
Effects of Changes in Alcohol Prices and Taxes

Alcohol research is carried out from a variety of disciplinary backgrounds and perspectives. From an economic perspective, alcoholic beverages are consumer goods, and therefore what is known about consumer behavior in general is likely to provide insights into alcohol consumption in particular. Perhaps the most basic prediction from the economic model of consumer behavior is that, other things being equal, consumer demand for a given good falls when the price of that good rises. A large body of research shows that this “law of demand” holds for alcoholic beverages. This means that excise taxes and other public policies that affect the price of alcohol can influence the demand for alcohol.

Because excessive consumption of alcohol has adverse consequences for health and safety, the consumer response to changes in alcoholic beverage prices is an especially important topic for investigation. One research approach, pioneered in the early 1980’s (Cook 1981; Cook and Tauchen 1982), is to examine the direct relationships between alcohol tax rates and such public health outcomes as traffic fatalities and cirrhosis of the liver. An alternative approach is to examine the linkages through which an alcohol tax increase might reduce alcohol-related problems. Taking this approach leads to questions such as: How much does the consumption of alcoholic beverages fall when prices increase? Do persons who drink heavily respond as much to price changes as lighter drinkers do? Do college students and young adults respond as much to price changes as other adults do? The two approaches complement each other and provide a richer and more complete understanding of the nature of price and tax effects.

This section reviews recent economic research on the relationship between alcohol prices or taxes and alcohol consumption and related problems. Because the focus is on recent research findings,

this section does not contain a comprehensive review of earlier research on these topics (such reviews can be found in Chaloupka 1993; Chaloupka et al. 1998; Cook and Moore 1993a; Kenkel and Manning 1996; Leung and Phelps 1993). In addition, although this section is limited to studies of alcohol prices and taxes, economic research has made other important contributions to the field of alcohol research. These include studies of the effect of advertising on alcohol demand (Saffer 1996); the geographic relationships between outlet density, alcohol availability, and alcohol-related problem rates (Gruenewald et al. 1996); the effect of raising legal drinking ages on traffic fatalities (Wagenaar 1993); the effects of macroeconomic conditions on alcohol consumption and drinking and driving (Ruhm 1995, 1996); and the relationship between alcohol consumption and earnings (French and Zarkin 1995; Kenkel and Ribar 1994; Mullahy and Sindelar 1993).

Public Policies and Alcohol Prices

Public policies can affect alcoholic beverage prices in several ways. One is that national, State, and local governments impose excise taxes on alcoholic beverages. An excise tax is based on the quantity of alcoholic beverage purchased, in contrast to a sales tax, which is based on the price of a purchased good. Current Federal excise tax rates are \$0.58 per gallon for beer, between \$1.07 and \$3.40 per gallon for wine (depending on the type), and \$13.50 per proof gallon of distilled spirits (a “proof gallon” is the amount of liquid that contains one-half gallon of pure alcohol). These rates translate into taxes of about 10 cents for each ounce of pure alcohol in beer, 7 cents in wine, and 21 cents in spirits.

The excise tax rate is an important factor, but not the only factor, in determining the price of alcoholic beverages. An important variable is the

extent to which increases in excise taxes are passed along to consumers as opposed to being absorbed by firms. For competitive industries with constant average costs of production, economists expect taxes to be fully passed through to consumers—a 1-cent tax increase would result in a 1-cent price increase. This may not apply to business sectors in which competition is limited, which some authors have suggested is the case for alcoholic beverages (Cook and Moore 1993*b*). In such industries, a 1-cent increase in taxes may increase prices, but by less than or more than 1 cent. In addition, an excise tax may be passed to customers at different rates depending upon where the purchase is made, as the price of the same beverage can differ widely within a given geographic area even though the tax rates are the same (Treno et al. 1993). It is difficult to quantify the relationship between taxes and prices for alcoholic beverages because, to date, little research has been conducted on the topic.

Some States exercise more direct influence over alcoholic beverage prices by maintaining monopoly control over the retail and wholesale sale of alcoholic beverages, usually covering distilled beverages and sometimes wine as well. Retail monopolies generally control sales for off-premise consumption, while wholesale monopoly operations often serve as the exclusive source of supply for outlets with on-premise consumption. Where State retailing monopolies exist, the prices of alcoholic beverages are under direct government control. Limited evidence suggests that alcoholic beverage prices have, on average, been about the same or only slightly higher in States with monopoly control (Nelson 1990) and that privatization has sometimes, but not always, resulted in lower prices (MacDonald 1986).

