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ABSTRACT

We study the decentralization of liquor policies in the Post-Prohibition Era, which is the most famous natural experiment ever conducted with respect to policy decentralization in the U.S. Our empirical analysis exploits a unique feature of this policy change, namely that we observe votes of citizens in public referenda as well as roll call votes of the state legislators affecting the same policy. Our analysis is based on a probabilistic voting model. We show how to identify and estimate a model with a multi-dimensional policy space. These estimates then allow us to map the policy space into an alcohol consumption space. We find that this mapping is highly non-linear. Hence, differences in estimated bliss points in the ideological policy space tend to exaggerate differences in preferences over alcohol consumption. Nevertheless, decentralized policies offer the opportunity to account for heterogeneity in preferences and increase welfare. The optimal decentralized policy increases aggregate welfare by up to 79 percent compared to the optimal uniform policy.

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1 Introduction

The temperance movement in the U.S. was dedicated to promoting moderation and, more often, complete abstinence from intoxicating liquor. The organized efforts supporting this movement involved religious coalitions that linked alcohol to virtually all of society's ills, including immorality, criminality, and lack of patriotism. The crowning achievement of the temperance movement was the passage of the 18th Amendment to the United States Constitution in 1917.[1] This amendment prohibited the production, sale, and transport of "intoxicating liquors," but it did not provide an enforcement strategy. The National Prohibition Act, known informally as the Volstead Act, was enacted by the United States Congress in 1919 to establish and enforce a uniform liquor control policy throughout the U.S.

Neither the Volstead Act nor the 18th Amendment were enforced with great success. Rather, entire illegal economies such as bootlegging, speakeasies, and distilling operations flourished. The public appetite for alcohol remained strong, and, despite initial success in suppressing alcohol consumption in the early 1920s, alcohol consumption rebounded to approximately two-thirds of the pre-Prohibition level by the end of the 1920s (Warburton, 1932). Organized crime took over the production and distribution of liquor, which led to sharp increases in violent crime. Law enforcement efforts were soon considered insufficient to deal with organized crime cartels, changing beliefs about enforcement costs and attitudes towards liquor control policies (Garcia-Jimeno, 2016).

Responding to widespread disenchantment with Prohibition Era policies, the U.S. Congress passed the 21st Amendment in 1933 voiding the Volstead Act. The political compromise that ended the Prohibition Era specified that liquor policies were no longer decided at the federal level. Instead, each state could determine its own policy. This com-

[1] The 18th Amendment was ratified and became effective in 1919.

promise resulted in the most famous natural social experiment ever conducted concerning policy decentralization in the U.S. Approximately half of the states further delegated the decision-making power to county governments or local municipalities. States with more heterogeneous preferences and strong minorities were more likely to decentralize liquor policies after the end of the Prohibition Era (Strumpf and Oberholzer-Gee, 2002).

Texas was the largest state in the Union that decided to decentralize liquor policies. Almost all relevant liquor policy votes were taken in the Texas legislature between 1931 and 1937. During that period we have identified 102 roll calls on bills and amendments that dealt with alcohol and liquor policies. Using standard scaling techniques, we can estimate the legislators' ideal points based on the observed roll call votes.[2]

We can link legislators' bliss points to voters' unobserved preferences using a probabilistic voting model.[3] We treat liquor policy as a "pliable issue" on which legislators are free to take any position they want in order to appeal to their constituents.[4] We show that the probabilistic voting model is identified up to some normalizations and can be estimated using a GMM estimator. Our preferred model defines voter types based on religious affiliations, classifying voters into "wet" and "dry" types.[5] Using data on the socio-economic and demographic compositions of voting districts, as well as the estimated bliss points of each member of the Texas House of Representatives, we estimate the parameters of the probabilistic voting model. We find that the estimates are quite

[2]See, for example, Poole and Rosenthal (1985, 1991), Heckman and Snyder (1997), or Clinton, Jackman, and Rivers (2004). We discuss these techniques in detail below.

[3]For a comprehensive survey and analysis of probabilistic voting models see Coughlin (1992).

[4]We show below that there was no party discipline within the Texas Democratic party, which dominated state politics during the relevant period we study. In the language of probabilistic voting models, liquor policy was not a fixed issue which was dominated by the party.

[5]Garcia-Jimeno, Iglesias and Yildirim (2021) study the role of information networks and collection action during the Temperance Crusade in 1873-74. They also highlight the importance of religious organizations such as the Women's Christian Temperance Union in the push for prohibition.

reasonable and that the model fits the data well. We validate the model using the estimated bliss points of members of the Texas Senate which were not used in the estimation of the probabilistic voting model.

Liquor policies in Texas were ultimately determined by local public referenda, which pit a status quo against an alternative policy (Romer and Rosenthal, 1978). Given that we have identified voters' preferences from the probabilistic voting model of representation, we can also identify the unobserved policy positions of the status quo and the proposed alternative from the observed vote shares of the public referenda. We observe the outcome of 302 referenda at the county level between 1937 and 1952.[6] We find that our model explains the observed vote shares and provides reasonable estimates for the policies that were subject to the referenda. These estimates of the policy positions then allow us to map the liquor policy space into the alcohol consumption space. We find that this mapping is highly non-linear. Hence, differences in the liquor policy space tend to exaggerate differences in preferences over alcohol consumption.

Finally, we compare voters' welfare under different policy regimes. Our model allows for spillover and peer effects in the determination of policy preferences. Our estimates suggest that these spillover effects are small. As a consequence, decentralized policies offer the opportunity to account for heterogeneity in preferences and increase welfare as suggested by Oates (1972). First, we compare the dry status quo of the Prohibition Era to the optimal uniform policy. We find that aggregate welfare increases by 43 percent under the optimal uniform centralized policy. The gains primarily arise because the optimal uniform policy favors those districts that prefer wet policies.

[6] These data were also used by Strumpf and Oberholzer-Gee (2002) and Coate and Conlin (2004). See these papers for a more detailed discussion of these data. The vast majority of referenda pitted the dry Prohibition Era status quo against a "beer & wine only" alternative. We observe only a few referenda that allowed the sale of all types of liquor in Texas.

We also compare the Prohibition Era status quo and the optimal decentralized policy. We find that the optimal decentralized policy increases aggregate welfare by up to 79 percent relative to the status quo. Hence, there are potentially large and significant benefits from policy decentralization. Finally, we document that there existed much heterogeneity in preferences across voting districts and counties in Texas and conduct a disaggregate analysis of gains and losses under various policy regimes. Our empirical results thus provide a clean interpretation of the failures of the Prohibition Era and rationalize the decentralization that we observe in the Post-Prohibition Era.

The rest of the paper is organized as follows. Section 2 provides a literature review and discusses our contributions. Section 3 discusses the institutional background and introduces our data set. Section 4 develops the theoretical framework for our analysis. Section 5 discusses the identification and estimation of our model. Section 6 presents the main empirical results. Section 7 explores the policy and welfare implications of our work. Section 8 concludes.

2 Literature Review

Our paper is related to various parts of the literature on political economy and fiscal decentralization. A seminal empirical paper on fiscal federalism and policy decentralization is Strumpf and Oberholzer-Gee (2002). They show that states with high preference heterogeneity and strong minorities were more likely to decentralize liquor policies after the end of the Prohibition Era. Our research differs from this paper in several important ways. First, Strumpf and Oberholzer-Gee (2002) focus on strategic bargaining within a state legislature. In contrast, we primarily focus on local elections and referenda which we model as the outcome of a probabilistic voting model with sincere voting. Second, Strumpf and Oberholzer-Gee (2002) estimate their model by exploiting variation in decentralization decisions across states, while we exploit variation in the preferences of legislators within a single state. Third, we use the referenda to test whether voters' behavior in referenda is consistent with the outcomes of legislative elections, while they use the referenda data to measure heterogeneity within states. Fourth, our analysis allows us to ultimately compare welfare differences between centralized and decentralized decision-making, whereas Strumpf and Oberholzer-Gee (2002) are primarily interested in establishing that heterogeneity within states predicts policy decentralization. Finally, having estimated the bliss points of the legislators, we can estimate an upper bound for the gains associated with centralization as suggested by Strumpf and Oberholzer-Gee (2002)

One of the main insights of fiscal federalism is that a decentralized provision of public goods is likely to improve welfare over a centralized, uniform provision if spillovers and differences in costs among local jurisdictions are negligible (Oates, 1972). Our analysis accounts for policy spillovers which were also highlighted by Acemoglu, Garcia-Jimeno, and Robinson (2015). In our application, spillover effects may arise due to liquor purchases by customers that cross jurisdictional borders or due to spillovers in law enforcement. Moreover, drunk driving and highway accidents may cross county boundaries. Finally, individuals who are against liquor consumption plausibly get disutility from the very fact that others are drinking even if they live in another jurisdiction. Preferences over liquor policies in one county depend on the preferences of neighboring counties and are defined over policy outcomes in neighboring jurisdictions. Overall, we find that spillover effects are small and insignificant.

Our paper adds to the literature that has estimated the magnitude of the spillover effects. Several empirical papers have directly measured spillovers studying changes in local liquor law changes in Texas, mostly focusing on a later period between 1975 and 1996. After controlling for both county and year-fixed effects, Baughman, Conlin, Dickert-Conlin, and Pepper (2001) find evidence that the sale of beer and wine may decrease expected accidents. They also find that the sale of higher alcohol-content liquor may present a greater risk to highway safety than the sale of just beer and wine. However, the evidence on the importance of direct spill-overs based on motor vehicle accidents is mixed. We focus on the 1930s and 1940s when highway safety was much less of an issue than in the 1970s and 1980s. This may explain why we find smaller estimates of spillover effects. In a related paper, Conlin, Dickert-Conlin, and Pepper (2005) find that prohibiting the sale of beer to persons under 21 increases the fraction of drug-related arrests involving juveniles more in wet counties than in dry counties. They find that local alcohol access decreases mortality associated with illicit drugs. Overall, the findings of these papers are consistent with our finding that there are potentially large benefits from decentralization. In our modeling approach, the ideal points of voters and politicians reflect both benefits and costs of liquor policies. Moreover, preferences also depend on characteristics and policies of adjacent communities which can capture spill-overs over countries. Overall, our estimates are consistent with the mixed evidence in the paper papers above, especially once one adjusts for differences across time.

Given the prevalence of policy decentralization in most developed economies, it is surprising that there are few compelling empirical studies that have estimated the benefits of policy decentralization within an internally consistent political economy model. One exception is Calabrese, Epple, and Romano (2011) who compare the efficient decentralized allocation, the equilibrium allocation with decentralized provision, and the equilibrium allocation with a uniform provision in a model that is calibrated to the Boston metropolitan area. This paper develops and implements a completely different framework for measuring the benefits of policy decentralization. One important methodological contribution is that we show how to estimate the parameters of a probabilistic voting model and characterize the position of various policies that were implemented by combining data that characterize votes taken by legislators and vote shares in local policy referenda.

The decentralization theorem has been criticized since it assumes that centralization results in a uniform policy. In general, federal governments can provide different levels of public services among states. Nevertheless, there are often political and constitutional constraints on the extent to which this can happen. The theoretical literature has developed models of decentralization that have endogenized the centralized policy. Lockwood (2002) considers a model of legislative bargaining and shows that more heterogeneity among preferences across jurisdictions does not necessarily imply that welfare increases under decentralization. Besley and Coate (2003) have shown that decentralization is desirable under the same conditions if one relaxes the assumption that the federal government is constrained to implement a uniform policy. In their model centralization tends to generate an over-provision of public goods because voters have incentives to elect representatives with high demand for public spending. In these models, voters do not necessarily want to elect candidates who share their policy preferences. Depending on the composition and procedures of the legislature, they may want to strategically delegate to candidates with more extreme preferences to counteract the influence of other districts. Our analysis abstracts from these strategic voting issues, but allows for spill-overs or peer effects in preferences over policies. These papers are also motivated by the observation that federal government policies are not necessarily uniform. In contrast, we study an era in which it was the explicit objective of the federal government to implement a uniform policy for all states. As discussed above, both the 18th Amendment to the United States Constitution and the National Prohibition Act had the intention to establish and enforce a uniform liquor policy throughout the U.S. It thus makes sense to compare decentralized policies against uniform centralized policies in our application.

Our paper is also related to the literature that has studied the validity of voting models using state and local data. Compelling indirect evidence in favor of the median voter theorem is provided by Lott and Kenny (1999) who examine the growth of state governments as a result of giving women the right to vote. Similarly, Miller (2008) finds that suffrage rights for American women helped children to benefit from technological innovations in health care and significantly decreased child mortality in the U.S. Epple, Romer, and Sieg (2001) and Calabrese, Epple, Romer, and Sieg (2006) analyze whether observed local tax and expenditure policies are consistent with a version of the median voter theorem that accounts for endogenous household sorting within a system of jurisdictions. In contrast to these papers, we use a probabilistic voting model and directly exploit a combination of observed roll call votes and vote shares in public referenda to identify, estimate, and validate our model.

Our paper is also related to Coate and Conlin (2004) who estimate models of voter turnout also using data from Texas liquor referenda. They find that a rule-utilitarian model provides a good explanation for the observed turnout patterns. This result is important since it provides a compelling explanation of why voters show up at the ballot box. Coate, Conlin, and Moro (2008) extend the analysis and estimate a pivotal voting model. We do not provide an explicit model of voter turnout. However, we show how our model and empirical analysis can also account for imperfect voter turnout.

Finally, our paper adds to the recent literature on estimating game-theoretic models in political economy. An early example of theory-based estimation in political economy is Merlo (1997), who estimates a dynamic bargaining model of government formation. More recently, Knight and Schiff (2010) estimate a model of social learning in presidential primaries. Iaryczower and Shum (2012) estimate a game with asymmetric information to describe the voting behavior of judges in appellate courts. Kawai and Watanabe (2013) consider models of strategic voting. Sieg and Yoon (2017, 2022) estimate dynamic games of electoral competition with asymmetric information and evaluate the impact of term limits. Aruoba, Drazen, and Vlaicu (2019) use governors' job approval ratings as outcome measures and estimate a model with moral hazard. Battaglini, Patacchini, and Rainone (2020) estimate a model of network formation and show that social connections are important for legislators' productivity. Our model and estimation strategy significantly differs from all those papers.

