Retail Alcohol Availability and Product Diversity

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Abstract: The repeal of the Prohibition Act in 1933 introduced many state-specific regulations in alcohol markets. As one example of this, several states currently have laws that restrict specific alcoholic beverages in grocery stores, and some states have recently considered lifting these restrictions. Some opponents of such legislative changes claim that allowing alcohol to be more widely distributed would put smaller liquor stores out of business and eventually lead to a narrower set of product choices available to consumers. Here we use the Nielsen Homescan dataset that describes alcoholic beverage purchasing patterns for approximately 70,000 households between 2004 and 2012 to examine this issue empirically. Our results show that, even when controlling for preferences for variety, consumers in states that allow beer and wine sales in grocery stores have greater diversity in their purchases of beer and wine. Overall, the findings suggest that expanding the retail availability of beer and wine may actually increase the diversity of alcoholic beverage products purchased by consumers in those states.

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Introduction

The repeal of Prohibition in the United States in 1933 introduced many state-specific regulations in alcohol markets. These regulations were initially designed to reduce the acute and chronic social problems associated with alcohol consumption; now it is believed that many of these regulations continue to exist for historical reasons and because of rent-seeking behavior. As examples of this, twelve states have laws that restrict the availability of beer in grocery stores and eighteen states currently have laws that restrict wine sales in grocery stores (including all outlets that sell food such as supermarkets, convenience stores, and pharmacies). Introducing alcohol into grocery stores certainly would have negative consequences for licensees of liquor stores (see Rickard 2012); however, the implications for consumers are more complicated to assess. Greater availability of alcohol is expected to lead to lower prices for consumers, yet some have argued that introducing alcoholic beverages into grocery stores would lead to a more consolidated set of products available in grocery stores and consequently less choice for consumers.

We recently saw legislation that allowed grocery stores in Washington State to sell spirits. Proposals to allow beer and wine sales in grocery stores have been quite common in recent years, including policy initiatives in Colorado, Delaware, Kentucky, Massachusetts, New York State, Oklahoma, and Tennessee. Furthermore, in many states such proposals have resurfaced several times beginning as far back as the 1960s. However, none of the recent proposals have become legislation (legislation is pending in Tennessee) and they continue to meet significant resistance from liquor store owners and from social interest groups concerned that the introduction of alcoholic beverages into grocery stores would increase alcohol

consumption and increase the various problems associated with alcohol. Food retailers, breweries, winery owners, and consumer advocate groups have been much more favorable towards legislative proposals that seek to expand the distribution of alcoholic beverages (notably beer and wine).

The purpose of this research is to investigate how state-level retail availability regulations for alcoholic beverages affect the diversity of products purchased by consumers. We imagine that such regulations may either i) decrease the diversity of products chosen given the extra search costs required to visit and shop in specific retail locations, or ii) increase diversity given that these retail locations will focus on alcoholic beverages and will be able to offer consumers a wider range of products. Ultimately, this is an empirical question that we address using the detailed Nielsen Homescan dataset. We begin with a detailed review of the literature on alcohol market regulation, retail availability of alcohol in different states, product variety, and measures of food diversity. Next we introduce the dataset we are using and specify how we measure wine consumption diversity. A simple regression model is employed to provide empirical results and we discuss how our findings shed light on this on-going policy debate in the United States.

A Literature Review of U.S. Regulations on Alcohol

Much of the research examining alcohol policy examines the social effects of regulation controlling alcohol consumption as well as social problems caused by alcohol abuse. Policy-oriented work has focused on the effects of regulations designed to address acute social problems (e.g. crime, traffic accidents and family violence) and chronic social problems (e.g., liver cirrhosis, pancreatitis, and specific types of cancer) (Wagenaar, Tobler, and Komro 2010).

Federal tax rates on beer and wine remained fixed in nominal terms between 1951 and 1991 and so fell by four-fifths, over the period, after accounting for inflation (Grossman et al.

1993). Many studies show that lower liquor taxes might lead to more drinking and drunk driving (Cook and Moore 1993; Grossman et al. 1993). Similarly, real state liquor taxes declined more than 50% between 1966 and 1993. Although traffic fatalities decreased in the 1990s (Zobeck et al. 1993), stricter alcohol control regulations might not be the entire reason for the reduction as the legislation was accompanied by many community activities trying to change public attitudes towards drinking and driving. Ruhm (1996) provided new evidence concerning the effects of alcohol policies on highway vehicle fatalities by paying special attention to the fragility of the estimates to plausible changes in model specifications.