Public policies can also indirectly affect alcohol prices by making alcoholic beverage markets more or less competitive in other ways. For example, in the beer industry, 24 States have exclusive-territory mandates that require brewers to have only one distributor marketing their products within a given area (Sass and Saurman 1993). Researchers have estimated that these mandates raise retail beer prices, but they have found no

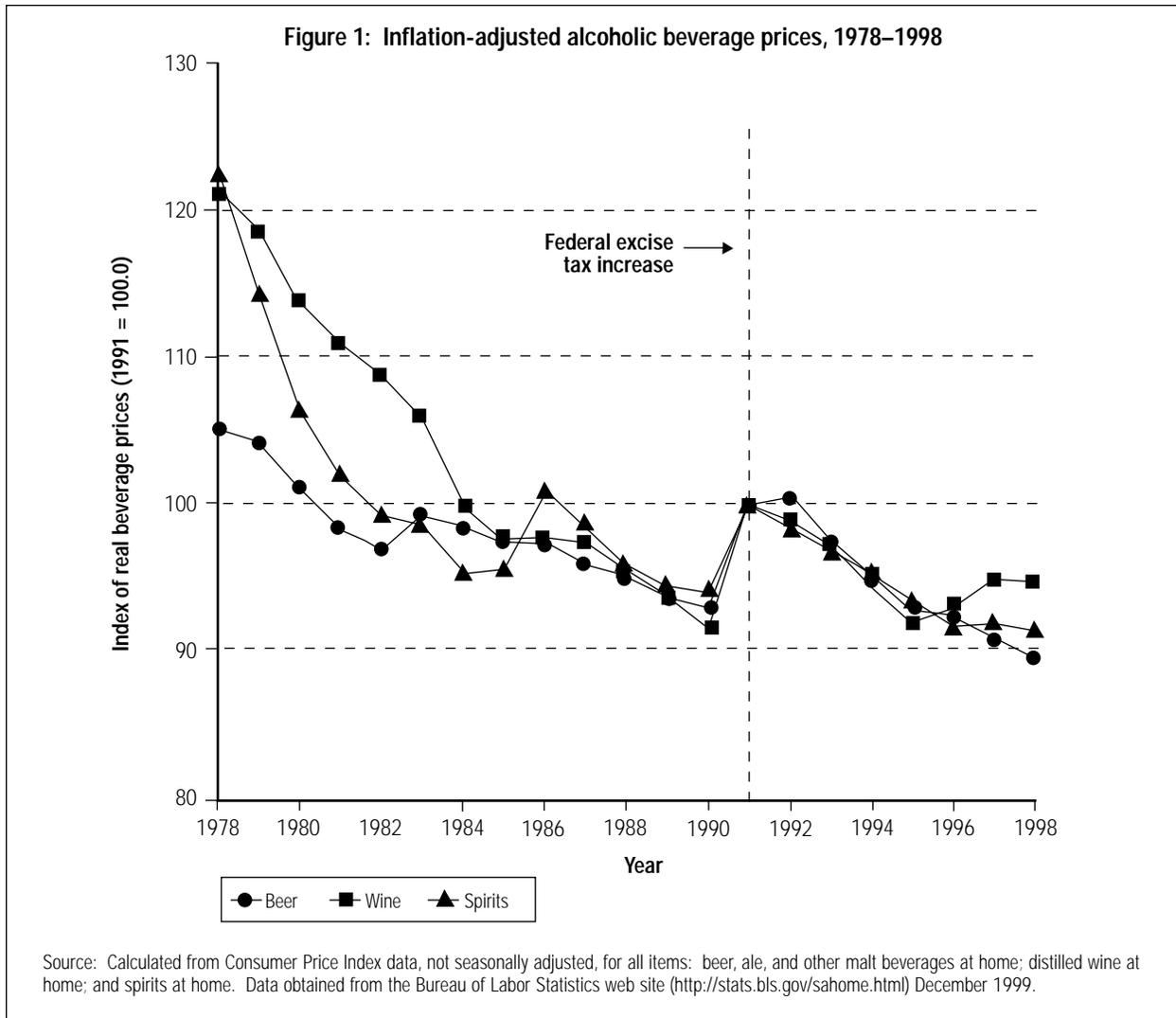
resulting significant change in beer consumption. It may be that the existence of exclusive territories encourages dealer-level promotional activities (which tend to increase consumption) but also limits competition, which raises prices (and tends to decrease consumption). This example illustrates a more general point that a given policy can have multiple effects on alcoholic beverage markets.

When evaluating alcohol price and tax policies, it is important to consider the context provided by private market forces, other public policies, and general economic conditions. For example, alcohol excise tax rates are not routinely increased to compensate for the effects of inflation. As a result, the “real” (that is, inflation-adjusted) tax rates have declined over most of the postwar period, except for the significant tax increase that took effect in 1991. This erosion of real tax rates has contributed to overall declines in real beverage prices over time (figure 1).