3 Data

3.1 Historical Background

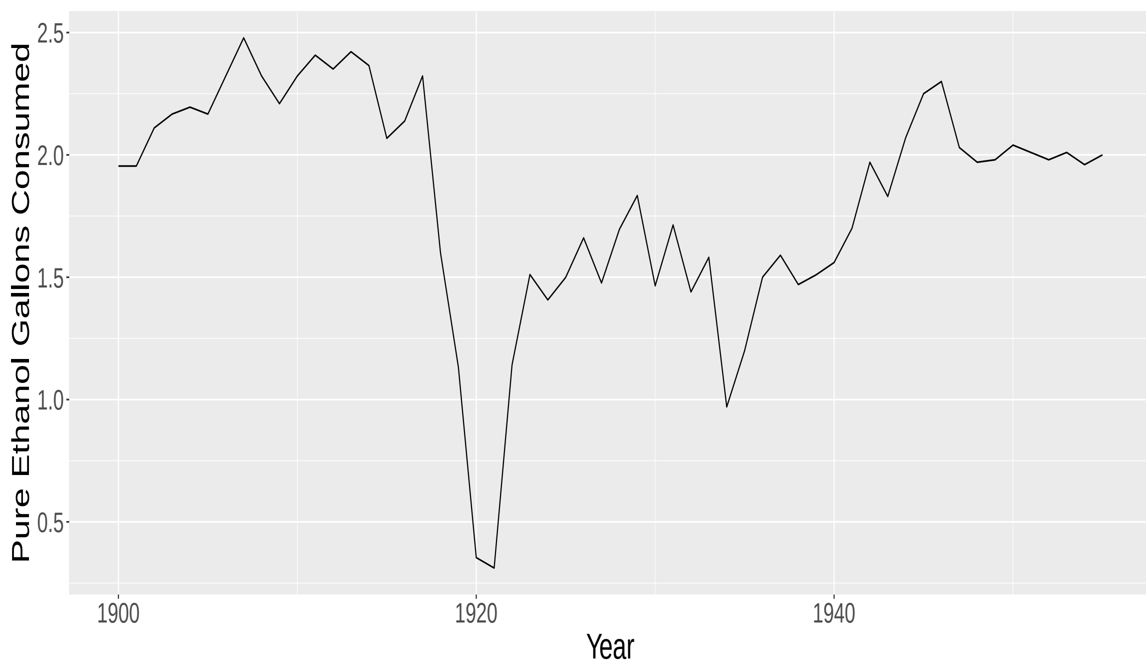
Since 1876, Texas has allowed localities to determine their liquor statuses through local option elections and referenda. As discussed above, the 18th Amendment to the U.S. Constitution on National Prohibition was ratified in January 1919. Texans followed suit with a Prohibition amendment to the state constitution in May 1919.

Overall, the impact of Prohibition on alcohol consumption in the U.S. is difficult to ascertain. While the federal government collected reliable data on alcohol consumption before and after the Prohibition Era, no accurate government data are available for the Prohibition Era. Perhaps more surprisingly, Warburton (1932) is the only careful economic study that was ever conducted toward the end of the Prohibition Era to determine the impact of Prohibition on alcohol consumption and a variety of other economic outcomes.

Figure 1 shows the time series of total pure ethanol consumption per capita (using the population 15 and older as deflator) between 1900 and 1955. Our data are based on the official statistics for the periods 1900-1920 and 1934-1955. For the years 1921-1930 we rely on the estimates from Warburton (1932, Table 30).[7] Note that alcohol consumption

[7]These estimates were confirmed by Miron and Zwiebel (1991) who extended Warburton's analysis

Figure 1: U.S. Alcohol Consumption: 1900-1955



was fairly stable before the Prohibition Era and averaged around 2.39 gallons per capita during the period between 1911-14.[8] Using a variety of different techniques, Warburton (1932) estimated that alcohol consumption fell sharply at the beginning of the Prohibition Era, to approximately 25-30 percent of its pre-Prohibition level. By the mid-1920s, however, law enforcement efforts slackened, leading to a significant rebound in alcohol consumption that reached approximately 60-70 percent of its pre-Prohibition level in

using data from the post-Prohibition Era and conducting a variety of sensitivity checks. Overall, their findings are essentially the same as those reported in Warburton (1932). Miron and Zwiebel (1991) also provide estimates for the period from 1931-33 which are used in the graph above.

[8]Warburton (1932) reports on p. 147 that the federal tax rates on beer were increased in 1917 from $1.50 per barrel to $3, and in 1919 to $6, and those on spirits from $1.10 per gallon to $3.20 in 1917, and to $6.40 in 1919. The rate on wines, which previously had borne no federal tax, was made to vary with the alcoholic content. This partially explains the large drop in alcohol consumption during World War I.

1930. The level of consumption remained the same right after the end of the Prohibition Era and averaged about 75-80 percent of its pre-Prohibition level between 1935 and 1955.

Average alcohol consumption is a continuous outcome measure that depends on legal and institutional constraints and enforcement. Appendix A of this paper shows how to translate these changes in demand for alcohol into traditional consumer surplus measures. Not surprisingly, we find that the changes in consumer surplus associated with changes in liquor policies are quite substantial. Given that alcohol consumption varies continuously over time, it also makes sense to think about the liquor policy as continuous and not as discrete. This is the approach that we take in our modeling analysis below.

While the aggregate time series for pure ethanol illustrates the main trend in alcohol consumption, it conceals some important aspects of the Prohibition Era. Table 6 in Appendix A reports three time series breaking down the total pure ethanol consumption into beer, wine, and spirits consumption. Notably, Prohibition primarily succeeded in reducing beer consumption. The per capita consumption of beer was reduced by about 70 percent, from approximately 31 gallons of beer per year (or 1.25 gallons of pure ethanol) in 1911-1914 to 8.75 gallons of beer (or 0.35 gallons of pure ethanol) in 1927-1930. In contrast, the consumption of wine increased by 65 percent and pure spirits by 10 percent during the Prohibition Era. As a consequence, Prohibition led to a strong substitution from beer to wine and spirits. This was probably due largely to the fact that it was much easier to enforce Prohibition for large-scale beer production by shutting down commercial breweries and forcing households into illegal home production of beer.[9]

Prohibition remained in effect for almost 14 years until it was rescinded by the 21st

[9]There are no estimates of alcohol consumption at the state level for the Prohibition Era. However, more recent statistics suggest that Texas tends to be in the 5th or 6th decile of alcohol consumption among the 50 states in the U.S. As a consequence, the US data also provide an accurate estimate of alcohol consumption in Texas.

Amendment in 1933. In 1933, Texans also voted in favor of allowing the sale of 3.2 percent beer, but full-strength beer, wine and hard liquor remained prohibited under the still-active statewide Prohibition law. The state dry law was repealed in August 1935, returning each county to its pre-Prohibition liquor status. The statewide sale of alcoholic beverages was licensed in 1936. The first post-Prohibition local option elections were recorded in 1937 when over 70 localities voted to change their alcohol status. By 1953, local liquor statuses were mostly constant, with an average of only 17 elections per year between 1953 and 1958.

3.2 Institutional Design in Texas

Texas uses a bicameral system which consists of a Senate and a House of Representatives. In this study, we primarily focus on the voting behavior of the members of the House of Representatives.[10] During the relevant period, there were 150 House districts. House districts did not cut county lines.[11] Representatives were elected from single- and multi-member districts.[12] Between 1933 and 1952 the Texas House of Representatives had 150 members from 127 districts. In particular, 115 representatives came from single-member districts accounting for 72.3 percent of all representatives. The remaining 35 representatives came from eight two-member districts, one four-member district, and

[10] There are also 31 members of the Texas Senate. We use the data from the Senate in our validation analysis as discussed below.

[11] Texas is divided into 254 counties.

[12] Multi-member districts were used extensively from 1846 until 1975. Although the idea of equal representation surely held some conceptual appeal, it was not until 1964 that the Supreme Court insisted on the "one person, one vote" principle for state legislative districts in the landmark Reynolds v. Sims decision (Calabrese, 2000). This and other court decisions, as well as the difficulty of developing a district plan that would pass muster, led to the exclusive use of single-member districts in Texas after 1975 (Eckham, 2016).

three five-member districts. The districts usually corresponded to counties or combinations thereof, with more populous counties getting more representatives.[13] Only two of the Representatives in office from 1933 to 1937 were unaffiliated with a party, and one of them later became a Democrat. All others were Democrats. Hence, the main political competition was within the Democratic party.

Using the 1940 U.S. Census micro-data, we observe several socio-economic demographics characterizing the income, age, gender, and racial distributions of the districts.[14] Moreover, we observe variables characterizing labor and housing markets such as wage income, fraction unemployed, housing wealth, and fraction renter. We also have detailed information about the different religious affiliations at the county level from the 1936 Decennial Census of Religious Bodies. We follow Garcia-Jimeno (2016) in grouping these religious affiliations into two types: "dry" and "wet". This grouping reflects the prevailing attitude of these religious groups toward liquor policies. Dry religions are Evangelicals, Baptists, Methodists, Presbyterians, and Mormons. Wet religions are Lutheran, Catholic, and Jewish.[15] We also observe the total population and land area which allows us to construct a population density measure. Table 1 provides socio-demographic characteristics at the district level for the Texas House of Representatives.

3.3 Estimation of Bliss Points

We estimate the ideal points of legislators using the NOMINATE method which is an application of multidimensional scaling techniques to political choice data developed by

[13]From time to time, flotorial districts were used. These were districts that overlapped with other districts to give representation to a county or region that otherwise would not get any.

[14]We use the Integrated Public Use Micro-data Series version of the complete count Census data. The 1936 Decennial Census of Religious Bodies comes from ICPSR Study #8.

[15]Garcia-Jimeno (2016) also includes Eastern Orthodox as a wet religion, but there is no Eastern Orthodox community in Texas in the 1936 Census.

Table 1: Texas House Districts

	Mean	Std Dev
Demographics		
Population ($\times 10^5$)	0.95	1.00
% Male	50.45	0.92
% Black	15.70	13.27
% Hispanic	7.96	15.00
% Black or Hispanic	23.60	16.37
% White	76.38	16.38
% 18+	64.74	3.23
% 21+	58.85	3.36
Average wage income ($\times 10^3$ 1940 $)	0.70	0.16
Median home value ($\times 10^3$ 1940 $)	0.89	0.49
Population Density ($\times 10^3$) per square mile	0.45	0.52
% Renter	57.74	5.49
% Urban	32.40	21.68
% Unemployed	7.23	2.19
% Completed high school	24.76	7.68
% Some college	10.62	3.32
Dry Religions		
% Evangelical	0.68	1.81
% Baptist	39.53	17.06
% Methodist / Episcopal	21.46	8.96
% Presbyterian	3.59	2.22
% Mormon	0.00	0.00
Wet Religions		
% Lutheran	3.52	6.93
% Jewish	0.64	1.46
% Catholic	18.26	22.05

Poole and Rosenthal (1985, 1991). This method is based on the observed roll call voting where the votes (for or against) of each member of the assembly are recorded and published. Though there are important technical differences between the different scaling procedures that are advocated and commonly applied in the literature, there are two important commonalities.[16]

First, most techniques assume that alternative votes can be projected on a low-dimensional Euclidean space. For the most part, Poole and Rosenthal (1997) find that U.S. congressional voting is uni-dimensional, with most of the variation in voting patterns explained by placement along the liberal-conservative first dimension. A second dimension is often added to pick up attitudes on salient issues of the period such as slavery, bimetallism, liquor policies, civil rights, regional, social and lifestyle issues. The scales of these dimensions are not identified and are typically normalized to be between -1 and 1. A score on the dominant first dimension that is close to either pole means that such a score is located at one of the extremes in the liberal-conservative scale. In our application, we restrict attention to votes on liquor policies. Hence, there is a single known dimension of the policy space. That simplifies the analysis and also avoids some of the identification problems associated with these techniques when the dimensionality of the policy space is not known ex-ante.[17] Moreover, we can easily interpret a score of minus one as the most extreme pro-liquor (wet) policy while a plus one score reflects the most extreme anti-liquor (dry) position. Since the scaling of the ideological space is somewhat arbitrary, we also construct a mapping from the liquor policy space to the

[16]Alternative techniques are proposed, for example, by Heckman and Snyder (1997) and Clinton, Jackman, and Rivers (2004). Different estimation techniques often result in similar estimates of the ideal points. Our estimator of the probabilistic voting model of representative democracy can be combined with any method that provides reasonable measures of the legislators' ideal points.

[17]See, for example, the discussion in Heckman and Snyder (1997) and Canen, Kendall and Trebbi (2020).

average alcohol consumption space, as discussed in detail below.

A second assumption is that legislators whose votes are observed have symmetric, single-peaked utility functions which center on their ideal or bliss points. These bliss points represent individuals' most preferred policy outcomes. Legislators vote sincerely, i.e. there is no legislative bargaining that may lead to vote trading. The classification algorithm is based on a probabilistic voting model. Legislators farther from the "cutting point" (in a one-dimensional model) or the "cutting line" (in a two-dimensional model) become more likely to vote in the manner predicted by the spatial model, i.e. the classification algorithm uses a probabilistic voting model to account for errors in the classification of the roll call votes. If the policy space is one-dimensional, the NOMINATE method is similar to a fixed-effect probit model in which both legislators' bliss points and cut-off points for each roll call vote are treated as unknown parameters.

Recently, Canen, Kendal and Trebbi (2020) have shown that standard scaling algorithms may be biased and miss important density in the middle of the support of the ideological distribution. They suggest using additional data from the whip count stage to disentangle party control from individual ideologies. Unfortunately, these data do not exist for our period. As we argue below, party control is unlikely to be an important issue in our application since all legislators belonged to the Democratic party and liquor policies were not subject to party discipline. In addition, the distribution of our estimates of ideal points does not show any anomalies such as excessive polarization.