The predicted effects of anti-drunk-driving legislation are shown to be quite sensitive to the inclusion of covariates that are expected to affect traffic deaths but that have frequently been omitted from earlier analyses. In particular, the estimated regulatory impacts appear to be overstated when changes in public attitudes or in other legislation, which may also operate to reduce drunk driving, are not accounted for. They are further reduced by the addition of controls for state-level macroeconomic conditions. By contrast, the predicted deterrent effects of alcohol taxes are more robust to alternative specifications. These findings suggest that ability of further legislative activity to reduce alcohol-involved driving is limited but higher liquor taxes might potentially be more important.

The wide variety of specifications and conflicting results in driving-under-the-influence (DUI) studies implies that a systematic examination of direct DUI deterrence in the context of Becker's (1968) economic theory of crime is warranted. Benson and Rasmussen (1999) found that direct law-enforcement efforts could be an effective way to significantly reduce drunk driving if policies were implemented to produce systematic, persistent, and consistent increases in the probability of being stopped and arrested for drunk driving (and perhaps in the severity of

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punishment). Alcohol consumption is positively correlated with driver involvement rate significantly. A higher legal drinking age, dram-shop laws, and open-container laws are considered to be more effective ways to mitigate DUI than other legislatively mandated policies.

Teens in the United States continue to engage in the illegal use and abuse of alcohol at persistently high rates despite the considerable efforts of policy-makers and public-interest groups (Grant et al. 1991).The policy relevance of this abusive drinking is motivated by the varied evidence that links it to a broad range of negative outcomes that are realized both contemporaneously and over the life cycle. Most notably, the abuse of alcohol is strongly implicated in traffic fatalities, the leading cause of mortality among young adults (Rosenberg et al. 1996). Dee (1998) suggested that price policies (in particular, excise taxes on beer) represent an unexploited lever for reducing the prevalence and consequences of abusive drinking among teens. However, the empirical evidence in support of these assertions has been based on somewhat limited econometric specifications. In particular, the direct evidence that abusive teen drinking is responsive to alcohol taxes has been based on individual-level demand equations that are identified solely by the cross-sectional variation in alcohol prices or taxes. Unfortunately, the finding that teens in states with relatively high beer taxes are less likely to abuse alcohol is observationally equivalent with very different hypotheses. It is equally reasonable to suppose that this cross-state relationship merely reflects the presence of unobserved state-specific attributes that influence both the level of beer taxation and the prevalence of teen drinking. Distinguishing between these hypotheses is critical for evaluating the widely held view that alcohol price policies represent an important and unexploited health policy lever.

Although the evidence base pertaining to economic efficiency of alcohol policy is sparse, there have been some valuable contributions. Her et al. (1999) found that greater availability of

alcohol through privatizing of alcohol sales in a retail environment where the government is also a retailer can increase the harm associated with alcohol consumption. The economic literature pertaining to price elasticity was reviewed and found that price increases can reduce the alcohol related harm and quantity of alcohol consumed (Chaloupka et al. 2002). Doran and Shakeshaft (2008) recommended combining fiscal measures of volumetric taxation with other supply and demand side initiatives to provide incentives to manufacturers to extend the product development of low-strength beer and wine and disincentives aimed at reducing the manufacture of high alcohol-content drinks and marketing of alcohol to young and vulnerable subgroups of the population.

Nelson (2003) studied different alcohol policies of different states in the United States to examine the impact of alcohol advertising restrictions on alcohol consumption. This research showed that a billboard spirits advertising ban is associated with higher overall alcohol consumption, higher spirits and wine consumption, and lower beer consumption. As to the effect of restricting advertising the price of spirits, not allowing advertising price of spirits increases search cost, and in turn increases the total cost of spirits and decreases spirits consumption. But restricting advertising of spirits prices is also associated with higher beer and lower wine consumptions. The net effect is therefore to leave total alcohol consumption unchanged.