Alcohol Prices, Taxes, and Consumption

Although there is a consensus among researchers that higher alcoholic beverage prices and taxes result in less drinking and fewer drinking-related problems, the precise magnitude of consumer response to price or tax changes has been somewhat harder to determine. Economists measure consumer response to price changes by computing the “price elasticity,” defined as the percentage change in the quantity demanded that results from a 1-percent change in price (see the box on page 344).

Price changes seem to affect the demand for beer less than they do the demands for wine and spirits. A 1993 review of 15 studies that used State and national consumption data found that every 1-percent increase in price translated to a 0.3-percent decrease in demand for beer, a 1.0-percent decrease in demand for wine, and a 1.5-percent decrease in demand for spirits (Leung and Phelps 1993). Thus, this study supported benchmark price elasticities of -0.3 for beer, -1.0 for wine, and -1.5 for spirits.



A more recent study provided evidence that alcohol demand may not respond as much to price changes as previously thought (Nelson 1997). The researcher analyzed data from a number of sources, including quarterly data from 1974 through 1990 on per capita consumption, real income, real alcohol prices, and the age composition of the U.S. population. The study found relatively unresponsive price elasticities of -0.16 for beer, -0.58 for wine, and -0.39 for spirits, with an overall price elasticity of -0.52 .

The analysis also provided an explanation of what might appear to be a puzzling feature of general trends in U.S. alcohol consumption and prices. The real prices of alcoholic beverages have been declining in the United States since 1978 (see figure 1), and per capita consumption of alcohol

also has been declining over most of the same period (figure 2). These trends seem to contradict the law of demand, which predicts that falling prices will lead to higher consumption, other things being equal.

As Nelson's analysis revealed, however, other things were not equal; important determinants of alcohol consumption changed over the time period studied. Specifically, the study showed that the demographic shift to an older population—which consumes less alcohol—outweighed the impact of falling real prices. Other factors, such as a shift to healthier lifestyles, also may help explain the decrease in consumption, but the study was not designed to evaluate those factors.

Measuring Consumer Response to Price Changes

When the prices of goods rise or fall, the quantity of goods that consumers choose to purchase tends to change in response. Economists estimate the “price elasticity of demand” to measure consumers’ responsiveness to changes in prices. Estimates are computed with the following formula:

$$\text{Price elasticity} = \frac{\% \text{ change in quantity demanded (+ or -)}}{\text{change in price (+ or -)}}$$

Example: A 5% price drop leads to a 10% increase in quantity demanded: $\frac{+10\%}{-5\%} = -2$

Some features of elasticity measures include the following:

- Price elasticities are negative for almost all goods, as consumers tend to choose to purchase greater quantities of goods at lower prices and fewer at higher prices.
- Elasticities of less than -1.0 indicate that demand is relatively responsive to changes in price (also called “elastic”). This is illustrated in the example to the left.
- Elasticities in the range between -1.0 and zero indicate that demand is relatively unresponsive (also called “inelastic”). For example, if a price drops 5 percent and the quantity demanded increases only 2 percent, the price elasticity is -0.4 .

Demand for Alcohol by Youths and Young Adults

Some important questions, such as how subgroups in a population differ in terms of their responses to price changes, cannot easily be addressed using State- or national-level data that reflect the drinking behavior of the population as a whole. A number of recent studies have used individual-level data to focus on alcohol demand by youths and young adults, who are considered a group at particularly high risk for alcohol problems.

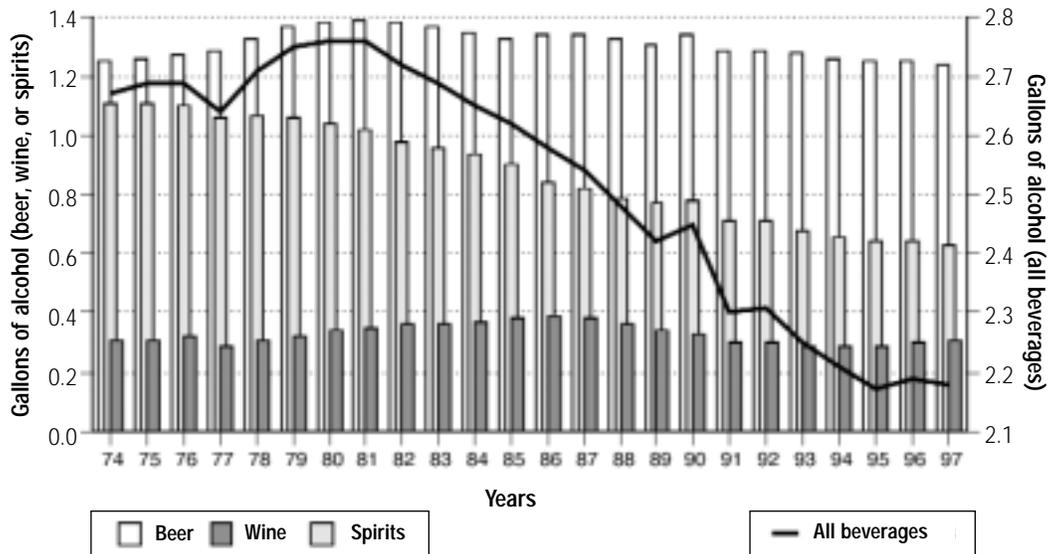
A recent study used survey data to explore the determinants of alcoholic beverage demand among young adults (Grossman et al. 1998). This study featured several innovations. First, it followed the same individuals over time using a “panel” data set formed from the national Monitoring the Future (MTF) Study of high school seniors (MTF surveys are widely used to track trends in adolescent substance use and abuse). Starting with the class of 1976, a subset of respondents was selected for follow-up, thus creating the MTF panels. For this study, the researchers used the MTF panels from 1976 through 1985 to create a sample of more than 7,000 individual respondents with an average of three observations per respondent.