To apply these classification methods we need to observe the voting behavior of legislators on a sufficiently large number of roll call votes. McCarty, Poole, and Rosenthal (2006) summarize the behavior of the estimator in a large number of Monte Carlo settings and suggest that, at minimum, twenty votes are necessary for obtaining reliable estimates of the ideal points. When removing legislators who vote less than 20 times on alcohol-related bills, we drop 78 of the 304 total legislators we observe in the Texas

House during our period. We have experimented with other roll call voting thresholds and found that including these missing legislators leads to similar results.[18]

For each legislator in the House and Senate, we primarily analyze the votes on liquor policies.[19] We can identify roll call votes on this policy dimension using the journals of the House and the Senate made available by the Texas Legislative Reference Library. These journals index all proposed legislation by their policy content and contain detailed histories of each bill, including an overview of every time the legislature amends or votes to pass or table the bill.[20]

Table 2: Roll Call Votes on Liquor Policy

Chamber	Number of Legislators	Number of Single Member Districts	Number of Roll Calls Liquor Policy	Mean Liquor Votes
House	226	173	102	35.82
Senate	31	31	93	47.90

Table 2 shows that 226 members of the House voted at least 20 times on liquor policies during the relevant period. Moreover, 173 of these representatives came from single-member districts. This sample contains the vast majority of all Representatives

[18]A roll call voting threshold of 13 votes corresponds to us dropping 28 legislators, or just under 10 percent of the total legislators. Appendix F compares our model estimates based on the two different bliss points estimates. Overall we find that the results are quite robust

[19]We have also analyzed voting on a fiscal dimension and the results are available upon request from the authors. Overall, we find that the correlation between the two policy dimensions is only moderate. As we will discuss below, we can ignore other policy dimensions if preferences are additively separable across policy dimensions.

[20]Appendix B provides some examples of the type of bills that legislators voted on.

that served during the relevant period in the Texas legislature.

Figure 2: Histogram of Alcohol Bliss Points

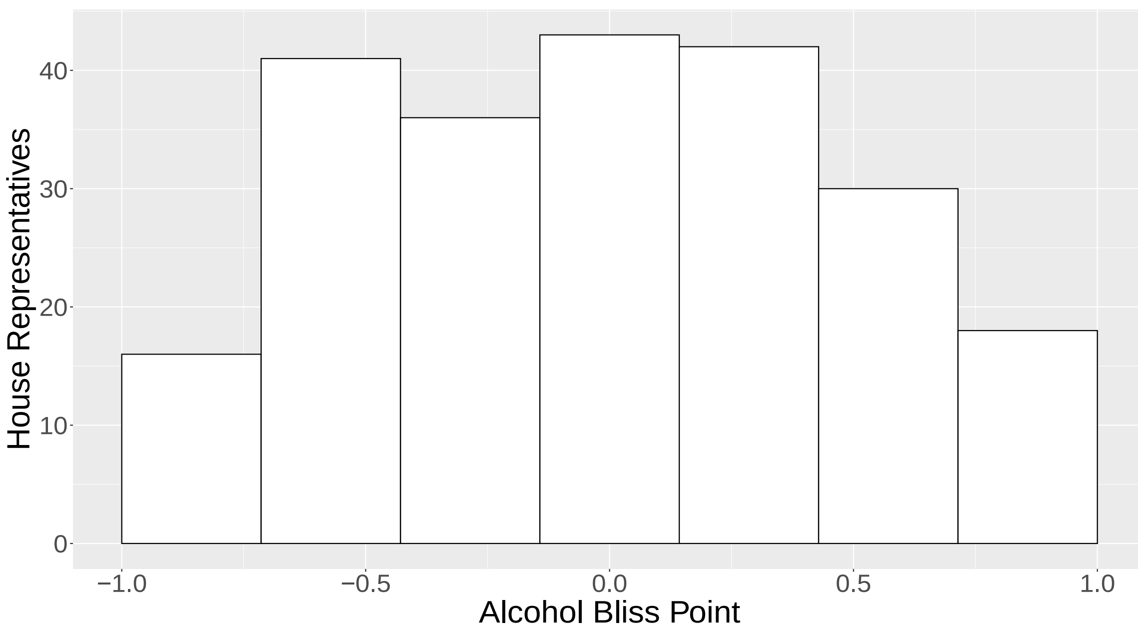


Figure 2 provides a histogram of the Nominate estimates of the liquor policy ideal points for the members of the Texas House of Representatives in our sample. We find that there was much heterogeneity in preferences over liquor policy in the House of Representatives. The distribution of the bliss point strongly suggests that legislative votes on liquor policies were not subject to party discipline. Instead, each legislator had the freedom to vote in accordance with his preferences and those of his constituencies.[21] Moreover, these estimates do not provide any evidence of strong polarization.

[21]We also estimated the bliss points for 31 senators that are used as a hold-out sample as part of a validation exercise.

3.4 Liquor Referenda

Liquor referenda were either held at the county, justice precinct, city, or town level. Since voting districts are composed of counties in Texas, we focus on the 302 county-level referenda during our period. We also observe a number of referenda at the precinct level, which is below the county level. These sub-county referenda allowed individual precincts to adopt a different liquor policy than the county. As a consequence, there was heterogeneity within counties with respect to liquor policies. We have analyzed in detail the precinct-level referenda between 1937 and 1945. We find that a large majority of the precincts that had additional referenda are small. In particular, there are only six counties in which a sufficiently large number of precincts adopted different policies than the dry counties.[22]

We observe 122 unique counties holding local option elections between 1937 and 1952. These 122 counties comprised over 48 percent of the total number of counties in Texas at the time.[23] All referenda can be broadly classified into three types: a) beer-only voted out (in), b) 14 percent beverages voted out (in); and c) all alcoholic beverages voted out (in). We observe 183 beer-only-versus-dry referenda, 38 beer-and-wine-only-versus-dry referenda, and 81 all-versus-dry referenda. For counties that held multiple referenda, we computed an average vote share. Table 3 provides some descriptive statistics for our sample.

The mean share was 42 percent, indicating that the majority of referenda were in favor of keeping the county dry. The mean voter turnout was approximately 27 percent.

[22] We provide some robustness tests excluding these counties from our analysis below.

[23] We follow the literature such as Strumpf and Oberholzer-Gee (2002) and Coate and Conlin (2004) restrict the sample to the observed referenda and do not model the decision to have a referendum. It might be interesting for future research to study why certain counties decided to hold referenda and others did not.

Table 3: Local Referenda: Descriptive Statistics

	Individual Referenda		Average Referenda	
	Mean	Std Dev	Mean	Std Dev
Vote Share	42.14	12.85	41.34	14.20
Turnout	27.56	13.00	26.47	11.04
Number of Referenda	302		122	
% of Counties that Held a Referendum	48.03		48.03	

4 A Probabilistic Voting Model

To gain some additional insights we develop and estimate a model of political competition and representation at the district level. We adopt a standard probabilistic voting model with two candidates that compete to represent the district in the legislature.[24] To illustrate the basic issues that are encountered in the analysis, we first discuss voting in legislative elections assuming no spillovers among voting districts. We then characterize voting in referenda. Finally, we extend the model to allow for spillovers or peer effects in preferences over policy among districts.

4.1 Voting in Two-Candidate Elections in a Single District

Let us assume that there are I types of voters. Each type has a share given by s_i. A policy is given by a K-dimensional vector, $g = (g_1, ..., g_K)$. For empirical tractability, we assume that preferences of voter i are additively separable over the K policy dimensions

[24]Coughlin (1992) provides a detailed discussion of probabilistic voting theory. One of the drawbacks of probabilistic voting theory is that it assumes commitment. Citizen candidate models that are due to Osborne and Slivinski (1996) and Besley and Coate (1997) provide one way to relax the commitment assumption.

and given by:

$$u_i(g) \;=\; \sum_{k=1}^{K} u_{ki}(g_k) \;=\; \sum_{k=1}^{K} -\,\omega_{ki}\,(g_k-\theta_{ki})^2 \tag{1}$$

Hence, θ_{ki} is the bliss points of voter group i for the policy dimension k, and ω_{ki} is the relative weight that voter i assigns to the policy dimension k.

There are two candidates a and b that are competing for office. Each candidate can fully commit to a policy position before the election. Voters' utilities are subject to random shocks, denoted by ϵ_{ij}, which are not observed by the two candidates. Hence, the share of voters of type i that vote for candidate a is given by:

$$\begin{aligned} V_i^a(g_a,g_b) &= Pr\{u_i(g_a)+\epsilon_{ia} \geq u_i(g_b)+\epsilon_{ib}\} \\ &= \Phi_i(u_i(g_b)-u_i(g_a)) \end{aligned} \tag{2}$$

where $\Phi_i(\cdot)$ is the distribution function of $\epsilon_{ib}-\epsilon_{ia}$. The total vote share of candidate a is, therefore, given by:

$$V^a(g_a,g_b) \;=\; \sum_i \; s_i\;\Phi_i(u_i(g_a)-u_i(g_b)) \tag{3}$$

and $V^b(g_a,g_b)=1-V^a(g_a,g_b)$.

Each candidate is maximizing her vote share. Taking derivatives with respect to g_{ka}, we obtain for each k:

$$\frac{\partial V^a(g_a,g_b)}{\partial g_{ka}} \;=\; -2\sum_i \; s_i\;\phi_i(u_i(g_a)-u_i(g_b))\;\omega_{ki}\;(g_{ka}-\theta_{ki}) \;=\; 0 \tag{4}$$

and a similar condition for g_{kb}.

In a symmetric Nash equilibrium, both candidates commit to pursue the same policies, implying that $u_i(g_a)-u_i(g_b)=0$.[25] Hence, we obtain:

$$\sum_i \; s_i\;\phi_i(0)\;\omega_{ki}\;\theta_{ki} \;=\; g_k\sum_i \; s_i\;\phi_i(0)\;\omega_{ki} \tag{5}$$

[25] With a slight abuse of notation let us denote this equilibrium policy by g.

Solving this equation implies that the optimal position of each candidate for policy k is given by:

$$g_k \;=\; \sum_i \frac{s_i\ \phi_i(0)\ \omega_{ki}}{\sum_j\ s_j\ \phi_j(0)\ \omega_{kj}}\ \theta_{ki} \tag{6}$$

Once in office, a legislator has quadratic, additively-separable preferences with bliss point given by g_k. Each legislator votes sincerely on each policy proposal. Note that the bliss point is a weighted average of the bliss points of the voters for each policy dimension. The weights depend on the share of each type (s_i), the density of the median voters ($\phi_i(0)$), and the relative importance of the policy dimension (ω_{ki}).

Our model relies on a number of strong assumptions. First, the probabilistic voting model predicts that both candidates take the same position on all pliable issues on which legislators are free to take any position they want in order to appeal to their constituents. In our application, we have seen that the Democratic party dominated state politics. We should, therefore, interpret the model above as a theory of political competition within a party. We do not find any evidence that the Democratic party exercised strong party discipline on liquor policy during the post-Prohibition Era that we study in this paper. Second, preferences are separable across policy dimensions. Non-separabilities could arise between liquor policies and enforcement. However, enforcement after the end of prohibition was largely a local and not a state issue. In general, relaxing the separability assumption is challenging since it involves making additional assumptions on the exact type of the non-separability. It also requires the ability to measure all the other relevant policy dimensions that interact with liquor policies. To our knowledge, there are no previous papers that have estimated a multi-dimensional voting model with non-separable preferences. Third, we assume that legislators have no policy preferences of their own. As such we are assuming that the benefits from holding office are sufficiently high so that policy platforms converge. In a model with policy preferences, we do not necessarily obtain full convergence. But given that liquor policy was only an important topic in the state legislature between 1933 and 1937, it is difficult to explore divergence in policies among candidates within our application. We also do not observe candidates from different parties, so we cannot conduct the standard test of whether legislators with different party affiliations from the same district pursue different policies. Finally, there is full commitment to announced policies. This is a strong assumption, and models without commitment are more compelling. However, we are restricting our attention to a static model and do not model the reelection incentives that help to overcome a lack of commitment.

4.2 Voting in Local Referenda in a Single District

Next, we consider voting in local public referenda. We assume that each proposal only affects a single dimension k. A referendum pits a status quo, denoted by g_{ks}, against an alternative policy, denoted by g_{kr}. Since preferences are additively separable, voter i prefers the alternative policy if and only if:

$$-(g_{kr} - \theta_{ki})^2 \; + \; \epsilon_{kri} \geq -(g_{ks} - \theta_{ki})^2 \; + \; \epsilon_{ksi} \tag{7}$$

where ϵ_{ksi} and ϵ_{kri} are random election shocks that impact the vote during the referendum. Hence, the share of votes in favor of the alternative policy proposed in the referendum is given by:

$$V(g_{ks}, g_{kr}) \;\; = \;\; \sum_i \; s_i \; F_{ki}((g_{ks} - \theta_{ki})^2 - (g_{kr} - \theta_{ki})^2) \tag{8}$$

where F_{ki} is the distribution function of the referendum shock $\epsilon_{ki} = \epsilon_{ksi} - \epsilon_{kri}$. Note that vote shares in referenda do not depend on ω_{ki}

4.3 Spillovers in Preferences Among Districts

Following Besley and Coate (2003), we can also account for spillover or peer effects in our analysis. Consider now a model with n districts, and assume that there are some spillovers or peer effects in preferences. In particular, let us assume that the bliss of each voter type depends on the average policy of the adjacent voting district. Let $\bar{g}_n = (\bar{g}_{1n}, ..., \bar{g}_{Kn})$ denote the vector of the average neighboring policies. Spillovers or peer effects arise if the policy of a neighbor shifts the bliss points of each voter type, i.e. if $\theta_{kni} = \theta_{kni}(\bar{g}_{kn})$. Hence, preferences are given by:

$$u_{in}(g_n, \bar{g}_n) \quad = \quad \sum_{k=1}^{K} - \omega_{ki} \left(g_{kn} - \theta_{kni}(\bar{g}_{kn})\right)^2 \tag{9}$$

Holding the policies of the other district fixed, the candidates still compete against each other described in Section 4.1. and a necessary condition for equilibrium is given by:

$$g_{kn} \quad = \quad \sum_{i} \frac{s_i \ \phi_i(0) \ \omega_{ki}}{\sum_j \ s_j \ \phi_j(0) \ \omega_{kj}} \ \ \theta_{kni}(\bar{g}_{kn}) \tag{10}$$

A Nash equilibrium in the simultaneous move game also requires that the strategies of the candidates are the best responses to each other, i.e. no candidate has incentives to deviate from the chosen policy. To compute the Nash equilibrium for the full game we now need to solve the system of equations given in (10).[26] As we discuss in detail below, the estimation strategy that we use only exploits the necessary conditions in equation (10) and does not require us to compute the equilibrium for the full game. Computation of equilibria is only required for the counterfactual welfare analysis, as we discuss in detail below.

