic Analysis (BEA) over a long time period in the U.S. and may best represent average individual spending power. Aspects of the income distribution and the average or median disposable income of specific groups could also be relevant where available. Long series of various income measures are not available for the U.S.; however, a measure of low income from 1967 to 2010 was obtained from the BEA: the upper limit of the lowest quintile of household income. This measure best reflects the spending power of low-income households but is based on total, rather than disposable, household income.

Affordability

The preferred measure of affordability is the percentage of mean per capita disposable income needed to buy 1 drink each day of a particular brand in a given year. This measure reflects the cost of regular low-risk drinking and can easily be multiplied to reflect higher drinking amounts such as 2, 5, or 10 drinks per day. A measure of the cost burden of very heavy drinking on low-income households, calculated as the percentage of the upper limit of the lowest quintile of household income needed to buy 10 drinks per day of selected brands, is also presented. Analyses were conducted in 2012.

Results

The first four columns of Table 1 show the BLS CPI for all goods, and overall alcohol price indices, for the years they are available. Although the overall alcohol index has matched the all-goods CPI closely, since 1980 there has been some divergence between on-premises and off-premises prices. The on-premises index, which is also influenced by labor and real estate costs, has risen substantially more than the at-home index. From 1950 to 1980, alcohol prices only doubled, whereas the all-goods CPI increased 3.4 times, indicating a decline in real alcohol prices.

Per capita disposable income in 2011 was about three times higher in 2010 than it was in 1950. Prices for spirits, beer and wine at home estimated from the beverage-specific CPIs were used to calculate the percentage of mean disposable income needed to purchase 1 drink per day. Results indicate that beer in 1953 required five times the income share it did in 2010; wine in 1963 required 4.4 times the income share; and spirits in 1973 required three times the income share.

Table 2 presents the nominal and real (\$2011) prices of the lowest-priced spirits brand sold in Pennsylvania, as well as for the popular Bacardi light rum, along with an affordability measure calculated as the percentage of per capita disposable income required to purchase 1 drink per day. Affordability was dramatically lower in the past; drinking the cheapest spirits required 15 times the percentage of income in 1950 that it did in 2011. The cost of heavy drinking (10 drinks per day of the cheapest brand) required 45% of mean disposable income in 1950, whereas in 2011 it required less than 3%. The price of Bacardi has declined less, with the real price being about 3.3 times higher in 1950 and the cost of 1 drink per day in 1950 requiring about ten times the percentage of that year's disposable income as that required in 2011.

Appendix B (available online at www.ajpmonline.org) lists standard drink prices in \$2011 for two brands of beer, and a brand of low-priced wine available in the Washington state liquor stores over time. The real price of Guinness since 2000 has been about half the 1978 price. The Rainier and wine prices were more stable after 1980 but declined substantially from 1978 to 1980. Comparison of the current lowest prices for spirits with those for beer and wine suggests that heavy drinkers looking for the cheapest alcohol will be incentivized toward spirits. Affordability measures for beer and wine brands show reduction in the

percentage of income required over time. For Guinness, more than double the percentage of income was needed in 1978 compared to that needed 2011, whereas for wine about three times the percentage was needed.

Also considered were the alternative measure of household income (the upper limit of the lowest quintile), and the affordability of heavy drinking (10 drinks per day) for low-income households was calculated as an indicator of the burden that heavy or dependent drinkers would place on such families (Table 3). Heavy drinking has become much more affordable for such families since 1967. Currently, the burden from the cheapest spirits is about 5% of this household income measure, about one fifth of the percentage needed in 1967. The burden in 2011 is twice as high if Bacardi is chosen, which is about one third of the percentage needed in 1967. Affordability of wine has also increased since 1967 with 10 drinks per day of Carlo Rossi Burgundy requiring about 12% of household income in 2011. Less change in affordability is seen for beer, with 10 drinks of Budweiser requiring about 17% of household income compared to 25% in 1967.

The key source of the increased affordability of alcoholic beverages in the U.S. has been the decline in the real values of both federal and state taxes on beer, wine and spirits. Appendix C (available online at www.ajpmonline.org) presents the federal tax rates and average state tax rates for license states (those without government monopolies) in 2011 dollars. Many of these tax rates were three to six times higher in the 1950s than they are today. Combined state and federal spirits taxes averaged \$0.20 per standard drink in 2011 as compared to \$0.36 in 1980, \$0.87 in 1965 and nearly \$1.00 per standard drink in the 1950s. These real tax reductions have also affected the relative prices of beer, wine and spirits as they have declined much more for spirits. The average combined beer tax is now \$0.08 per standard drink compared to \$0.33 in 1950, whereas the combined wine tax has declined from \$0.22 in 1970 to \$0.07 in 2011.

Discussion

The current analysis indicates that alcohol beverages in the U.S. are now considerably more affordable than they were in the 1950s and 1960s. Consuming 1 drink per day of the cheapest brand of spirits, representing the price of alcohol with no amenities, currently requires the outlay of only 0.29% of U.S. per capita disposable income. The same purchases would have required a share of income 15 times higher in 1950, ten times higher in 1970, three times higher in 1980, twice the share in 1990, and about 25% higher in 2000.