Second, this study made a conceptual refinement by testing an innovative theory of the demand

for addictive goods (Becker and Murphy 1988). Previous research had applied economic demand models that account for habit formation by exploring past consumption of alcohol as a possible determinant—through acquired taste or addiction—of current consumption (see, for example, Andrikopoulos et al. 1997). The Becker and Murphy theory of addiction takes this line of reasoning one step further by positing that consumers may anticipate that their current use of alcohol will influence their future demand for it. If so, expected future consumption is also a possible determinant of current alcohol demand, and factors that can be anticipated to affect future consumption also have an impact on current consumption choices. The relevant policy implication of this theory is that long-run demand for addictive goods is actually more responsive to price than is short-run demand. (For applications of this theory to the study of demand for cigarettes, see Becker et al. 1994; Chaloupka 1991; Keeler et al. 1993.)

The study results did support the implication that alcohol demand responds more to price in the long run than it does in the short run (Grossman et al. 1998). The analysis yielded long-run elasticities ranging from -0.26 to -1.25 , which were a little more than 1.5 times larger (in absolute magnitude) than the short-run elasticities (which ranged from -0.18 to -0.86). In addition

Figure 2: Per capita alcohol consumption by beverage type, United States, 1974–1997



Source: Nelson 1997. Reprinted with permission from *Empirical Economics*, Vol. 22, pp. 83–102, 1997. Copyright 1997, Springer-Verlag GmbH & Co., Heidelberg, Germany.

to supporting the addiction theory, these results suggested that raising alcohol prices would be an effective policy to reduce alcohol consumption among youths.

In contrast, a recent study reported that beer taxes have a relatively small and statistically insignificant effect on teen drinking (Dee 1999). Using a limited set of variables from the MTF Study for 1977 through 1992, the researcher examined the effects of beer taxes and minimum legal drinking age laws on the prevalence of teen drinking in three categories (1 or more drinks in the past month, 10 or more drinks in the past month, 5 or more drinks in a row in the past 2 weeks). Dee hypothesized that there might be unobserved, State-specific factors that affect teenagers' alcohol consumption (such as shared cultural attitudes toward drinking). To explore this hypothesis, the study estimated the effects of within-State variation in beer tax rates on consumption. This approach contrasts with most other studies, which have relied mainly on cross-State variation in taxes or prices to identify the effects of these variables on consumption. The results suggested that raising the legal drinking age above 18 significantly reduced the number

of high school seniors in each drinking category. However, the within-State comparisons found beer tax rates to have no significant effect in reducing these drinking prevalence rates.

The contrast between these findings and the accumulated weight of previous research indicate a clear need for additional studies to clarify how taxes and other factors affect various patterns of drinking among different groups.

College students as a group are at particularly high risk for alcohol-related problems. An analysis using data from the 1993 College Alcohol Study, a nationally representative survey of more than 17,000 college students at 140 4-year U.S. colleges and universities, reported that almost 40 percent of female college students and about 50 percent of male college students reported binge drinking (defined in that study as drinking four or more drinks on a single occasion for females and five or more drinks for males) (Chaloupka and Wechsler 1996). To estimate alcohol demand functions for this high-risk subpopulation, the researchers merged the college drinking data with measures of beer prices and an index of drunk driving laws prevailing in the locations of the colleges.

The results suggested that alcohol prices were a less salient determinant of the drinking behavior of college students than they were in other population groups. Male college students' drinking was virtually unresponsive to price. Higher prices were estimated to have a negative and statistically significant impact on the drinking of underage female college students, but the effect was still relatively small.

The researchers did find, however, that more severe drunk driving penalties tended to reduce both drinking and binge drinking. These effects were found among underage and older students, both male and female. In addition, they found that more alcohol outlets near campus, higher fraternity and sorority membership levels, and a higher percentage of students living on campus were associated with higher levels of drinking and binge drinking. It should be noted, however, that the researchers were unable to determine whether these environmental variables played a causal role in drinking decisions, or whether college students who were predisposed to heavy drinking sorted themselves into these types of college environments. Clarifying the direction of causality in this relationship is an important goal for future research.