[26]Note that there NK equation in NK unknowns.

5 Identification and Estimation

The intuition for the empirical strategy proposed in this paper is fairly straightforward. Recall that we can estimate the legislators' bliss points using standard scaling techniques as long as we observe a sufficiently large number of roll call votes. Our voting model endogenizes the bliss point of a legislator who represents a voting district. In particular, equation (6) provides the crucial link between the (estimated) bliss point of the legislator and the (unobserved) preferences of the voters in the district. We observe the vote shares in local liquor referenda. We have also characterized how citizens vote in referenda that pit a status quo against an alternative proposal. In particular, equation (8) provides the link between the (observed) vote shares and the (unobserved) positions of the status quo and the alternative policy. That allows us to characterize the policies that were under consideration and implemented in practice and compute the welfare associated with these policies. Once we have identified and estimated the preferences of the voters in each district, we can also estimate the optimal uniform policy and the vector of optimal decentralized policies. We discuss the details of our identification and estimation strategy in detail below.

Consider a sample that consists of a large number of districts, $n = 1, ..., N$. We assume that all voter types i and their shares s_{in} are observed. We consider an environment with a small I and a large N.[27]

5.1 The Model with Two Types

To illustrate how we can identify and estimate the parameters of the model, let us first consider a model with two types ($I = 2$ and assume that the politicians use weights that

[27]In our application, we consider a model with two types, dry and wet voters, and approximately 150 voting districts.

are equal to the population shares, i.e. that the following condition holds:

$$\phi_1(0)\,\omega_{kn1} \;=\; \phi_2(0)\,\omega_{kn2} \tag{11}$$

Hence, equation (6) simplifies to the following expression

$$g_{kn} \;=\; \sum_i s_{in}\,\theta_{kni} \tag{12}$$

The observed bliss points are just population-weighted averages of the voters' bliss points.

Let us assume that we also observe some characteristics of the district, denoted by x_{kn}, that systematically shift preferences over policies of each voter type. These are socioeconomic characteristics of the district (income, urbanization rates, etc) that are not used to define voter types, but affect district preferences. We can think about these variables as shifting the bliss points of all types in the district.[28] Let us assume that the bliss points of each voter type satisfy:

$$\theta_{kin} \;=\; \alpha_{ki} + \beta_{ki}\,x_{kn} \;+\; \zeta_{ki}\,\bar{g}_{kn} + \;u_{kin} \tag{13}$$

where x_{kn} are some observed shift variables, $\bar{g}_{kn}$ is the mean policies in the neighboring counties, and u_{kin} is an error term. Note that this assumption is primarily made to reduce the number of voter types while still allowing for a rich set of socio-economic demographics to affect voters' preferences. In principle, one could also use the observed heterogeneity in x_{kn} to define additional voter types.[29]

[28] Note that we allow these characteristics to differ by the dimension of the policy space.

[29] In our application, the most important voter characteristic that affects preferences over liquor policy is religious affiliation. In the data, we only see the marginal distribution of this variable. As a consequence, we use a model with two religious types.

Hence, our econometric model with two types can be written as:

$$
\begin{aligned}
g_{kn} &= \left(\sum_{i=1}^{2} s_{in} \left(\alpha_{ki} + \beta_{ki}\, x_{kn} + \ \zeta_{ki}\, \bar{g}_{kn} \right) + u_{kin} \right) \\
&= s_{1n} \left(\alpha_{k1} + \beta_{k1}\, x_{kn} + \ \zeta_{k1}\, s_{1n}\, \bar{g}_{kn} \ + \ u_{k1n} \right) \\
&\quad + (1 - s_{1n}) \left(\alpha_{k2} + \beta_{k2}\, x_{kn} + \ \zeta_{k2}\, \bar{g}_{kn} + \ u_{k2n} \right) \qquad (14) \\
&= (\alpha_{k1} - \alpha_{2k}) s_{1n} + (\beta_{k1} - \beta_{k2})\, s_{1n}\, x_{kn} + \ (\zeta_{k1} - \zeta_{k2})\, s_{1n}\, \bar{g}_{kn} \\
&\quad + \alpha_{k2} + \beta_{k2}\, x_{kn} + \ \zeta_{k2}\, \bar{g}_{kn} \ + \ u_{k2n} \ + s_{1n}(u_{k1n} - u_{k2n})
\end{aligned}
$$

First, note that the model is linear in its parameters. Second, the parameters are identified and can be estimated using 2SLS if $E[u_{kin}|s_{1n}, x_{kn}, z_{kn}] = 0$, i.e., we need, at least, one instrument to deal with the potential endogeneity of $\bar{g}_{kn}$. We need additional instruments if components of x_{nk} are also endogenous. The most obvious instrument for the average policy of the neighbors can be constructed based on the average characteristics of the adjacent communities, $\bar{x}_{nk}$. Finally, the model without spillovers can be estimated using OLS if $E[u_{kin}|s_{1n}, x_{kn}] = 0$ for i=1,2. The key identifying assumption is that households do not sort across voting districts in response to unobserved characteristics that affect the liquor policy ideal points of the different voter types. That assumption appears to be plausible, but it's hard to validate.[30]

More generally, we can write the probabilistic voting model as a weighted average of the two bliss points:

$$
g_{kn} = w_{kn}\, \theta_{k1} + (1 - w_{kn})\, \theta_{k2} \qquad (15)
$$

[30]Note that almost all papers in the literature that we are aware of make a similar assumption.

where the weights are given by:

$$w_{kn} = \frac{s_{1n}\ \phi_1(0)\ \omega_{k1}}{s_{1n}\ \phi_1(0)\ \omega_{k1} + s_{2n}\ \phi_2(0)\ \omega_{k2}} \qquad (16)$$
$$= \frac{s_{1n}\ \gamma_{k1}}{s_{1n}\ \gamma_{k1} + s_{2n}\ \gamma_{k2}}$$
$$= \frac{s_{1n}}{s_{1n}\ + s_{2n}\ \frac{\gamma_{k2}}{\gamma_{k1}}}$$

Hence, only the ratio $\frac{\gamma_{k2}}{\gamma_{k1}}$ is identified. Given that the ratio $\frac{\gamma_{k2}}{\gamma_{k1}}$ enters the model in a non-linear way, we can estimate the parameters of the model using GMM (in the case of spillovers) or NLLS (in the case without spillovers).

Also note that for any known value of $\frac{\gamma_{k2}}{\gamma_{k1}}$ the remaining parameters of this model can be estimated using 2SLS. This insight suggests that there is a simple way to estimate our model. First, we pick a grid for plausible values of the parameter $\frac{\gamma_{k2}}{\gamma_{k1}}$ and estimate the remaining parameters of the model for each value of the grid. We can estimate $\frac{\gamma_{k2}}{\gamma_{k1}}$ by maximizing the goodness of fit of the model. We show below that this estimator works as well as our GMM estimator.

5.2 The General Model

Now consider the model with I types. The observed policy platforms (bliss points of the legislators) can be written as:

$$g_{kn} = \left(\sum_i w_{kni}\ (\alpha_{ki} + \ \beta_{ki}\ x_{kn} + \ \zeta_{ki}\ \bar{g}_{kn}) \right) + \ v_{kn} \qquad (17)$$

where

$$v_{kn} = \sum_{i=1}^{N} w_{kni}\ u_{kin} \qquad (18)$$

and

$$w_{kni} = \frac{s_{in}\ \gamma_{ki}}{\sum_j\ s_{jn}\ \gamma_{kj}} \qquad (19)$$

and $\gamma_{ki} = \phi_i(0)\, \omega_{ki}$. Assuming that $E[u_{kin}|\, s_{in}, x_{kn}, z_{nk}] = 0$ for all k, i, and n, we have

$$E[v_{kn}|x_{kn}, s_{1n}, ..., s_{In}, z_{nk}] \;=\; \sum_i \frac{s_{in}\;\gamma_{ki}}{\sum_j\; s_{jn}\;\gamma_{kj}}\; E[u_{kin}|x_{kn}, s_{in}, z_{kn}] \;=\; 0 \qquad (20)$$

where z_{nk} is an instrument for $\bar{g}_{kn}$.

Assuming that $E[u^2_{kin}|\, s_{in}, x_{kn}, z_{kn}] = \sigma^2_{ki}$ for all k, i, we have

$$Var[v_{kn}|s_{1n}, ..., s_{In}] \;=\; \sum_i \left(\frac{s_{in}\gamma_{ki}}{\sum_j s_{jn}\gamma_{kj}} \right)^2 \sigma^2_{ki} \qquad (21)$$

We, therefore, have the following results:

Proposition 1 *The parameters $(\alpha_{ki}, \beta_{ki})$ as well as the ratios, $\frac{\gamma_{ki}}{\gamma_{k1}}$ are identified. Moreover, the conditional distributions of u_{kin} are non-parametrically identified and can be estimated using a GMM estimator.*

The proof of Proposition 1 is given in Appendix C. We offer several observations. First, the proof extends the arguments made in Section 5.1. Second, recall that $\gamma_{ki} = \phi_i(0)\, \omega_{ki}$. Hence, we cannot separately identify $\phi_i(0)$ and ω_{ki}. Third, the normalization of the γ_{ki} reflects the fact that the weights associated with different types have to sum up to one:

$$\sum_{i=1}^{I} w_{kni} \;=\; \sum_{i=1}^{I} \frac{s_{in}\;\gamma_{ki}}{\sum_j\; s_{jn}\;\gamma_{kj}} \;=\; 1 \qquad (22)$$

Fourth, to identify and estimate the model with spillovers we need additional instruments. The most straightforward approach here is to use $\bar{x}_{kn}$. [31]

[31] This approach is based on Manski (1993) and relies on the fact that we have excluded $\bar{x}_{kn}$ from the outcome equation, or in the language of Manski, that there are no exogenous peer effects. It is also similar to the IV strategy used in Berry, Levinsohn and Pakes (1996) who use characteristics of close competitors to instrument for the price.

5.3 Orthogonality Conditions Based on Referenda

We also observe a large sample with size N of votes on the same type of referendum.[32] Adding subscripts and substituting equation (13) into the utility function, we obtain:

$$\begin{aligned} & (g_{ks} - \alpha_{ki} - \beta_{ki} x_{kn} - \zeta_{ki}\, \bar{g}_{kn} - u_{kin})^2 \; - \; (g_{kr} - \alpha_{ki} - \beta_{ki} x_{kn} - \zeta_{ki}\, \bar{g}_{kn} - u_{kin})^2 \\ = \; & g_{ks}^2 + 2\,(g_{kr} - g_{ks})\,(\alpha_{ki} + \beta_{ki} x_{kn} + \zeta_{ki}\, \bar{g}_{kn}) \; + \; 2\,(g_{kr} - g_{ks})\, u_{kin} \; - \; g_{kr}^2 \end{aligned} \tag{23}$$

Note that the referenda equation (23) does not just depend on difference $g_r - g_s$. Given the preferences, it also depends on g_r^2 and g_s^2. Hence, we can separately identify and estimate g_r and g_s.

We assume that F_{ki} is Type I extreme value distributed. Hence, we can write the vote share equation as follows:

$$V_{kn} = E[V_{kn} | s_{1n}, ..., s_{In}, x_{kn}] + w_{kn} \tag{24}$$

where $E[V_{kn} | s_{1n}, ..., s_{In}, x_{kn}]$ is given by

$$\sum_i s_{in} \int \frac{\exp[(g_{ks}^2 + 2\,(g_{kr} - g_{ks})\,(\alpha_{ki} + \beta_{ki} x_{kn} + \zeta_{ki}\, \bar{g}_{kn}) \; + \; 2\,(g_{kr} - g_{ks})\, u_{ki} \; - \; g_{kr}^2)/\sigma_{ki}^{\epsilon}]}{1 + \exp[(g_{ks}^2 + 2\,(g_{kr} - g_{ks})\,(\alpha_{ki} + \beta_{ki} x_{kn} + \zeta_{ki}\, \bar{g}_{kn}) \; + \; 2\,(g_{kr} - g_{ks})\, u_{ki} \; - \; g_{kr}^2)/\sigma_{i}^{\epsilon}]}\, r(u_{ki})\, du_{ki}$$

and σ_i^{ϵ} is the scale parameter of the election shock of voter type i. Hence, the remaining parameters of the model, given by $g_{ks}, g_{kr}, \sigma_i^{\epsilon}$, are identified.[33] We can thus construct additional orthogonality conditions based on equations (24) and estimate the parameters of the voting model using a GMM estimator.[34] Note that it is straightforward to extend the analysis and allow for more than one type of referenda, as long as we have a large enough sample size for each type.

[32] We do not require that the sample size in the third stage is equal to the sample size in the first and second stages of the estimation. However, we use the same notation for expositional simplicity.

[33] Up to a normalization that $\sigma_1^{\epsilon} = 1$.

[34] See Appendix D for details.

In summary, the estimation proceeds in two steps. First, we estimate the bliss points of politicians in the legislature using standard spatial estimation techniques. Second, we estimate the parameters of the voters' preferences as well as the positions of the status quo and the alternative policy proposed in the referendum using a GMM estimator. Note that we can identify the probabilistic voting model using just the bliss points of the legislators for each district and the voter characteristics. The only additional parameters that are identified when we incorporate the referenda data are the positions of the status quo and the alternative in the ideological space as well as the parameters that govern the referenda shocks.

6 Empirical Results

6.1 Parameter Estimates

As we discussed above, we classify voters into two types using religious affiliation. Type 1 voters are members of a "dry" religion and type 2 voters are affiliated with a "wet" religion. Using this classification system, we then estimate a variety of different specifications of our model for the liquor policy dimension. Given the sequential nature of our estimation strategy, we use a bootstrap algorithm to estimate standard errors. We randomly drop one alcohol vote for each representative and reestimate the bliss points based on the leave-one-out sample. We then drop one representative-district observation and one referendum and reestimate the model on the leave-one-out samples. The estimated standard errors are then obtained based on 100 iterations of this jackknife algorithm. We start with a specification with a full set of interactions. We then estimate a constrained model restricting $\beta_1 = \beta_2$. We find that we cannot reject this restriction.[35] Hence, we

[35]See Appendix E for a more detailed discussion of our results.

focus on this parsimonious version of our model in the analysis below.