One of the most economically efficient measures to reduce alcohol related harm is taxation (Anderson et al. 2009). There are two economic rationales for taxation of alcohol: to correct market failures, specifically the externality costs associated with alcohol consumption; and to raise taxation revenue for governments. These two rationales suggest varying approaches to the application of taxation on alcoholic beverages. The former suggests a taxation regime that aims to internalize the external costs within the market by applying a marginal tax directly to the

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cost driver of the externality, equal to the marginal cost of the externality, thereby realigning marginal private costs with the marginal social costs associated with consuming alcohol. In this sense, alcohol taxation can be described as a Pigovian tax, attempting to align private consumption levels with the socially optimal level of consumption. Alternatively, the latter of the two rationales proposes a taxation rate inversely proportional to alcohol products' price elasticities in order to maximize taxation revenue. Alcohol excise taxes generally fail to recover the externality costs placed on society that arise from alcohol consumption. Where externality costs are greater than excise revenue higher excise taxes are one effective and appropriate policy response. Complementary policies to higher excise taxes are likely to include: the provision of more information about harmful effects to have a modest impact on reducing costs, while advertising restrictions are unlikely to be effective consumers, especially the young; greater enforcement of drunk-driving laws and zero tolerance drunk-driving laws for young drivers.

Retail availability regulations for alcoholic beverages differ from state to state. No alcohol is sold in grocery stores in twelve states, and beer is the only alcohol available in grocery stores in six states, while beer and wine are sold in grocery stores in fifteen states, and beer, wine, and spirits are sold in grocery stores in seventeen states (see Table 1). Several states have proposed changes that would expand the distribution of beer and wine. Proposals to allow wine sales in grocery stores have recently been initiated in Colorado, Delaware, Kentucky, Massachusetts, New York State, Oklahoma, and Tennessee. Furthermore, in many states such proposals have resurfaced several times beginning as far back as the 1960s. However, none of these recent proposals have become legislation (legislation is pending in Tennessee) and they continue to meet significant resistance from liquor store owners and from social interest groups concerned that the introduction of wine into grocery stores would increase alcohol consumption and

increase the various problems associated with alcohol. Retailers, winery owners, and consumer

advocate groups have been much more favorable towards legislative proposals that seek to

expand the distribution of wine.

Table 1. Selective Availability of Alcohol in Grocery Stores, by State

No (or limited) Alcohol Sales (NAIGS)	Only Beer Sales Allowed (BIGS)	Only Beer and Wine Sales Allowed (WIGS)	Beer, Wine, and Spirit Sales Allowed (SIGS)
Alaska	Connecticut	Alabama	Arizona
Colorado	Kentucky	Arkansas	California
Delaware	Mississippi	Florida	Hawaii
Kansas	New York	Georgia	Illinois
Massachusetts[a]	Tennessee	Idaho	Indiana
Minnesota	Wyoming	Maine	Iowa
New Jersey[a]		Montana	Louisiana
North Dakota		New Hampshire	Maryland
Oklahoma		North Carolina	Michigan
Pennsylvania		Oregon	Missouri
Rhode Island[b]		South Carolina	Nebraska
Utah		Texas	Nevada
		Vermont	New Mexico
		Virginia	Ohio
		Washington	South Dakota
			West Virginia
			Wisconsin

The economic literature includes several studies that examine the effects of introducing

wine sales in grocery stores. Using data from four states introducing different regulatory

changes that permitted increased availability of wines, Scott (1986) found that, in the two states

where the number of outlets permitted to sell wine increased (i.e. wine was sold in grocery

stores) and prices were lower, consumption of wine was significantly greater than one would

expect, based on the prevailing trends in consumption. In the two states where there was only an

increase in the selection of wines, one state showed a significant increase in wine consumption,

and one state showed no significant increase. When increases in wine consumption occurred,

they did not seem to be the result of substitution from spirits or beer. Macdonald (1986) found increased wine sales in three of four states that privatized the retail sale of wine. Smart (1986) examined the effect of introduction of wine to grocery stores in the Canadian province of Quebec and found no evidence of increased wine sales. Using data from a state survey conducted in 1986, some 9 months after Iowa private retailers began selling wine, Mulford and Fitzgerald (1988) assessed the effects of introduction of wine sales in grocery stores in Iowa. They found that the average quantity of wine purchased remained the same and only slight increases in the frequency of wine consumption. There were no significant changes in either the prevalence of heavy drinkers or of problem drinking in Iowa following the wine availability increase. Wagenaar and Holder (1991) evaluated the effects of a 1985 policy change introducing wine sales into grocery stores in Iowa, and a similar 1981 policy change in the state of West Virginia. They found a 93% increase in wine sales in Iowa over the first 2.5 years after the introduction of wine into grocery stores, and in West Virginia wine sales increased 48%.