Price data for wine and beer are not available over as long a period, but substantial increases in affordability are seen for these as well. One drink per day of Budweiser beer now requires 1.37% of per capita disposable income, and low-priced wine requires 0.36%. The same beer in 1950 would have required five times the share of income.

One source of increasing affordability is increasing real income. Real per capita disposable income has tripled since 1950 and increased by 60% since 1980. Declining real prices for alcoholic beverages account for the rest of the affordability increase with price and income changes having multiplicative effects on affordability. Declining real federal and state alcoholic beverage taxes played a key role in the price trends. These taxes are now one third to one sixth of their real values in the 1950s, with the largest reduction being implemented for spirits taxes, which were especially high, averaging about \$1 per standard drink in 1950 and 1955 in 2011 dollars. These taxes now average about \$0.20 per standard drink, constituting two thirds of the price of the cheapest spirits.

Clearly, taxes have a major impact on the price of low-priced brands and have played a major role in declining real prices for spirits. Real beer and wine taxes have declined as well

to current levels averaging \$0.07 per drink for wine and \$0.08 per drink for beer. Although federal wine taxes have always been low, average state wine taxes were six times higher in 1970 than they are at present. Declines in federal beer taxes have been more substantial, with real values less than one quarter of their 1950–1960 values. Average real state taxes have also dropped from \$0.10 to \$0.03.

Tax rates are the main policy option for maintaining real prices over time. Nearly all U.S. license state alcohol taxes are based on beverage volume and are not indexed for inflation. Options for maintaining the real value of taxes over time include periodic increases on an ad-hoc basis; indexing tax rates to the rate of inflation; and assessing all or part of the tax on a price basis (ad valorem), as done with the additional sales tax of 3% recently adopted in Maryland. Levying taxes on the basis of alcohol content, like the federal spirits tax, rather than beverage volume, would also improve the specificity of the tax and would not tax higher %ABV beverages at lower rates, as is currently the case.

From the point of view of maintaining real tax rates on alcohol, an indexed excise tax on a per-ounce-of-ethanol basis would be the preferred method. Practically, it might be easier to add an ad valorem tax, which would maintain real values without indexing but fall more heavily on more-expensive products. An indexed minimum price of alcohol could also be used to prevent erosion of the lowest-priced options.

Alcoholic beverages are highly affordable in the U.S. currently. Even 10 drinks per day can be purchased for about 5% of the upper limit of the lowest quintile of household incomes. In 1950, even the cheapest spirits would have required 45% of per capita disposable income, a substantial economic restraint. Moderate drinking has also become more affordable, and this is a benefit to the majority of drinkers who drink at low risk levels. Increased affordability may also benefit families burdened by an alcoholic or other heavy drinker, but it also erodes a barrier to problematic drinking and may lead to more such families having to bear all the other costs associated with alcohol problems.^{1,15}

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. Cook, PJ. *Paying the Tab: The costs and benefits of alcohol control*. Princeton, NJ: Princeton University Press; 2007.
2. Wagenaar AC, Salois MJ, Komro KA. Effects of beverage alcohol price and tax levels on drinking: a meta-analysis of 1003 estimates from 112 studies. *Addiction*. 2009; 104(2):179–190. [PubMed: 19149811]
3. Xu X, Chaloupka FJ. The effects of prices on alcohol use and its consequences. *Alcohol Research and Health*. 2011; 34(2):236–245. [PubMed: 22330223]
4. Wall M, Casswell S. Affordability of alcohol as a key driver of alcohol demand in New Zealand: a co-integration analysis. *Addiction*. 2013; 108:72–79. [PubMed: 22724896]
5. Imlach Gunasekara F, Wilson N. Very cheap drinking in New Zealand: some alcohol is more affordable than bottled water and nearly as cheap as milk. *The New Zealand Medical Journal*. 2010; 123(1324):103–107. [PubMed: 20953230]

6. Bogdanovica I, Murray R, McNeill D, Britton J. Cigarette price, affordability and smoking prevalence in the European Union. *Addiction*. 2011; 107(1):188–196. [PubMed: 21777323]
7. The NHS Information Centre. Statistics on Alcohol: England. Vol. 2010. Leeds, West Yorkshire, England: The Health and Social Care Information Centre; 2010 May 26. Lifestyles Statistics. Archived by WebCite®; www.webcitation.org/5whSopvNx
8. Anderson P. Alcohol as a key area. *British Medical Journal*. 1991; 303(6805):766–769. [PubMed: 1932941]
9. Anderson P. A safe, sensible and social AHRSE: New Labour and alcohol policy. *Addiction*. 2007; 102(10):1515–1521. [PubMed: 17854326]
10. Seabrook R. A new measure of alcohol affordability for the UK. *Alcohol and Alcoholism*. 2010; 45(6):581–585. [PubMed: 21075856]
11. Lancaster KJ. A new approach to consumer theory. *The Journal of Political Economy*. 1966; 74(2): 132–157.
12. Rosen S. Hedonistic prices and implicit markets: product differentiation in pure competition. *The Journal of Political Economy*. 1974; 82(1):34–55.
13. Ponicki, WR. Statewide availability data system II:1933–2003. Berkeley, CA: Pacific Institute for Research and Evaluation, Prevention Research Center; 2004.
14. Meier PS, Purshouse R, Brennan A. Policy options for alcohol price regulation: the importance of modelling population heterogeneity. *Addiction*. 2010; 105(3):383–393. [PubMed: 19839965]
15. Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *The Lancet*. 2009; 373(9682):2223–2233.