The main results of implementing the probabilistic voting model with spillovers are summarized in Table 4. Column 1 reports the specification without spillovers. Column 2 contains the IV estimates when allowing for endogenous spillovers. Column 3 contains the estimates when allowing for exogenous spillovers. Overall, we find that spillover effects are negligible in our application. None of the coefficients are statistically significantly different from zero at any reasonable confidence level. We thus conclude that there is no strong evidence indicating the presence of spillovers or peer effects. The rest of the analysis is, therefore, based on the model without spillovers.

Table 4: Parameter Estimates with Spillovers

	(1)	(2)	(3)
	Liquor Policy		
α_1 (Intercept Dry)	3.80	3.56	3.80
	(0.48)	(0.50)	(0.40)
α_2 (Intercept Wet)	2.85	2.69	2.85
	(0.31)	(0.31)	(0.23)
β_1 (% Minority)	-1.09	-1.03	-1.09
	(0.22)	(0.24)	(0.18)
β_2 (% High School)	-0.04	-0.09	-0.04
	(0.14)	(0.14)	(0.11)
β_3 (Logged Mean Income)	-0.46	-0.42	-0.46
	(0.07)	(0.06)	(0.04)
β_4 (% Urban)	0.20	0.17	0.20
	(0.09)	(0.09)	(0.08)
β_5 (Population Density)	-0.36	-0.34	-0.36

	(1)	(2)	(3)
	(0.07)	(0.07)	(0.05)
ζ (Endogenous Spillovers)	–	0.06	–
		(0.04)	
ζ (Exogenous Spillovers)	–		-0.01
			(0.02)
γ_2/γ_1 (Weight Wet)	1.92	2.20	1.92
	(0.14)	(0.38)	(0.18)
σ_1^u (Variance Dry)	0.50	0.51	0.50
	(0.10)	(0.11)	(0.09)
σ_2^u (Variance Wet)	0.85	0.97	0.85
	(0.15)	(0.29)	(0.18)
		Referenda	
g_{1s} (Status Quo)	0.28	0.34	0.28
	(0.22)	(0.21)	(0.08)
g_{1r} (Alternative)	-0.39	-0.38	-0.39
	(0.08)	(0.08)	(0.03)
σ_2^ϵ (Variance Wet)	0.55	0.58	0.55
	(0.03)	(0.05)	(0.01)
Number of Representatives	173	173	173
Number of Referenda	122	122	122
	(1)	(2)	(3)

Table 5 compares several different estimators for the restricted model without spillovers. Column (1) in Table 5 contains the full set of parameter estimates when $\frac{\gamma_2}{\gamma_1} = 1$. Column (2) reports the estimates when we use a grid for $\frac{\gamma_2}{\gamma_1}$ and estimate the remaining parameters using OLS. Finally, Column (3) reports the estimates that are based on the efficient GMM estimator. Columns (4) - (7) conduct other robustness checks discussed in detail below.

Table 5: Parameter Estimates of the Probabilistic Voting Model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Liquor Policy			
α_1 (Intercept Dry)	3.92	3.80	4.09	3.82	3.80	3.80	3.80
	(0.51)	(0.48)	(0.29)	(0.40)	(0.57)	(0.44)	(0.48)
α_2 (Intercept Wet)	2.95	2.85	3.10	3.03	2.85	2.85	2.85
	(0.33)	(0.31)	(0.14)	(0.29)	(0.35)	(0.29)	(0.31)
β_1 (% Minority)	-1.01	-1.09	-0.81	-0.97	-1.08	-1.09	-1.08
	(0.20)	(0.22)	(0.17)	(0.16)	(0.26)	(0.20)	(0.22)
β_2 (% High School)	0.01	-0.04	0.12	0.44	-0.04	-0.04	-0.04
	(0.13)	(0.14)	(0.08)	(0.10)	(0.14)	(0.14)	(0.14)
β_3 (Logged Mean Income)	-0.50	-0.46	-0.52	-0.49	-0.46	-0.46	-0.46
	(0.07)	(0.07)	(0.05)	(0.06)	(0.07)	(0.06)	(0.07)
β_4 (% Urban)	0.19	0.20	0.24	0.03	0.20	0.20	0.20
	(0.09)	(0.09)	(0.03)	(0.05)	(0.10)	(0.09)	(0.09)
β_5 (Population Density)	-0.37	-0.36	-0.29	-0.15	-0.36	-0.36	-0.36
	(0.08)	(0.07)	(0.08)	(0.02)	(0.09)	(0.07)	(0.08)
γ_2/γ_1 (Weight Wet)	–	1.92	1.94	2.19	1.92	1.92	1.92
	–	(0.14)	(0.03)	(0.25)	(0.14)	(0.12)	(0.14)
σ_1^u (Variance Dry)	0.46	0.50	0.60	0.51	0.50	0.50	0.50
	(0.08)	(0.10)	(0.08)	(0.09)	(0.11)	(0.09)	(0.10)
σ_2^u (Variance Wet)	0.46	0.85	0.50	0.95	0.85	0.85	0.85
	(0.07)	(0.15)	(0.02)	(0.20)	(0.17)	(0.15)	(0.16)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Referenda			
g_{1s} (Status Quo)	0.16	0.28	0.74	0.53	0.16	0.04	0.34
	(0.24)	(0.22)	(0.14)	(0.14)	(0.22)	(0.19)	(0.23)
g_{1r} (Alternative)	-0.52	-0.39	-0.69	-0.43	-0.31	-0.46	-0.40
	(0.10)	(0.08)	(0.09)	(0.06)	(0.10)	(0.10)	(0.07)
σ_2^ϵ (Variance Wet)	0.77	0.55	0.89	0.57	0.85	1.68	0.59
	(0.04)	(0.03)	(0.06)	(0.05)	(0.05)	(0.45)	(0.02)
Number of Representatives	173	173	173	226	173	173	173
Number of Referenda	122	122	122	122	81	90	118
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

We find that our estimates and standard errors are plausible. Recall that we allow for type-specific intercepts in all specifications but constrain the parameters of the observed socio-economic characteristics to be the same across types. The estimates of the α_1 and α_2 reflect the main differences between the two types of voters. Not surprisingly, there are large differences in preferences between dry and wet religious types. Almost all the estimates of β's that capture heterogeneity across districts have the expected sign. Minorities and higher-income voters as well as voters from more densely populated districts prefer wet policies. These findings are similar to the ones that can be obtained from reduced-form regression estimates.[36]

Overall, we strongly reject the hypothesis of equal treatment of voter types. Our estimate of γ_2/γ_1 is approximately 2. Politicians assign higher weights to wet voters than to dry voters. We also find that the parameter estimates reported in Column (2) and Column (3) are similar. We mostly see some efficiency gains reflected in the smaller estimated standard errors of the GMM estimator in Column 3 than the sequential

[36]Details of the reduced-form estimates are available upon request from the authors.

estimator in Column (2)

Finally, the estimates of the parameters that are identified by the referenda orthogonality conditions suggest that the position of the dry status quo is positive, reflecting the preferences during the Prohibition Era. The alternative policy, which legalizes the purchase and consumption of beer and wine, is negative and therefore closer to the preferences of the wet voters. The estimates of the variance of the election shocks are well below one. Again, we view these findings as providing strong evidence in support of our modeling approach. We, therefore, conclude that the model provides a reasonable mapping of voters' preferences into legislators' bliss points.

6.2 Robustness Analysis

We have conducted some robustness analyses. First, we can also estimate the bliss points of 53 legislators that come from 12 multimember districts. Column (4) includes the legislators from multi-member districts in the sample. We find that the overall fit of the model improves as we use these additional data points while the parameter estimates are similar to the ones reported in Column (3).

Second, we have noted that the period in which legislators voted on liquor policies and the period for which we observe referenda do not perfectly overlap. Not surprisingly, legislators' voting typically precedes referenda. We have estimated the model using referenda that took place before the U.S. entry into World War II. One may conjecture that liquor preferences may have changed during and after World War II. Hence, specification (6) only uses referenda that took place before 1942. Overall, the results are similar across all these specifications, which is consistent with the observation that alcohol consumption was very stable between 1935 and 1955.[37]

[37]There are no obvious structural changes in alcohol consumption during that period as can be seen

Third, Column (6) excludes any referenda that did not pit "beer only" against dry. Overall, we find that our point estimates are similar to the ones of our preferred specification. In particular, there are no large differences in the estimates of the position of the alternative policy. That suggests that any type of "wet" policy that was considered by voters was pushing the policy significantly to the left of the policy space. Again, this finding is consistent with the observation that Prohibition primarily reduced the consumption of beer. Lifting the restrictions on beer consumption thus removed the most obvious constraint imposed by Prohibition policies.

Fourth, we also observe several referenda at the precinct level, which is below the county level. These sub-county referenda allowed individual precincts to adopt a different liquor policy than the county. Recall that most of the precincts that opted out are too small to affect the validity of our estimation results. There are only six counties in which a sufficiently large number of precincts adopted different policies than the dry counties. As a robustness check, we have also re-estimated the model omitting the counties in which a significant fraction of the precincts adopted a different policy than the county. Column (7) in Table 5 contains the estimates when we drop partly wet counties where a substantial number of justice precincts were dry. We find that our main findings are quite robust to the exclusion of these counties.

Our model and estimation method can, in principle, be used to make predictions about voters' behavior at the precinct level. However, it is impossible to obtain reliable maps for all these precincts in Texas in the 1930s and 40s. Moreover, the key variable in our analysis is religious affiliation. That variable is only available at the county level. As a consequence, most of the empirical papers that have studied local referenda in Texas during this period – including our study – have focused on county-level referenda, ignoring the precinct-level variation

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from Figure 1.

Fifth, we consider how robust our analysis is to assumptions regarding voter turnout. Thus far we have assumed that all citizens turn out to vote in public referenda. It is straightforward to extend the model and allow for differences in voter turnout among the types of voters. Let us assume that the exogenous probability of voter turnout during a referendum is p_i. Define the effective or turnout adjusted population as

$$s_i^e = \frac{p_i \ s_i}{\sum_{j=1}^{J} p_j \ s_j} \tag{25}$$

Hence the effective vote share in favor of the referendum is:

$$V(g_{ks}, g_{kr}) = \sum_i s_i^e \ F_{ki}((g_{ks} - \theta_{ki})^2 - (g_{kr} - \theta_{ki})^2) \tag{26}$$

The estimates reported in Table 5 assume that the voter turnout is the same for the two types ($p_1 = p_2$). This assumption then implies that $s_i^e = s_i$ for all i. Note that we do not have to assume that turnout is complete ($p_1 = 1 = p_2$), which is not the case in these local elections. We just have not allowed for differential attrition in turnout by type ($p_1 \neq p_2$).

We have conducted a more systematic analysis of voter turnout in our sample. The results are summarized in Table 12 in Appendix G. The table contains the estimates of models that regress turnout on the share of voter types across counties. Overall, we find that the coefficient of the share of dry religion voters is insignificant in the regression model. We thus do not find any evidence that suggests differential voter turnout among the two religious types in our model.[38]

Finally, the estimates reported in Table 5 are based on an unweighted sample. We have some missing observations in our sample. First, there are some legislators and hence districts for which we cannot estimate the bliss points. More importantly, there

[38]Coate and Conlin (2004) and Coate, Conlin, and Moro (2008) provide a more systematic analysis of voter turnout in these local referenda. They also provide some tests of structural turnout models.

are a larger number of counties that never held a single liquor referendum. To address these issues, we have explored different weighting schemes (such as inverse probability weighting) both for the sample of legislators and the sample of referenda. Overall, our main findings are qualitatively and quantitatively robust to all these changes.

6.3 Translating the Policy Space into the Consumption Space

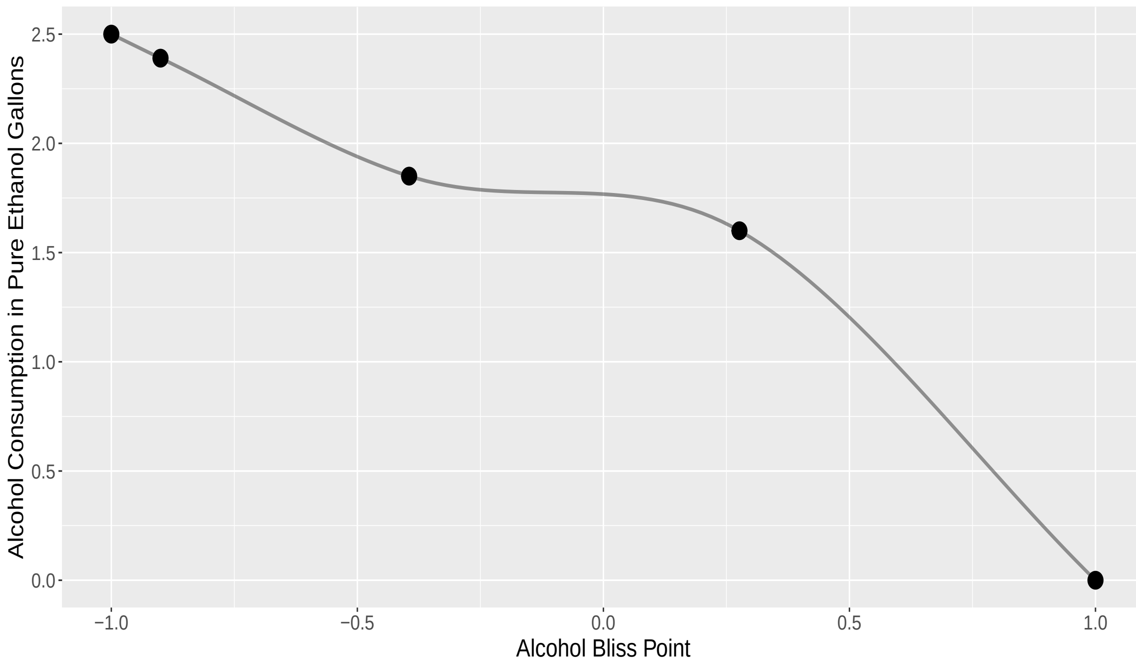
Our estimates allow us to map the policy position from the ideological policy space, which is defined on the interval $[-1, 1]$, into the space of average alcohol consumption. Recall that g denotes the position of a policy in the liquor policy space. Let $a(g)$ denote the corresponding level of average alcohol consumption as a function of g. It is plausible to assume that the most extreme dry policy position, denoted by $g = 1$, is associated with complete abstinence, i.e. $a(1) = 0$. We have also seen in Figure 1 that average alcohol consumption never exceeded 2.5 gallons of pure alcohol per capita between 1900 and 1955. As a consequence, we normalize $a(-1) = 2.5$.[39]

As we discussed in Section 2 of the paper, the estimated average consumption during the period 1920-1921 was 0.33 gallons of pure ethanol per capita. This suggests that the policy had been shifted very close to the extreme dry policy during the peak of Prohibition that saw the most serious attempts to enforce the Volstead Act.