Mulford et al. (1992) published a second study of the Iowa experience using a Box-Jenkins analyses of alcohol sales data and analyses of self-reported survey data (Fitzgerald & Mulford 1992). The survey data did not reflect a significant increase in drinking. Their time-series models indicated a modest increase in wine sales, but the authors argue the increase decayed relative to pre-intervention levels over time. Wagenaar and Holder (1993) subsequently noted several methodological problems with the Mulford study, most notably failure to control for national trends in alcohol sales over this period. Rickard et al. (2013) found that states with grocery store wine availability have lower wine prices and higher wine consumption rates. Holding constant the total quantity of alcohol consumed, a higher share of wine correlates with lower rates of traffic fatalities, while the opposite is true for beer. Spirits appear to be more

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strongly associated with traffic fatalities than wine, but less than beer. These findings suggest that the ethanol alcohol content in beverages is not a good indicator of its relative impact on traffic fatalities.

Those buying all/most of their wine at grocery outlets (who are subsequently referred to as "buyers" of wine from grocery outlets) were universally responsive to the convenience of being able to buy their wine along with their groceries: "one-stop shopping." Frequent wine drinkers often said they purchased wine from grocery outlets to supplement existing home supplies, compared with infrequent wine drinkers, who were more occasion-specific purchasers. For the infrequent wine drinkers buying at grocery outlets, the price of the particular bottle or cask that they were buying was particularly important (Caswell, Sally, et al. 2015).

Product Choice and Purchase Diversity in Alcohol Markets

There exists a large literature on the effects of various policies applied to alcohol markets in the United States, yet little research has focused on how such policies affect consumer choices and how different regulations affect the diversity of alcoholic beverages purchased (and consumed). The term product variety is used to refer to the number of variants within a specific product group, corresponding broadly to the number of "brands" as the term is used in the marketing literature or the number of "models" in consumer durable models. Theories of product variety are found at various points in economics, management, and marketing theories. Economics theory tend to emphasize competitive relationships, product differentiation and product variety as decision variables for firms, as well as the market equilibria that result.

A number of studies consider treat grocery retailers as local monopolists (Slade 1995; Besanko, Gupta, and Jain 1998; Dhar et al. 2003). This assumption is based on the evidence that consumers base their store selection decisions on attributes unrelated to market prices, such as

location, cleanliness, service, and product variety (Walters and McKenzie 1988). That is, retailers may use these various forms of non-price competition to differentiate themselves into local monopoly markets. Moreover, it is also the case that shoppers generally find it easier to compare prices across products within a store than to compare prices of common products across retail stores (Slade 1995), and this also tends to promote localized brand competition. Under this view, providing product variety would serve as an instrument for retailers to extract multi-product monopoly rents from consumers through "portfolio" pricing.

In models of product differentiation without consumer search, equilibrium prices typically rise with the degree of consumer taste for diversity (Anderson, de Palma, and Thisse 1992). This is because greater taste for diversity imparts more market power through more intense preferences. The picture changes dramatically when there are consumer search costs. With low preference for diversity, the Diamond result prevails, since consumers have no incentive to search. As the preference for diversity rises, some consumers will check out other firms if the product at the first firm sampled is not to their liking. This means that, some consumers will actively search, bringing firms into direct competition, which in turn induces a lower equilibrium price. The greater the taste for variety, the more consumers search, and this intensified search activity increases the scope of competition. However, once taste for variety is high enough so that a sufficient number of consumers search, the situation is close to the case of perfectly informed consumers, and thereafter the equilibrium price rises with taste for variety for the standard reason.