International Research on Alcohol Price and Consumption

Several studies, using data from other countries, shed additional light on the effect of prices on alcohol consumption. Using an approach similar to the 1997 study by Nelson, another research group analyzed annual data from Australia, Canada, Finland, New Zealand, Norway, Sweden, and the United Kingdom (Clements et al. 1997). Most data were from the mid-1950's to the mid-1980's, though the periods of analysis varied from country to country. Averaging the results for all seven countries, the researchers found price elasticities of -0.35 for beer, -0.68 for wine, and -0.98 for spirits. In every country, beer demand was the least responsive to price changes. In a reversal of the U.S. findings just mentioned, this study found that wine demand in these countries was less responsive to price changes than was spirits demand.

Another 1997 study employed a similar approach with data from Ontario, Canada, from 1958 through 1987, but incorporated into the analysis the hypothesis that consumption is influenced not only by such economic factors as price and income, but also by habit formation (Andrikopoulos et al. 1997). Thus, the study examined past consumption levels of alcoholic beverages as determinants of current consumption. The analysis, which separated domestic and imported alcoholic beverages, estimated price elasticities ranging from -0.34 for imported spirits to -1.02 for imported beer.

Broadly speaking, the results from the international literature on price elasticities are consistent with the results from the domestic literature. Price elasticities for alcoholic beverages are generally negative, meaning that increases in price lead to decreases in the amount consumed. Recent studies have found these elasticities to be mostly in the "relatively unresponsive" range of -1.0 to zero. Consumption of distilled spirits appears to be more responsive to price changes than is wine consumption, which in turn is more responsive than is beer consumption.

Alcohol Taxes and Traffic Fatalities

Research indicates that higher beverage taxes affect not only alcohol consumption but also various alcohol-related problems, the most studied of which is the effect of beer taxes on traffic fatalities. For higher taxes to affect traffic fatalities, it is assumed that the taxes lead to reduced consumption, which in turn leads to fewer traffic fatalities. However, most studies have examined the direct relationship between taxes and traffic fatalities without examining the role of consumption as an intervening variable. Although the previous discussion suggests that overall demand for alcohol is only moderately responsive to price changes, a number of studies have found that higher alcohol taxes are linked to lower traffic fatality rates.

Using U.S. data from 1982 through 1988, one study confirmed earlier findings that higher beer taxes are associated with lower rates of traffic fatalities (Ruhm 1996). In estimating the

determinants of total vehicle fatalities per capita, the researcher found that for every 1-percent increase in the price of beer, the traffic fatality rate declined by nearly the same proportion, or 0.9 percent (this translates into a “fatality price elasticity” of -0.9). When the researcher performed a second analysis using fatalities per total vehicle miles driven, he found nearly identical results.

Moreover, the study showed that rates for nighttime fatalities and for people aged 18 through 20 were even more responsive to an increase in beer prices in that a 1-percent increase in price translated into a 1.4-percent decrease in each of these categories of fatalities (a fatality price elasticity of -1.4). On the basis of these results, the researcher calculated that increasing the Federal excise tax on beer in 1988 to the inflation-adjusted equivalent of its value in 1975 would have saved between 3,300 and 3,700 lives annually (Ruhm 1996).

Similar results have been found in previous studies. In an early research review that focused on drinking drivers under age 22 who were killed in vehicle crashes, the researcher reported fatality price elasticities ranging from -0.7 to -1.3 (Phelps 1988). More recently, a 1993 review of the literature reported overall fatality price elasticities in the range of -0.5 to -1.0 , with a higher range among young adults of between -0.7 to -1.6 (Kenkel 1993). These studies suggest that a tax increase may be a useful tool to reduce traffic fatalities, particularly among youths and young adults.

A recent study (Dee 1999) contended that the reported effects of beer taxes on traffic fatality rates (for example, Ruhm 1996) were implausibly large and suggested that changes in fatality rates that have been attributed to beer taxes might be linked more strongly with other factors that were omitted from the analyses. Dee found no statistically significant effects of beer taxes on youth fatality rates when the analysis included State-specific time-trend variables to account for the effects of unobserved, State-specific factors. The researcher regarded these results as somewhat

inconclusive because the trend variables were highly correlated with changes in real beer tax rates over time. However, using an approach similar to that used in previous studies, Dee estimated that the effect of beer taxes on daytime fatalities was somewhat smaller than the effect on nighttime fatalities, but still statistically significant and of substantial magnitude. The researcher found this result implausible, because alcohol is far more likely to be involved in nighttime fatalities than daytime fatalities, and concluded that taxes may be less effective at reducing traffic fatalities than has been suggested by a number of published studies. Further research clearly is needed to reconcile the apparent discrepancies between the recent findings of Dee (1999) and the substantial body of prior research that has found significant effects of prices or taxes on youth fatality rates.