By the mid-1920s enforcement efforts had considerably slackened. Alcohol consumption in 1927-1930 averaged around 1.61 gallons of pure ethanol per capita. Similar levels of consumption were maintained from 1931-1933 according to estimates by Miron and Zwiebel (1991). According to Table 5, the average estimate of the dry status quo is approximately 0.28. We, therefore, assume that $a(0.28) = 1.6$. After the end of Prohibition,

[39] Recall that the average consumption in 1911-14 was approximately 2.39 gallons, which is fairly close to the most extreme wet position. Hence, we assume that $a(-0.9) = 2.39$.

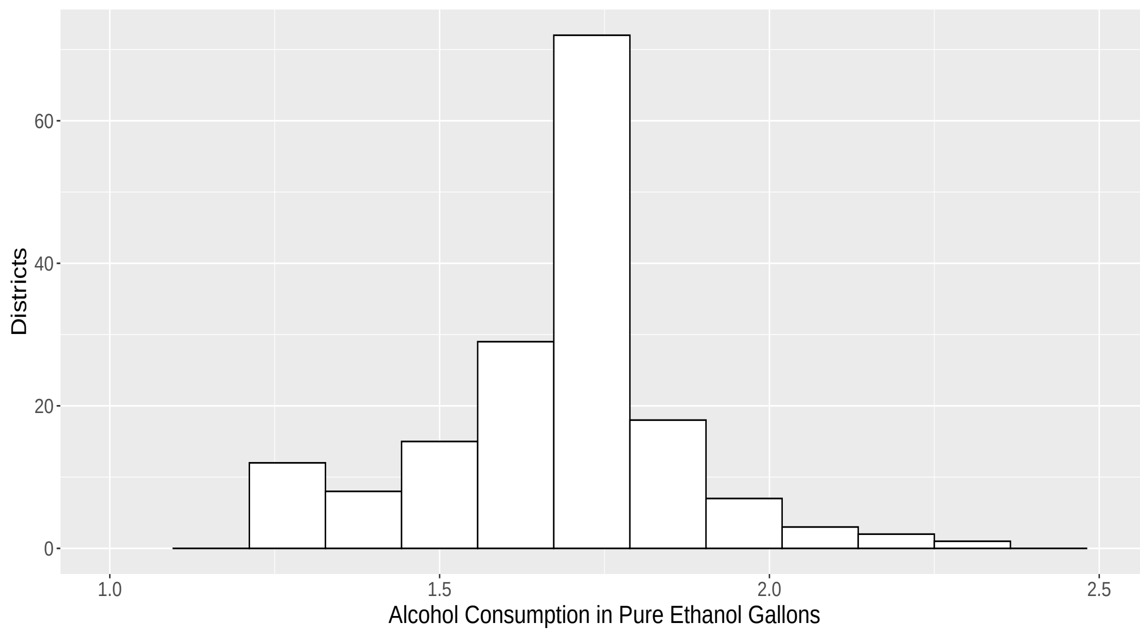
Figure 3: Mapping the Liquor Policy Space into Average Pure Alcohol Consumption



average alcohol consumption rose to 1.85 gallons of pure alcohol from 1935-1955. Our average estimate of the alternative referenda position in Table 5 is approximately -0.39 which suggests that $a(-0.39) = 1.85$.

Figure 3 illustrates our mapping from our ideological policy space into average levels of pure alcohol consumption. Note that the mapping is highly nonlinear. Figure 4 plots the distribution of district bliss points in alcohol consumption space. It shows that the difference in preferred average alcohol consumption across districts is smaller than the differences in liquor policies shown in Figure 2.

Figure 4: Distribution of District Alcohol Bliss Points in Alcohol Consumption Space



6.4 Goodness of Fit

Finally, we consider the within-sample fit of our model. Figure 5 plots the estimated and predicted bliss points for legislators in the House of Representatives. These estimates are based on the third specification in Table 5. Overall, the within-sample fit of our model is quite good. As shown in Table 5, the correlations between the predicted and estimated bliss points exceed 0.63. As one would expect the fit is not as good for the bliss points of the more extreme politicians. Our model tends to over-predict the bliss points for extremely wet politicians and under-predict the position of extremely dry politicians.

Figure 5 plots the estimated and predicted average vote shares. These estimates are also based on the second specification. We find that the correlation between the predicted and estimated vote shares is approximately 0.60. Overall, the fit is quite good.

Figure 5: Liquor Policy Bliss Points Fit

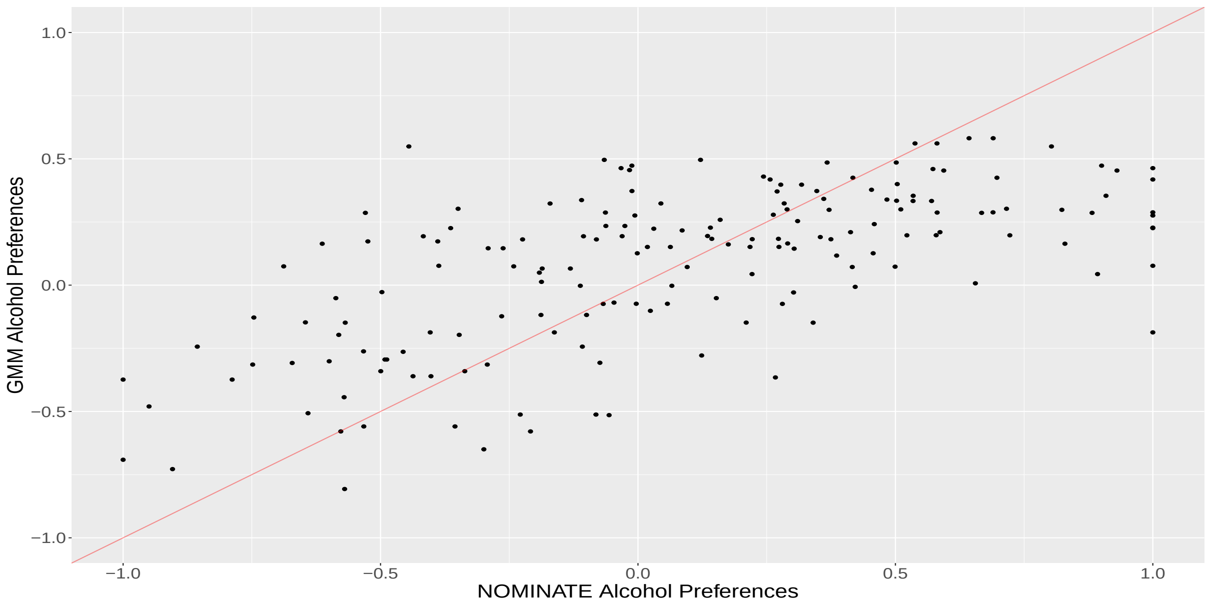
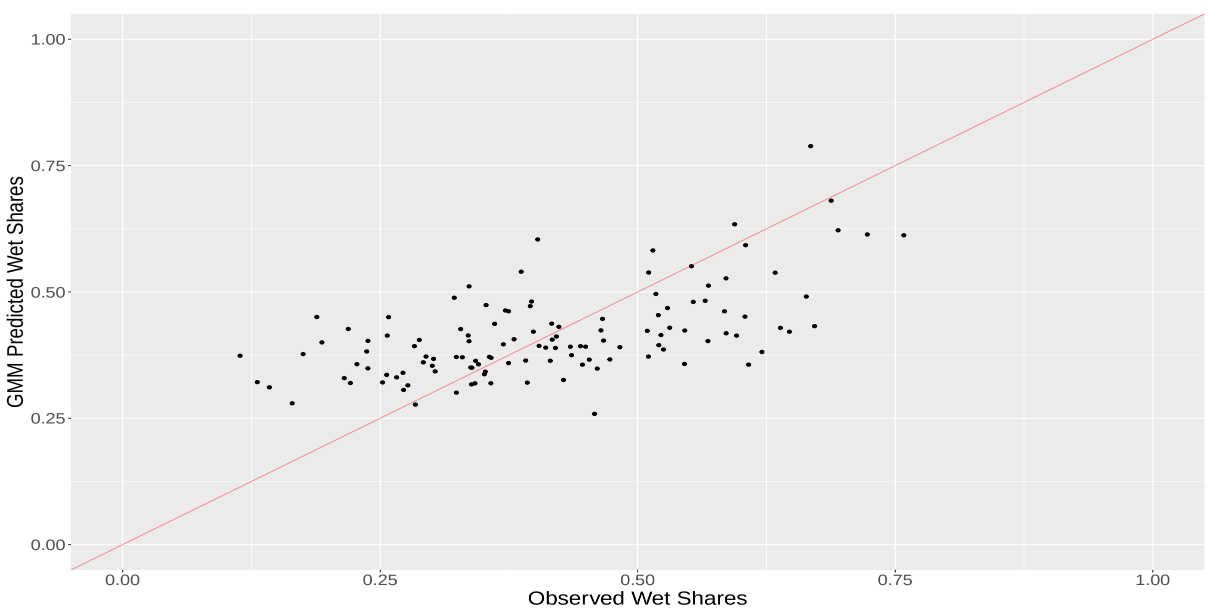


Figure 6: Wet Share Fit



To validate our model, we consider the 30 members of the Texas Senate as a hold-out sample. We have also estimated the liquor policy bliss points for these Senators. Note that we did not use these Senators when we estimated the parameters of our voting model. Nevertheless, we can compare the estimated bliss points with the bliss points predicted by our model. We find that the correlation between the estimated and predicted bliss points is 0.63. Our model, therefore, performs as well in predicting the bliss points of the senators as it does for members of the House of Representatives. We thus conclude that we obtain good out-of-sample predictions for the Senate, even though the Senate was more polarized on liquor policy than the House of Representatives. We view these results as providing strong support for the validity of our model.

7 Centralization versus Decentralization

Finally, we discuss how to compare the outcomes under optimal centralization and decentralization. Consider a model with voting districts $n = 1, ..., N$. The voter's utility function in equation (9) is additively separable across policy dimensions. As a consequence, we can construct welfare measures that are also additively separable across policy dimensions. Recall that voter i in district n has preferences over the kth policy dimension is given by

$$u_{kin}(g_k) \;=\; -\omega_{ki}\,(g_k - \theta_{kin})^2 \tag{27}$$

The status quo is denoted by g_{ks}. Assuming a utilitarian welfare function, a welfare measure of district n under the status quo is then

$$W_{ns}(g_{ks}) \;=\; \sum_{i=1}^{I} s_{in}\, u_{kin}(g_{ks}) \tag{28}$$

where s_{in} is district n's share of voter type i. Total welfare for all N voting districts is then given by

$$W_{ks} \;=\; \sum_{n=1}^{N} w_n \, W_{ns}(g_{ks}) \tag{29}$$

where w_n is the population share of district n.

The optimal uniform centralized policy, g_{kc}, that maximizes aggregate welfare is:

$$g_{kc} \;=\; \text{argmax}_{g_k \in [-1,1]} \, \sum_{n=1}^{N} \, w_n \, \sum_{i=1}^{I} s_{in} \, u_{kin}(g_k) \tag{30}$$

It is straightforward to show that g_{kc} is the population-weighted average of the districts' voter share-weighted alcohol bliss points. Total welfare for all N voting districts is then given by

$$W_{kc} \;=\; \sum_{n} w_n \, W_{ns}(g_{kc}) \tag{31}$$

Having estimated the parameters of our model and the position of the Prohibition Era status quo, we can implement the analysis. Here we use the full set of 254 counties in Texas as the relevant set of jurisdictions. We find that the optimal uniform policy is fairly close to the estimated referendum position, $g_u = 1.81$ gallons < 1.85 gallons $= g_r$. This difference is because the counties with large, urban populations tend to prefer a wet policy. Compared to the Prohibition Era status quo, we find that aggregate welfare increases by 43 percent under the optimal uniform centralized policy.

We can also provide a more disaggregated analysis of the welfare gains. In particular, we study which counties gain and which counties lose in the different policy regimes. We plot a county's change in welfare relative to the Prohibition Era status quo against its average alcohol bliss point in Figure 7. Each blue circle represents a county in Texas. The size of the circle is proportional to its voting-age population, so that larger counties are represented with larger circles.