Previous studies have identified numerous factors that have been found to have an impact on the wine selection process (Batt and Dean 2000; Hall et al 2002; Jenster and Jenster 1993; Koewn and Casey 1995). This complexity has been further emphasized by Howard and Stonier

(2002), who stress that there is more to wine than simple tangible qualities. Factors that affect wine selection can be summarized as the following aspects: Intrinsic and Extrinsic Cues, Taste, Brand, Price, Original,Packaging, and Situation. When a product has a high proportion of attributes that can only be assessed during consumption (experience attributes) as with wine (Chaney 2000), then the ability of consumers to assess quality prior to purchase is severely impaired, and consumers will fall back on extrinsic cues in the assessment of quality (Speed 1998). Koewn and Casey (1995) found that the taste of the wine was a dominating factor for wine consumers, when asked why they chose a particular wine. Brands are the sum total of all the images that people have in their heads about a particular company; brands represent promises made regarding what we can be expected from a product, service, or company (Gordon 2002). Accumulated theoretical and empirical evidence suggests that wine prices depend on quality, reputation and objective characteristics (Oczkowski 2001). It has been found that the reputation of the producer and objective wine trait measures such as the wine's year of vintage, region from which the grapes were sourced and the grape variety are significantly related to price (Combris et al 1997, 2000, Landon and Smith 1998, Oczkowski 2001).

Overall, little is known about how alcohol availability in grocery stores will affect product choices and the diversity of consumption. We extend prior work in two important ways. First, the different availability arrangements in grocery stores are included as policy variables in our model; that is, we differentiate between states that sell specific alcoholic beverages in grocery stores from those that do not sell specific alcoholic beverages in grocery stores. Second, we model the effects of wine consumption diversity on grocery store wine availability.

Data and Methods

The Nielsen Homescan dataset consists of a panel of households who record their grocery purchases. Household-based scanner data come from a sample of households that scan universal

product codes (UPCs) of all purchased products after each shopping trip. In addition, Homescan data provide wide variation in household location and demographics because of national coverage. The purchases can come from a wide variety of store types, including traditional food stores, super-centers and warehouse clubs, and online merchants. Interested consumers who are 18 or older register online to participate (at http://www.homescan.com) and are asked to supply demographic information. Based on this information, Nielsen contacts a subset of the registered consumers to become panel members. They are not paid in currency for participating in the program, but every week a panel member who scans at least one purchase receives a set amount of points. The points can be redeemed for merchandise. Panelists can earn additional points for answering surveys and by participating in sweepstakes that are open only to panel members.

To understand how availability of wine in grocery stores will affect product diversity and consumer choice, we use the Nielsen Homescan panel data from January 1, 2004 through December 31, 2012, which covers 48 continental states plus the District of Columbia. We believe that some households have a greater demand for diversity in their food and beverage purchases more generally, so we try to control for this by including households' diversity of cheese purchases as well as their diversity of alcohol purchases. The consumption patterns for cheese are believed to capture some attributes such as consumers' general preference of purchase variety, preference of quality of life and other geographic features of certain state. So we first choose households who buy wine and cheese in each year. Not all the households stay in this panel across the entire time period, so we have an unbalanced panel data set with 194,323 observations.

Our empirical model includes various stages. For all models, we calculate the purchase diversity score following the Berry-Index and the Entropy-Index. We examine how the policy

variable and other controls affect purchases diversity in our empirical analysis that employs

regression techniques. We also perform a series of falsification tests and look into the group of

households that move between states in additional models. The key explanatory variable of

interest in our model is the presence of laws that allow beer or wine to be available in grocery

stores. A positive coefficient on this policy variable indicates that allowing the alcoholic

beverage to be sold in grocery stores increases the diversity of products selected by consumers.

Given that households have heterogeneous preferences for variety across all food and beverage

products, we attempt to control for this by including the diversity of cheese purchases as an

explanatory variable.

There are several ways that dietary variety can be measured. In the nutritional literature,

count measures are frequently applied (Kant 1996), whereby the number of consumed food items

and food groups are recorded. Some well-known indices measuring diversity and overall diet

quality based on this method are dietary diversity score developed by Kant et al. (1993), dietary

variety score (DVS) by Drewnowski et al. (1997), Healthy Eating Index by Kennedy et al.

(1995), Diet Quality Index (DQI) by Patterson et al. (1994), Diet Quality Index (DQI)-Revised

by Haines et al. (1999), DQI-China by Stookey et al. (2000), and DQI International by Kim et al.