In addition to investigating price effects among youths, researchers have studied price effects in other subgroups with a high risk of traffic crashes: those who engage in binge drinking and those who engage in regular, heavy drinking. One such study investigated the potential effects of price on binge drinking (defined in the study as consuming five or more drinks on one occasion in the past month) (Sloan et al. 1995). The study also investigated several other factors that might influence decisions regarding drinking and driving, including insurance rules, tort liability (rules governing civil suits for injuries or damages), and criminal sanctions. Findings from the study, based on a random sample of 49,199 individuals surveyed between 1984 and 1990, suggested that a 10-percent increase in the price of alcoholic beverages would decrease the number of binge-drinking episodes per month by approximately 8 percent. The research also indicated that liability and insurance rules were more effective in reducing binge drinking than were criminal sanctions. With any of the factors under study, most of the deterrent effects appeared to influence the decision to binge; the results suggested that once individuals decide to binge, policies probably have little influence on the decision to drive after drinking.

Another 1995 study found, however, that persons who drank extremely heavily were unresponsive to price increases (Manning et al. 1995). While this study was concerned only with the effects of price on consumption and did not go on to analyze the effects on subsequent problems, such as traffic crashes, the findings implied that among the very heaviest drinkers, the effects of tax increases on alcohol consumption would be limited. Presumably this would translate into a limited effect on traffic crashes among this group, although tax increases could still reduce drunk driving incidents occurring among those who are not extremely heavy drinkers.

Research on the effects of price or tax changes shows considerable variation in the magnitude of estimated effects. Overall, the weight of evidence indicates that prices have modest effects on overall consumption and somewhat more substantial effects on traffic crash fatality rates. It is plausible, although by no means established, that small effects on consumption could have substantial effects on outcomes like traffic fatalities. One way this could be true is if higher prices tend to reduce the riskiest drinking behaviors more than they reduce overall alcohol consumption. If, for example, higher prices reduce the number of drinks consumed on a given occasion of heavy drinking, the effect on the of traffic crashes could be significant, as shown by Phelps (1988), who found that the relative risk of traffic crashes increased sharply with the sixth drink on a given occasion. Clarifying the nature of price effects on different aspects of consumption—such as frequency of drinking and quantity per occasion—and on important health-related outcomes remains a critical task for future research.

Alcohol Demand and Marijuana Demand

The idea that tax increases might be used to reduce alcohol use by raising beverage prices raises an important, related concern. One possible, but unintended, consequence of such a policy may be that consumers might decide to use less alcohol but more marijuana in response to increased beverage prices. Two recent studies have examined this issue, with contrasting results.

In economic parlance, this debate centers on whether alcohol and marijuana are “substitutes” for each other or “complements.” When two goods are substitutes, an increase in the price of one good causes a shift in consumption and increase in demand for the other good. When two goods are complements, an increase in the price of one good causes a drop in consumer demand for both goods. The goods are complements in the sense that they tend to be used together, as with gin and tonic water. If gin suddenly becomes more expensive, consumers will choose to drink fewer gin and tonics, resulting in a lower demand for both gin and tonic water. To determine whether a particular pair of goods are substitutes, complements, or unrelated, economists estimate a “cross-price elasticity,” which is an estimate of how the demand for one good is affected by a change in the price of another good. A positive cross-price elasticity indicates substitution; a negative cross-price elasticity indicates complementarity.

One study used data from the 1984 National Longitudinal Survey of Youth and found that alcohol and marijuana were economic complements (Pacula 1998). An increase in the beer tax was estimated to reduce the demand for marijuana. This research employed a sample of about 8,000 individual respondents, with an average age of about 22.5 years at the time of the interview in 1984. Consumption had been measured for the 30 days preceding the interview, in terms of the number of drinks of any alcoholic beverages and the number of times marijuana was smoked. The investigator merged the individual-level survey data with a set of variables indicating the prices of alcoholic beverages and marijuana as well as the legal environment the young adults faced in their geographic areas of residence. The study’s estimates suggested that doubling the beer tax would reduce the quantity of alcohol consumed by 8.1 percent and reduce the quantity of marijuana consumed by 13.2 percent. This finding should be viewed with caution, however, because an analysis of this sort can arrive at a false relationship between beer taxes and marijuana use if States with lower beer taxes also have more tolerant social attitudes toward substance abuse.

Another qualification was the finding that higher marijuana prices reduced marijuana consumption but did not significantly affect alcohol demand. The evidence on whether alcohol and marijuana are economic complements was thus somewhat mixed in this study, because complementarity implies that the demand for both goods should fall when the price of either good is increased.