Figure 7: Status Quo versus Optimal Uniform Policy

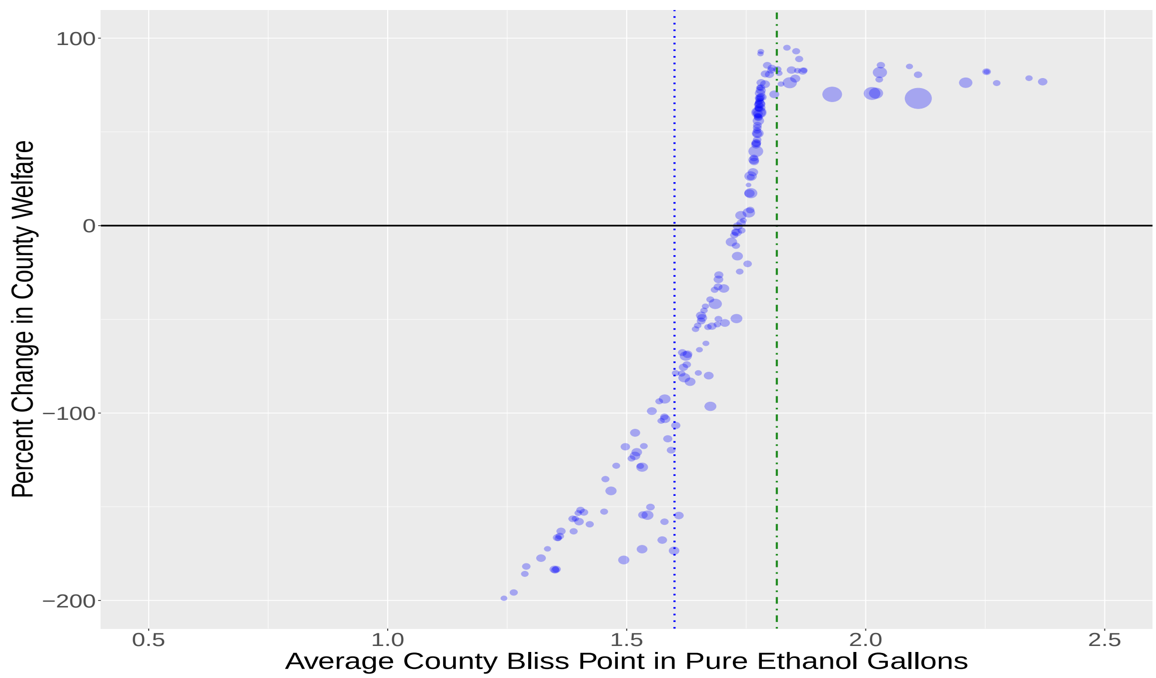


Figure 7 shows the change in welfare comparing the status quo with the optimal uniform centralized policy. As a consequence of this policy shift, counties with average bliss points up to approximately 1.74 gallons experience welfare losses, while counties with bliss points above that threshold experience gains. Also, note that the welfare losses for some small dry counties are quite large. We thus conclude that by the end of the Prohibition Era, the dry status quo was not close to the optimal uniform policy. Instead, the alternative policy of the referenda is close to the optimal uniform policy.

The optimal decentralized policy, g_{kdn}, maximizes welfare for each district n, $W_n(g_k)$:

$$g_{kdn} = \text{argmax}_{g_k \in [-1,1]} \sum_{i=1}^{I} s_i \, u_{kin}(g_k) \tag{32}$$

It is straightforward to show that it is given by the district's voter share-weighted bliss point

$$g_{kdn} \;=\; \sum_{i} s_{in}\, \omega_{ki}\, \theta_{kin} \tag{33}$$

Aggregate welfare under the optimal decentralized policy is then

$$W_{kd} \;=\; \sum_{n=1}^{N} w_n \, W_{dn}(g_{kdn}) \tag{34}$$

Implementation of these measures reveals that there are large gains from decentralization. Compared to the Prohibition Era status quo, welfare increases by 79 percent under the optimal decentralized policy. Compared to the optimal uniform centralized policy, the optimal decentralized policy increases aggregate welfare by 62.5 percent.

Figure 8: Status Quo versus Optimal Decentralized Policy

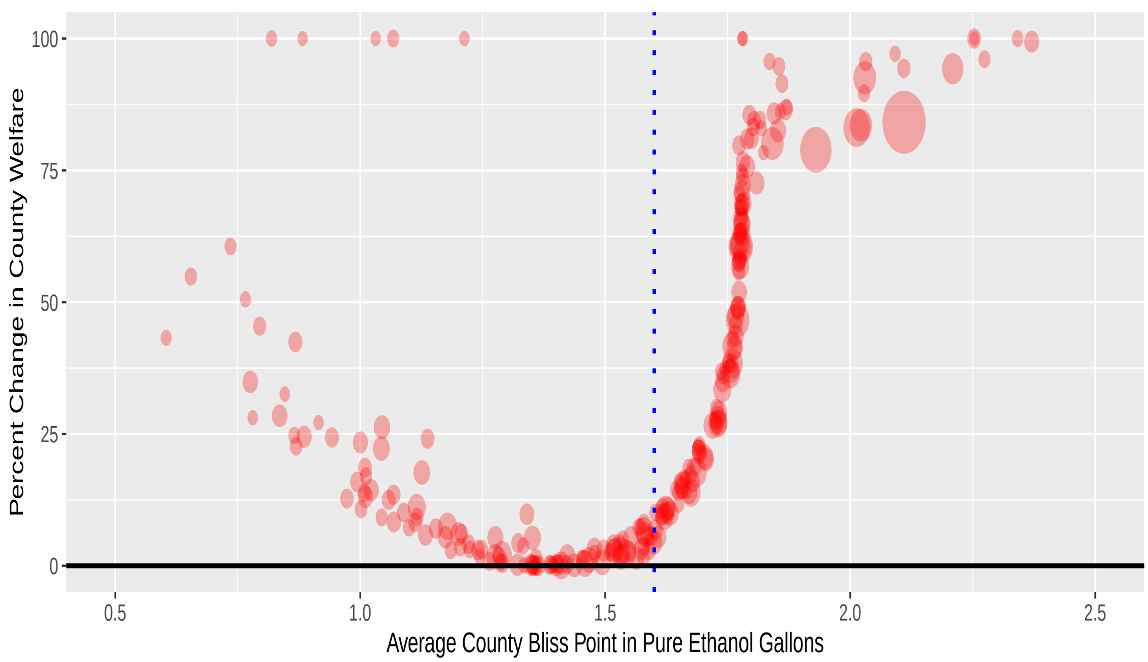


Figure 8 plots the change in welfare comparing the status quo with the optimal decentralized policy. Note that all communities gain from policy decentralization. The gains are increasing as we move into the tails of the distribution, which are comprised of counties that have strong preferences for or against liquor sales. We conclude that the compromise that was reached after Prohibition significantly improved welfare. There are large and significant gains from decentralization. These gains are likely to be larger than the costs associated with decentralization. Our findings, therefore, provide strong evidence supporting the decision of the Texas legislature to decentralize liquor policies after the end of the Prohibition Era.

8 Conclusions

We have studied the most famous natural experiment ever conducted regarding policy decentralization in the U.S., namely the decentralization of liquor policies at the end of the Prohibition Era. We have documented that there was large heterogeneity in preferences over liquor policies across voting districts and counties in Texas Our empirical results thus provide a clear interpretation of the failures of the Prohibition Era. We illustrate the usefulness of policy decentralization and provide plausible estimates of the magnitudes of the welfare gains that can arise from decentralization.

The paper has also made some important methodological contributions that go beyond the study of fiscal decentralization. In particular, we have shown how to identify and estimate a probabilistic voting model using the bliss points of legislators as well as characteristics of voting districts and voter types. Any desirable model of political competition should account for the fact that legislators have to compete for voters on other, potentially more important, issues besides liquor policies. We have shown that these models can be estimated for arbitrarily large policy spaces. The proof of identification is constructive and can be used to derive a GMM estimator for the parameters of the model. To estimate this model we do not need to observe public referenda. We have also shown how to integrate additional data on local referenda in the estimation procedure.

If we observe vote shares in local referenda, we can construct additional orthogonality conditions which help improve the efficiency of the estimator and provide estimates of the position of the status quo and the alternative policy considered in the referenda.

Finally, we explored a second dimension which is based on fiscal roll call votes. We found that our model can explain the fiscal dimension as well and yields plausible estimates. Admittedly, our model assumes that preferences across dimensions are separable. This seems to be a reasonable assumption when it comes to liquor and fiscal policies which are not strongly correlated. Non-separabilities could arise between liquor policies and enforcement. However, enforcement after the end of prohibition was primarily a local and not a state issue. In general, relaxing the separability assumption is challenging since it involves making additional assumptions on the exact type of non-separability. It also requires the ability to measure all the other relevant policy dimensions that interact with liquor policies. To our knowledge, there are no previous papers that have estimated a multi-dimensional voting model with non-separable preferences. Future research should investigate these issues more carefully.

Our empirical results primarily apply to Texas. Note that alcohol consumption in Texas has been near the U.S. average for most of its history. Moreover, the distribution of religious affiliation within Texas is not that different from other states that have a significant share of Catholic households. For example, California had an even larger share of Catholic households than Texas. The main advantage of Texas is that it has a large enough legislature and there are enough counties that had referenda which gives us enough power for the econometric analysis. However, our methods can, in principle, be applied to any state in the U.S. that decided to decentralize liquor policy decisions to the local level. Future research should study other applications of our framework and thus help to establish the external validity of your estimates.

We acknowledge that we do not provide a complete cost-benefit analysis of policy decentralization. A more comprehensive analysis of the monetary benefits of various policies also needs to take into consideration the impact of the different policies on tax revenues. Warburton (1932) estimated that the federal government lost approximately one billion dollars of tax revenues per year during the Prohibition Era. It would also be useful to measure producer surplus. In the case of Prohibition, a large fraction of the producer surplus was absorbed by organized crime, which was particularly problematic from a welfare perspective. We acknowledge that these aspects were of paramount importance in the discussion to end Prohibition. While our estimates of the ideological policy position capture all these dimensions, including some of the potential costs associated with enforcement, it is rather difficult to assign monetary values to all the relevant components that affect the distribution of economic welfare among the citizens. Instead, we only focus on the voters' benefits. In particular, we do not attempt to estimate the heterogeneity in costs across jurisdictions and voting districts. Heterogeneity in costs could arise, for example, due to different enforcement technologies used at the local level.

There are other fruitful applications that combine legislative voting with local public referenda. For example, Masket and Noel (2012) consider voting on budgetary and educational policy issues in the California legislature as well as outcomes of local public expenditure referenda. Other potential applications could study abortion or cannabis policies. Our model is well-suited to study a variety of different topics.

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A Alcohol Consumption in the U.S.

Table 6 reports quantities of alcohol consumed in gallons of pure ethanol per capita. We use the total population that is fifteen and older population to obtain the per capita quantities. For the years 1934-1950, quantities come from Slater and Alpert (2021). For the years 1921-1930, quantities are reported in Table 30 of Warburton (1932), Table 30. [40] For the years 1900-1920, quantities come from Warburton (1932), Table 1. Here, Warburton reports per capita quantities with respect to the entire U.S. population of gallons of beer, wine, spirits, and pure ethanol consumed. We convert the gallons of beer, wine, and spirits into gallons of pure ethanol using Warburton's assumed alcohol by volume measures of 4.25 percent, 14 percent, and 50 percent, respectively. We then re-weight the quantities so that they are per capita quantities relative to only the fifteen and older population. Data on alcohol consumption between 1931 and 1933 are based on Miron and Zwiebel (1991).

To estimate the demand function for alcohol during the Prohibition Era we need to construct price data. Table 78 in Warburton (1932) contains prices per gallon of beer, wine, and spirits from 1920-1930. We convert these prices to prices per gallon of pure ethanol assuming alcohol by volumes of 4.25 percent, 14 percent, and 50 percent for beer, wine, and spirits, respectively. To construct a price of pure ethanol, we compute a weighted sum of the beer, wine, and spirits prices, where the weights of each type of alcohol's price correspond to that type's share of total alcohol consumption as reported in Table 6.

Table 7 reports the demand schedule for alcohol in the U.S. between 1920 and 1930. Quantities consumed are reported in gallons of pure ethanol consumed per capita with

[40] According to the 1930 Complete Count Census Data, the total U.S. population in 1930 was 122,777,512, of which 86,694,367 individuals were at least fifteen years of age.

Table 6: Per Capita Alcohol Consumption in Gallons of Pure Ethanol, 1900-1955

Year	Beer	Wine	Spirits	Total	Year	Beer	Wine	Spirits	Total
1900	0.97	0.08	0.91	1.95	1928	0.33	0.15	1.21	1.70
1901	0.96	0.07	0.93	1.95	1929	0.40	0.13	1.30	1.83
1902	1.03	0.12	0.95	2.11	1930	0.39	0.13	0.95	1.46
1903	1.06	0.09	1.01	2.17	1931	–	–	–	1.71
1904	1.08	0.10	1.02	2.20	1932	–	–	–	1.44
1905	1.08	0.08	1.00	2.17	1933	–	–	–	1.58
1906	1.17	0.11	1.04	2.32	1934	0.61	0.07	0.29	0.97
1907	1.24	0.13	1.12	2.48	1935	0.68	0.09	0.43	1.20
1908	1.22	0.11	0.98	2.32	1936	0.79	0.12	0.59	1.50
1909	1.15	0.13	0.93	2.21	1937	0.82	0.13	0.64	1.59
1910	1.19	0.13	1.01	2.32	1938	0.75	0.13	0.59	1.47
1911	1.25	0.13	1.03	2.41	1939	0.75	0.14	0.62	1.51
1912	1.20	0.11	1.03	2.35	1940	0.73	0.16	0.67	1.56
1913	1.25	0.11	1.07	2.42	1941	0.81	0.18	0.71	1.70
1914	1.25	0.11	1.02	2.37	1942	0.90	0.22	0.85	1.97
1915	1.11	0.07	0.89	2.07	1943	1.00	0.17	0.66	1.83
1916	1.07	0.09	0.97	2.14	1944	1.13	0.18	0.76	2.07
1917	1.09	0.08	1.15	2.32	1945	1.17	0.20	0.88	2.25
1918	0.90	0.10	0.60	1.60	1946	1.07	0.24	0.99	2.30
1919	0.48	0.10	0.55	1.13	1947	1.11	0.16	0.76	2.03
1920	0.15	0.02	0.18	0.35	1948	1.07	0.20	0.70	1.97
1921	0.06	0.06	0.20	0.31	1949	1.06	0.22	0.70	1.98
1922	0.09	0.07	0.98	1.14	1950	1.04	0.23	0.77	2.04
1923	0.12	0.13	1.27	1.51	1951	1.03	0.20	0.78	2.01
1924	0.15	0.12	1.14	1.41	1952	1.04	0.21	0.73	1.98
1925	0.18	0.12	1.20	1.50	1953	1.04	0.20	0.77	2.01
1926	0.23	0.14	1.29	1.66	1954	1.01	0.21	0.74	1.96
1927	0.28	0.15	1.05	1.48	1955	1.01	0.22	0.77	2.00

Table 7: Estimated Demand Schedule for Pure Ethanol, 1920-1930

Year	Per Capita Gallons of Pure Ethanol	Price per Gallon in Dollars
1920	0.35	24.82
1921	0.31	17.72
1922	1.14	13.78
1923	1.51	11.03
1924	1.41	11.09
1925	1.50	11.10
1926	1.66	10.46
1927	1.48	9.92
1928	1.70	11.37
1929	1.83	10.56
1930	1.46	10.01

respect to the fifteen and older population.