(2003). These indices, although handy for interpretation, have an important disadvantage: a

minor food counts as much as an important component of the individual's diet. The economic

literature, however, tends to measure variety not only by the number of foods but also by their

distribution-for a given number of foods, diversity increases as their shares of the diet are more

evenly distributed. The most often applied measures are Entropy (E), the Simpson Index (SI) and

the Cumulative Share (CS) (Lee and Brown 1989; Theil and Finke 1983; Jekanowski and

Binkley 2000). The basic idea behind each of these measurements is that maximum diversity occurs when consumption shares are equally distributed among varieties.

A well-designed index for diversification should have at least the following properties:

a) it should vary directly with the number of different products

b) it should vary inversely with the increasing unequal distribution of products

c) it should vary directly with the dissimilarity or heterogeneity of products

d) if possible, it should be bounded between zero and unity

Gort (1962) generally is credited with having made the first quantitative examination of diversification in U.S. manufacturing. The familiar primary product specialization ratio (PPSR) forms the basis for his most popularly referenced measure:

$$d_1 \equiv 1 - PPSR = \sum_{j=2}^{n} s_j,$$

where Sj, typically defined at the four-digit level, is the share of the jth secondary product in establishment, firm, or industry shipments. The PPSR is a good measure of a producing unit's primary product concentration, but d1 does not satisfactorily fulfill the critical properties of a well-defined index of diversification. It is silent regarding the number of products. It accounts only for the share distribution between the primary product and the aggregate of all secondary products.

Berry (1971) and McVey (1972) apparently independently propose and apply the Herfindahl index as a measure of corporate diversification. The index has the form i^2, where s1 is the share of the ith product in total sales. The Berry Index is defined as:

$$d_2 \equiv 1 - \sum s_i^2.$$

where Si is the ration of the firm's output in the ith industry to the firm's total output in n

industries. This index applied to the distribution of a firm's industrial activity rather than to the

distribution of an industry's sales among other firms. This index of diversification takes the

value 0 when a firm is active in a single industry, and approaches unity when the firm in question

produces equally in a large number of different industries. This index appears to approximate

rather closely what is generally meant by diversification. It has, in addition, the convenient

property that when a firm is equally active in each of several industries, the index of

diversification becomes 1 where n is the number of industries in which the firm is active. The

index does not address product heterogeneity, but it does satisfy both the number and distribution

property.

The economic literature, however, tends to measure variety not only by the number of

foods but also by their distribution – for a given number of foods, diversity increases as their

shares of the diet are more evenly distributed. The most often applied measure is the Entropy

Index (E). The basic idea behind each of these measurements is that maximum diversity occurs

when consumption shares are equally distributed among varieties. Entropy is defined as a

function of the consumption share Wi, where high diet diversity corresponds to a large index

value of E. Entropy index weights each P_i by the logarithm of i/P_i, A maximum of $\log_n$ is

reached when consumption is evenly distribution across all varieties.

$$E = \sum_{i=1}^{n} P_i \ln 1/P_i$$

Equation (1) outlines the basic model that uses a fixed effect linear model to examine the

relationship between alcohol purchase diversity and alcohol retail availability regulations.

$W = \beta_0 + \beta_{1t}*p + \beta_{2t}*r + \beta_3*R + \beta_4*Yr + e$ (1)

To keep the notation simple, W is the purchase diversity of an alcoholic beverage; p represents the policy dummy variable, which is 1 when states allow alcohol sales in grocery stores, and is 0 when states do not; r is the regional dummy variable which defines the households' geographical information; R is the regional specific time trend. We have 9 regions, representing New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific. The regional specific time trend is calculated as regional dummy multiplied by panel year, and Yr is the year dummy variable representing years from 2004 to 2012.

Results

Summary statistics show that the Index measuring the diversity of beer purchases is higher in states that allow beer in grocery stores; we also see a similar, yet stronger, result for wine. The Index measuring the diversity of annual cheese purchases is nearly the same across all states. Our econometric results show that households in states that allow beer sales in grocery stores have greater diversity in their beer purchases; the estimated coefficient suggests that the level of product diversity in the beer category increases by between 6% and 9%. In the case of wine, the estimated coefficient indicates that households that are in states with wine in grocery stores have between 12% and 20% greater diversity in their wine purchasing behavior. These results are robust across various model specifications that include additional explanatory variables.