Table 1

CPIs, mean income, and affordability of 1 drink per day, % of per capita U.S. disposable income

Year	CPI				Per capita income		At-home CPI (%) ^d		
	Overall Alcohol	All-Goods	Alcohol On-Premises	Alcohol At-Home	Year shown \$	Year 2011–adjusted \$	Spirits	Beer	Wine
1950	17.6 ^b	11.1			1,378	5,718		4.87 ^b	
1955	18.1	12.3			1,707	6,369		4.05	
1960	19.3	13.6			2,013	6,801		3.61	2.92 ^c
1965	20.0	14.4			2,552	8,102		2.96	2.31
1970	23.3	17.8			3,581	9,229		2.37	1.96
1975	29.5	24.7	24.5 ^d	39.2 ^d	5,489	10,203	3.92 ^d	1.99	1.69
1980	38.7	37.8	28.4	45.7	8,779	10,654	2.69	1.66	1.44
1985	47.7	49.3	38.1	55.1	12,887	11,977	2.15	1.43	1.10
1990	57.9	59.9	49.6	64.4	16,985	12,995	1.94	1.25	0.95
1995	68.9	69.9	60.6	74.9	20,472	13,433	1.87	1.21	0.92
2000	78.2	79.0	71.1	82.8	25,956	15,073	1.64	1.04	0.82
2005	87.7	89.6	83.9	90.2	31,367	16,061	1.48	0.97	0.70
2010	100.0	100.0	100.0	100.0	36,090	16,551	1.37	0.96	0.66

Note: Source for the data is the U.S. Department of Labor, Bureau of Labor Statistics. Reference alcohol prices are averages for 1995 from the American Chamber of Commerce Research Association index.

^aSpirits are represented by J&B Scotch; beer is represented by Budweiser; wine is represented by Gallo Chablis.

^bCPI used is for Year 1953

^cCPI used is for Year 1963.

^dCPI used is for Year 1978.

CPI, consumer price index

Table 2

Historical and \$2011-adjusted prices and affordability of 1 standard drink per day of spirits brands in Pennsylvania

Year	Price				1 drink per day (% of per capita disposable income)			
	(Year shown \$)		(Year 2011 –adjusted \$)		Bacardi		Bacardi	
	Cheapest Spirits	Bacardi	Cheapest Spirits	Bacardi	Cheapest Spirits	Bacardi	Cheapest Spirits	Bacardi
1950	0.17	0.21	1.57	2.00	4.46	5.67		
1955	0.20	0.24	1.66	2.04	4.23	5.20		
1960	0.20	0.26	1.51	1.98	3.61	4.72		
1965	0.21	0.29	1.51	2.09	3.02	4.18		
1970	0.22	0.31	1.27	1.79	2.24	3.15		
1975	0.23	0.33	0.95	1.36	1.51	2.17		
1980	0.25	0.34	0.67	0.92	1.02	1.41		
1985	0.27	0.39	0.57	0.82	0.77	1.11		
1990	0.27	0.44	0.47	0.76	0.59	0.95		
1995	0.28	0.48	0.41	0.71	0.50	0.86		
2000	0.28	0.51	0.36	0.66	0.39	0.71		
2005	0.28	0.58	0.32	0.67	0.33	0.68		
2010	0.29	0.66	0.30	0.68	0.30	0.67		
2011	0.29	0.66	0.29	0.66	0.29	0.65		

Table 3

Burden of heavy drinking on low-income households

Year	Upper limit of lowest quintile of Household income (\$)	10 drinks a day as % of lowest-quintile income					
		Cheap spirits	Bacardi	Gallo	Chablis	Guinness	Budweiser
1967	3,000	25.66	35.57	19.66	—	—	25.14
1970	3,688	21.75	30.62	19.05	—	—	22.99
1975	5,000	16.60	23.78	18.51	—	—	21.80
1980	7,478	12.02	16.52	16.90	41.45	19.53	18.48
1985	9,941	10.00	14.33	14.23	35.72	17.02	15.06
1990	12,500	7.98	12.87	12.93	23.89	15.84	17.30
1995	14,400	7.06	12.20	13.10	28.67	17.20	15.06
2000	17,920	5.62	10.32	11.95	23.51	15.06	15.84
2005	19,178	5.35	11.09	11.50	23.89	15.84	17.30
2010	20,000	5.36	12.02	11.99	28.67	17.30	17.30

Note: Spirits prices are from Pennsylvania, Guinness price is from Washington; Gallo and Budweiser prices are extrapolated from 1995 U.S. average American Chamber of Commerce Research Association prices using the beer and wine off-premises consumer price indexes.