In contrast, another study found evidence that alcohol and marijuana were substitutes (Chaloupka and Laixuthai 1997). This study examined the effects of beer prices and marijuana prices on the demand for alcohol among young adults. The first part of the analysis used measures of drinking and heavy drinking among high school seniors who participated in the 1982 and 1989 waves of the MTF Study. Consistent with previous studies, the results showed that raising both the price of beer and the minimum legal drinking age (to 21) reduced youth demand for alcohol. Moreover, when the 1982 and 1989 samples were pooled, the results suggested that marijuana decriminalization reduced youth drinking. Under decriminalization, youths face lower potential costs of marijuana use, so the pattern found in this study suggested that youths substitute marijuana and use less alcohol in States where marijuana is decriminalized. In addition, in analyzing the 1989 data, the researchers were able to include an estimate of the price of marijuana, and found that higher marijuana prices increased alcohol demand. This finding is also consistent with the conclusion that the two substances are substitutes.

Given the conflicting findings between these two studies, one of which found alcohol and marijuana to be complements (Pacula 1998) and one of which found alcohol and marijuana to be substitutes (Chaloupka and Laixuthai 1997), further research is needed to clarify the nature of the relationship between the demands for alcoholic beverages and marijuana.

Benefits and Costs of Taxation

The bulk of research evidence shows that higher alcohol taxes or prices lead to reductions in alcohol consumption and in some of the adverse

consequences of alcohol abuse. But how heavily should alcoholic beverages be taxed? Studies of “optimal taxation” provide a framework for answering this question by balancing the benefits of alcohol taxation with the costs that alcohol taxes impose on moderate drinkers and on alcoholic beverage producers.

Several studies have concluded that substantial increases in alcohol taxes would yield social benefits that exceed their costs (Manning et al. 1989, 1991; Pogue and Sgontz 1989). The social benefits of alcohol taxation flow from reductions in alcohol-related health problems and other adverse consequences of drinking. Economists distinguish alcohol-related consequences that individual drinkers create for themselves, termed the “private costs” of alcohol abuse, from consequences that their drinking imposes on others, termed the “external costs” of alcohol abuse. Important components of the external costs are the thousands of nondrinkers killed by drunk drivers each year and the extra health care costs attributable to drinking that heavily drinking persons do not pay.

Some studies have estimated that alcohol tax rates in the mid- to late 1980’s were about one-half the amount necessary to cover the external costs of excessive drinking (Manning et al. 1989, 1991). Other researchers have concluded that during the same period, the benefits of higher taxes would have substantially exceeded the costs and that optimal taxes on alcoholic beverages were probably much higher than the rates that were then in force (Kenkel 1996; Pogue and Sgontz 1989). By “optimal tax,” these researchers mean tax rates that would balance the reduced social costs of heavy drinking with the losses in enjoyment experienced by more moderate drinkers.

In contrast, another study concluded that alcohol tax levels were too high (Heien 1995–96). The researcher identified several factors that helped to explain why the conclusion differed from those of previous studies. One was that the study used data from 1993, which already showed the effects of higher tax rates because of the 1991 increase in

Federal excise tax rates. In addition, the sharp decline in alcohol-related traffic fatalities in the late 1980's and early 1990's reduced the potential effects of higher taxes and other policy changes.

This study also differed from other studies of the optimal taxation of alcoholic beverages in an important way. Based on an unpublished report, the analysis incorporated the assumption that drinkers have lower health care costs than do nondrinkers. As a result, the study reported that drinkers imposed, at most, zero net health care costs on others, and that drinkers may actually have generated an "external benefit" for nondrinkers by subsidizing their health insurance premiums by as much as \$21.6 billion. Under this framework, increased alcohol tax rates would reduce moderate drinking and thereby reduce these external benefits. This factor, which was not considered in previous studies, could be of considerable significance if moderate drinkers are particularly responsive to price changes, as Manning and colleagues (1995) found.

However, assessing the net effects of alcohol consumption on health is difficult, and assessments may vary over the life span (Dufour 1996)—complexities that were not considered in the Heien study. For example, low-level alcohol consumption may generate net health benefits for some people, such as postmenopausal women with risk factors for heart disease. However, even low levels of consumption may pose risks to others, such as teenagers, for whom alcohol-related traffic crashes are a leading cause of death (Dufour 1996). Predicting the health impact of an increase in alcohol taxes requires assessing the health effects of all the changes in drinking behaviors that result from the tax change.

Further research is needed to explore the differences between existing studies (see the analyses of findings presented by Grossman et al. 1995; Heien 1995) and to incorporate new findings into the calculations. For example, none of the studies mentioned in this section measured the potential benefits alcohol taxation may create by reducing violent behavior (Cook and Moore 1993a).