We also ran two falsification tests. In the first test we regressed the policy variable on the Index for cheese diversity (rather than using the diversity of purchases of an alcoholic beverage as the dependent variable). Here the policy variable was not statistically significant in either model. In the second test, we randomly assigned the policy variable to states and re-estimated the effect on the diversity of beer and wine product purchases. In this case, we found no statistically significant effect when the policy variable was randomly assigned to states. The

results from both tests provide stronger evidence that policies that allow beer and wine to be available in grocery stores are linked to a wider basket of products purchased by households.

Our econometric results show that households in states that allow wine sales in grocery stores have greater diversity in their wine purchases; the estimated coefficient suggests that the level of wine product diversity increases by between 10% and 20% in states that allow wine sales in grocery stores and this result is robust across various model specifications that include additional explanatory variables, as we add more control variables into our model, the coefficient of policy remains stable. In particular, the basic model indicates that the availability of wine in grocery stores has a positive effect on wine consumption diversity, to the degree of 14.35%. In follow-up models, with cheese consumption diversity, annual expenditures on groceries divided by annual income, and controls on the total quantity of wine UPCs and cheese UPCs, the results show that the level of wine product diversity increases by approximately 12% in states that allow wine sales in grocery stores. In models with additional demographic and geographic variables as explanatory variable, the results show that, both female head age and male head age have a negative effect on wine consumption diversity. Also, as the household head grows older, they tend to choose a less diverse basket of wine products. While both the employment status of female head and male head, as well as female head education level, are not significantly related to wine consumption diversity, the education level of male head has slightly significant effect on the diversity of wine choices. Regression results using BI as a measurement of diversity are similar to the results using EI as a measurement.

In addition, we identified a group of 497 households that moved between regulatory regimes during the 2004 to 2011 time period. Comparing the average wine purchase diversity

when they are in states that allow wine sales in grocery stores to states that do not, the average wine purchase diversity score increases from 1.092 to 1.319.

Summary statistics show that the Entropy Indexes measuring the diversity of beer purchases in states that allow beer sales in grocery stores are higher than in states that do not allow beer sales in grocery stores. Our econometric results show that households in states that allow beer sales in grocery stores have greater diversity in their wine purchases; the estimated coefficient suggests that the level of beer product diversity increases by between 6% and 7% in states that allow beer sales in grocery stores. This result is not as robust as the results in the wine specification, yet it is statistically significant at the 5% level.

Seventeen states allow spirits in grocery stores, while the remaining thirty-three states do not allow spirits in grocery stores. Using the same dataset from Nielsen Homescan Panel Data and applying the same measurement of diversity (EI and BI) for spirit purchases, we also analyze the effect of regulations that allow spirit sales in grocery stores on the diversity of spirit purchases by consumers in the Homescan panel. In this model we find limited statistical significance to show that the retail regulation has an effect on the diversity of spirit products purchased. The effects are much stronger and more robust across specifications in the beer and wine analyses. We expect that decisions to purchase spirits are different from those for beer and wine as spirits are often stored at home for longer periods of time and decisions are made more deliberately. As a result, we also expect that the diversity of spirit purchases is much more affected by the composition of the household and less by the retail regulations observed in a particular state.

Conclusion and Policy Implications

Recently there has been a renewed interest to expand the distribution of beer and wine into a wider range of outlets including grocery stores in several states. Proposals put forward have been viewed as a vehicle for state governments to raise additional revenue, yet there has been strong opposition towards these proposals from liquor store owners and social interest groups. Our analysis shows that introducing beer and wine into grocery stores would, in fact, not lead to a decrease in product diversity and consumer choices for these alcoholic beverages.

Our analysis weighs in on the current debate regarding the costs and benefits of increased alcohol distribution in the United States. This is an issue that has far-reaching implications for beer and wine producers across the United States, as well as producers in Europe, Australia, and South America. Our research also sheds some new light on the tradeoffs that various stakeholders face as they debate the economic consequences of introducing beer and wine into grocery stores. The opposition to this set of legislative proposals—and associated claims that it will decrease product diversity and consumer choice—is most likely driven by rent-seeking behavior among licensees of alcoholic beverage products that would like to maintain control over beer and wine sales.

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