Another important issue is how the benefits and costs of alcohol taxation are distributed across the population. Distributional issues of this sort are inextricably related to subjective notions of fairness. One often used means of assessing the fairness of a particular tax is to consider the extent to which the burden of the tax falls disproportionately on lower income members of society. A tax that consumes a larger share of the income of poorer households is termed "regressive," while a tax that consumes an increasing fraction of income as income rises is considered "progressive." Determining the degree of regressivity or progressivity of a given tax is technically quite complex, depending on the consumption patterns of households at different income levels and on the "incidence" of the tax, that is, on who actually bears the burden of the tax. The incidence may fall on individuals other than those from whom the tax is actually collected. Often the burden of an excise tax is shared among consumers, sellers, and those whose incomes derive from businesses related to the taxed good.

A study by the Congressional Budget Office (Sammartino 1990) examined the distributional effects of changes in Federal excise taxes on alcoholic beverages. The study found that, across households, expenditures on alcoholic beverages increased as income increased, but at a slower rate. As a result, lower income households paid less in alcohol excise taxes than did higher income households on average, but the taxes nevertheless consumed a larger proportion of income in lower income households. Adjusting for some of the broader effects of excise tax changes, the study concluded that the regressivity of alcohol excise tax increases would be reduced by the changes in income tax liability and Social Security benefits that were assumed to result from the excise tax changes. Because a family's income in a particular year may not reflect its economic circumstances very accurately, the study also considered the effects of excise taxes as a share of total household expenditures instead of income. With this approach, the apparent regressivity of alcoholic beverage excise taxes was reduced but not completely eliminated. This finding was reinforced by a more recent study (Lyon and

Schwab 1995), which found that alcohol taxes were still regressive, but slightly less so, when measured with respect to lifetime income instead of current income.

Another issue related to tax fairness concerns employment. The argument is sometimes raised that alcohol tax increases will hurt workers whose livelihoods depend on the production and sale of alcoholic beverages. However, the overall level of employment in the United States is determined by macroeconomic conditions, not adjustments in the tax rates on specific industries. When the national economy is not in a recession or depression, workers laid off or not hired by industries affected by an alcohol tax increase would find employment in other sectors of the economy. The distinction between job losses and worker displacement is crucial: a tax increase could cause a permanent job loss in the alcohol industry, but research on labor economics suggests that the displaced worker almost certainly would find employment elsewhere eventually. Worker displacement remains costly during the spell of unemployment as well as in the long run because displaced workers appear to earn less on their new jobs (Jacobson et al. 1993; Ruhm 1991). Following the standard methodology of cost-benefit analysis, these transitional costs should be included as an extra cost of increasing alcohol taxes, but most or all of the employment losses in the alcohol industry will eventually be offset by employment gains in other sectors of the economy (Kenkel and Manning 1996).

In Closing

Ongoing research is increasing knowledge of the effects of changes in alcohol prices or taxes on the consumption of alcohol and on alcohol-related health outcomes. Recent studies have examined economic and other determinants of the level of alcohol consumption and have confirmed earlier findings that beer, wine, and spirits consumption do respond to changes in price. There is disagreement about how large such effects may be, however. The weight of evidence suggests that the effects are relatively modest, with a 1-percent

increase in price expected to lead to less than a 1-percent decrease in consumption.

Other studies have addressed whether higher alcohol prices or taxes reduce drunk driving and alcohol-related traffic fatalities. Recent research confirms that higher taxes can contribute to these public health goals. New studies have introduced important improvements in methodology and data collection. Future research must reconcile the magnitudes of the estimated effects of taxes on consumption with the larger estimated effects of taxes on traffic fatalities.

Young adults are at special risk for alcohol-related problems. While there is evidence that increases in alcohol prices or taxes reduce youth drinking, one study found that this effect may not hold for binge drinking among college students. Further research is needed to clarify whether measures to reduce alcohol consumption might lead to changes—either increases or decreases—in marijuana consumption.

Finally, the benefits and costs of alcohol taxation are being researched from a societal perspective. Recent studies disagree about the level of alcohol taxation that would best balance benefits and costs. The economic approach would provide a useful framework for further discussion and research on this topic.

Continued progress in economic studies of the demand for alcoholic beverages will provide insights into how changes in prices or taxes may affect different groups of drinkers or different kinds of drinking behaviors. Important challenges remain, however, such as the need for improvements in data, including better measurement of the prices of alcoholic beverages. Other challenges are methodological, such as the need to separate the actual effects of alcohol taxes on behavior from spurious associations between tax and price policies and social attitudes toward drinking. With the now-substantial base of knowledge and improved methods of data collection and statistical analysis, future studies

will provide new insights into the connections among alcoholic beverage taxes, prices, and consumption and related consequences.

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