We consider an iso-elastic demand curve of the form

$$q = A\, p^{\epsilon} e^{u} \tag{35}$$

Taking logarithms of equation (35) gives our estimating equation:

$$ln(q) = ln(A) + \epsilon\, ln(p) + u \tag{36}$$

We first estimate this equation using OLS which ignores the potential endogeneity of the price. We also estimate an IV regression using the logged price index of sugar as an instrument.[41] Table 8 summarizes the estimates. Overall, we find that the OLS and IV results are fairly consistent with each other. Our preferred IV estimate of the price elasticity is approximately -1.62, which is similar to the point estimate of -1.8 reported by Cook and Tauchen (1982). Their estimate is based on the post-Prohibition Era and obtained using a much larger data set.

We can use the estimated demand model to translate the changes in alcohol consumption that occurred during the Prohibition Era into welfare measures. Plugging our estimated inverse demand function, we can approximate the consumer surplus for all policies. Table 9 summarizes our estimates for four levels of consumption.

According to Warburton (1932), prices per gallon of ethanol ranged between \$24.82 in 1920 and \$10.01 in 1930. This implies that average expenditures were \$8.69 in 1920 and \$14.60 in 1930. Relative to these estimates of average expenditures, our estimates of the consumer surplus are large and economically meaningful. We thus conclude that the Prohibition Era policies significantly reduced the consumer surplus. As a consequence, there is some serious scope for welfare improvements in a decentralized system of government that was implemented in the Post-Prohibition Era.

[41] The sugar price index comes from Warburton (1932), Table 20, column X_3.

Table 8: Estimating the Price Elasticity of Ethanol Demand, 1920 - 1930

	Dependent variable:	
	log(Ethanol Consumption)	
	OLS	IV
ϵ	-2.018^{***}	-1.622^{***}
	(0.281)	(0.385)
α	5.210^{***}	4.214^{***}
	(0.710)	(0.971)
Observations	11	11
Adjusted R^2	0.835	0.799
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table 9: Estimates of Consumer Surplus

Time Period	Alcohol Consumption per capita	Consumer Surplus
1911 - 1914	2.39	$30.17
1920 - 1921	0.33	$14.12
1927 - 1930	1.61	$25.93
1935 - 1955	1.85	$27.35

B Liquor Laws Considered by the Texas Legislature

Our sample of roll call votes on liquor-related bills spans three legislatures. The regular session of the 43rd Legislature began in January 1933. Despite the active statewide Prohibition law, the state legislature considered several pieces of legislation addressing the manufacture, sale, and regulation of alcohol. Of these, House Joint Resolution no. 43 excepted vinous and malt liquors of not more than 3.2 percent alcoholic content by weight from Prohibition under the Texas state constitution and became known as the "Beer Amendment" upon its passage. This amendment was the first step towards repealing statewide Prohibition in Texas. Related legislation considered in the 43rd legislature included House Bills 122 and 168 on regulating, "the manufacture, sale, and disposition of nonintoxicating malt liquors and the places wherein the same are manufactured and sold; defining non-intoxicating malt liquors; imposing an occupation tax upon certain persons, firms, corporations, and associations of persons manufacturing and selling non-intoxicating malt liquors; defining manufacturers of such non-intoxicating malt liquors and regulating the business thereof, etc."[42] Also of note is House Joint Resolution no. 5, which would have, among other things, provided for a local option on liquor sales, which ultimately failed to pass.

The 44th Legislature began in January 1935. The session saw the passage of Senate Joint Resolution 3, which allowed voters to decide to amend the Texas state constitution to repeal statewide Prohibition and allow for a local option. It also considered Senate Joint Resolution 3a, which would have established a state-run monopoly over liquor production had voters not rejected it in a subsequent popular vote. Other alcohol-

[42]The quoted language is from the text of H. B. 122. H. B. 168 was a similar bill introduced in the First Called Session of the 43rd Legislature.

related issues voted on include those in H. B. 1[43] and H. B. 77[44]. These bills addressed regulating the manufacture, sale, trafficking, possession, and taxation of liquor. H. B. 77, known after its passage as the Texas Liquor Control Act, established the Texas Liquor Control Board in 1935, which would later become the modern Texas Alcoholic Beverage Commission.

The 45th legislative session began in 1937. Despite the newly established Texas Liquor Control Board, legislators considered several bills that would amend the Texas Liquor Control Act. H. B. No. 432 sought to authorize the use of search warrants by the Texas Liquor Control Board, "for the purpose of searching for and seizing and disposing of intoxicating liquors under certain circumstances and prescribing the rules relative thereto, and declaring an emergency." Also considered were House Bill no. 5[45], which provided alternatives to many of the issues covered in the Texas Liquor Control Act; House Bill no. 20[46], which would raise taxes on alcohol sales; and Senate Bill no. 20[47], which would restrict when and where alcohol could be sold.

[43]H. B. 1, "A bill to be entitled 'An Act regulating the manufacture, sale, importation, transportation and possession of alcoholic liquors; levying taxes; prescribing penalties for violations; repealing conflicting laws and parts of laws and amending the same; and declaring an emergency."'

[44]H. B. 77, "An Act defining the term 'open saloon'; creating a Board of Liquor Control; prescribing rules and regulations, and regulating the manufacture, sale, importation, transportation, and possession of alcoholic liquors; providing for the right of local option; etc"

[45]H. B. 5, A bill to be entitled "An Act defining the term 'open saloon'; regulating the manufacture, sale, importation, transportation and possession of alcoholic liquors; prescribing rules and regulations and the right of local option; providing for a system of permits; levying taxes; prescribing penalties for violations; repealing conflicting laws and parts of laws, and declaring an emergency."

[46]H. B. 20, To provide for an additional tax upon sale of alcoholic liquors, etc.

[47]S. B. 20, A bill to be entitled "An Act providing for certain restrictions on the sale of wine and beer or on premises where consumed; further providing for certain and definite penalties for violations in the traffic of alcoholic beverages and in making and keeping of records of permittees and licensees; etc., and declaring an emergency."

The journals of each legislature allow us to follow the history of each bill, tracking each time roll call votes were taken to pass or table the bill or amendments to the bill. In estimation, we include all roll call votes on the passage of these and similar bills. We also include roll call votes on amended versions of the bills. For example, in the passage of House Bill no. 20 in the 45th Legislature's Second Called Session, various amendments were proposed to raise or lower the proposed alcohol tax. Other amendments voted on would have added restrictions in the bill on the sale of alcohol and proposed punishments for violations of these restrictions.

C Identification: Proof of Proposition 1

For expositional simplicity consider the case in which $I = 2$. In the spirit of an identification at infinity result, we consider two extreme cases of the model which allows us to establish identification of (α, β). First, note that if $s_{1n} = 1$, our model reduces to the following simple regression model:

$$g_{kn} \;=\; \alpha_{k1} + \beta_{k1}\, x_{kn} \;+\; u_{k1n} \tag{37}$$

Hence $(\alpha_{k1}, \beta_{k1})$ are identified. This also implies that the conditional distribution of u_{k1n} is non-parametrically identified. So we do not need a distributional assumption for the error terms to establish identification. Similarly, if $s_{1n} = 0$ and hence $s_{2n} = 1$, we have:

$$g_{kn} \;=\; \alpha_{k2} + \beta_{k2}\, x_{kn} \;+\; u_{k2n} \tag{38}$$

Hence $(\alpha_{k2}, \beta_{k2})$ are identified. This argument easily extends to the more general case in which $I > 2$.

Next, define the expected bliss points for each type k as:

$$\begin{aligned} \bar{\theta}_{ikn} &= E[\theta_{kin} | x_{kn}] \\ &= \alpha_{ki} + \beta_{ki}\, x_{kn} \end{aligned} \tag{39}$$

which we can treat as known, since α and β are identified. Now consider the case in which $0 < s_{in} < 1$. We can write g_{kn} as a weighted average of the expected bliss points and the error term:

$$g_{kn} \;=\; \sum_i \frac{s_{in}\gamma_{ki}}{\sum_j s_{jn}\gamma_{kj}}\,\bar{\theta}_{ikn} \;+\; v_{kn} \tag{40}$$

The easiest way to see that the γ_{ki}'s are only identified up to a normalization is to consider an imposture structure $c\,\gamma_{ki}$, where c is an arbitrary positive constant. For any value of s_{1n} we have:

$$\frac{s_{in}c\,\gamma_{ki}}{\sum_i s_{in}c\,\gamma_{ki}} \;=\; \frac{c\,s_{in}\gamma_{ki}}{c\,\sum_i s_{in}\gamma_{ki}} \;=\; \frac{s_{in}\gamma_{ki}}{\sum_i s_{in}\gamma_{ki}} \tag{41}$$

To put it differently, the weights above must sum up to one. A natural normalization is:

$$\sum_{i=1}^{I}\gamma_{ki} = 1 \qquad k = 1,2 \tag{42}$$

Additional restrictions can be obtained if impose some assumptions on the distribution of the error terms, For example, if $V(u_{kin}) = \sigma_{ik}^2$, then the conditional variance of the error terms is given by:

$$Var(v_{kn}|\,s_n) \;=\; \sum_i \left(\frac{s_{in}\gamma_{ki}}{\sum_j s_{jn}\gamma_{kj}}\right)^2 \sigma_{ki}^2 \tag{43}$$

Hence the σ_{ki} are identified from the equation above. Q.E.D.

D GMM Estimation

Because of the separability of the utility function, we can estimate the model separately for each policy dimension. To simplify the notation, we consider again the case in which $I = 2$.[48] As we discussed in Section 4 of the paper, we can derive orthogonality conditions

[48]The estimator easily generalizes to the more general case, when $I \geq 2$.

from a variety of different implications of the model. First, consider the predictions of our model for the bliss points of legislators. For each policy dimension k, define a parameter vector:

$$\phi_{1k} \quad = \quad (\gamma_{k1}, \alpha_{k1}, \beta_{k1}, \alpha_{k2}, \beta_{k2}) \tag{44}$$

For policy dimension k , we obtain the following orthogonality condition:

$$h_{1k}(g_{kn}, s_{1n}, s_{2n}, x_{kn}|\phi_{1k}) = g_{kn} - \sum_i \frac{\gamma_{k1} \; s_{in} E[\theta_{kni}|x_{kn}]}{\sum_j s_{jn}\gamma_{kj}} \tag{45}$$

Next, consider the variance of the error terms. For each k, define a second parameter vector:

$$\phi_{2k} \quad = \quad (\sigma_{k1}, \sigma_{k2}) \tag{46}$$

Define the residuals for policy dimension k as:

$$v_{kn} \quad = \quad h_{1k}(g_{kn}, s_{1n}, s_{2n}, x_{kn}| \; \phi_{1k}) \tag{47}$$

Based on the variance of the error terms, we can define the following orthogonality condition:

$$h_{2k}(v_{kn}^2, s_{1n}, s_{2n}| \; \phi_{1k}, \phi_{2k}) \quad = \quad v_{kn}^2 - Var[v_{kn}|s_{1n}, s_{2n}, \phi_{1k}, \phi_{2k}] \tag{48}$$

where

$$Var[v_{kn}|s_{1n}, s_{2n}, \phi_{1k}, \phi_{2k}] \quad = \quad \sum_i \left(\frac{s_{in}\gamma_{ki}}{s_{1n}\gamma_{ki} + s_{2n}(1-\gamma_{k1})} \right)^2 \sigma_{kni}^2 \tag{49}$$

Note that we are exploiting the condition here that the functional form of heteroskedasticity is known.

Finally, consider the vote shares in referenda that pit the status quo against the same alternative. Define a third parameter vector as:

$$\phi_{3k} \quad = \quad (g_{ks}, g_{kr}, \sigma_{k1}^{\epsilon}, \sigma_{k2}^{\epsilon}) \tag{50}$$

We can exploit the predictions of the vote share in the referenda to obtain the following orthogonality condition:

$$h_{3k}(V_{kn}, s_{1n}, s_{2n}, x_{1n}|\phi_{1k}, \phi_{2k}, \phi_{3k}) \;\; = \;\; V_{kn} \; - \; E[V_n|s_{1n}, s_{2n}, x_{kn}] \tag{51}$$

where:

$$E[V_{kn}|s_{1n}, s_{2n}, x_{kn}] = \sum_i s_{in} \int \frac{\exp[(g_{ks}^2 + 2\,(g_{kr} - g_{ks})\,(\alpha_{ki} + \beta_{ki}x_{kn}) \; + \; 2\,(g_{kr} - g_{ks})\,u_{ki} \; - \; g_{kr}^2)/\sigma_{ki}^{\epsilon}]}{1 + \exp[(g_{ks}^2 + 2\,(g_{kr} - g_{ks})\,(\alpha_{ki} + \beta_{ki}x_{kn}) \; + \; 2\,(g_{kr} - g_{ks})\,u_{ki} \; - \; g_{kr}^2)/\sigma_k^{\epsilon}]}\, r_{ki}(u_{ki})\, du_{ki}$$

For computational convenience, we assume that the $r_{ki}(\cdot)$ are normal densities with mean zero and variance σ_{ki}^2. We can, therefore, numerically integrate the inner summand using quadrature methods. Let ϕ_k denote the full parameter vector:

$$\phi_k \;\; = \;\; (\phi_{1k}, \phi_{2k}, \phi_{3k}) \tag{52}$$

We can estimate all parameters jointly using a GMM framework. To see this, define

$$f_{1k}(g_{kn}, s_{1n}, s_{2n}, x_{kn}, z_{1kn}|\phi_k) \;\; = \;\; z_{1kn}\; h_{1k}(g_{kn}, s_{1n}, s_{2n}, x_{kn}|\phi_k) \tag{53}$$

where z_{1kn} is a J-dimensional vector of instruments. Note that $J \geq 5$ is a necessary condition for identification. Additional orthogonality conditions can be formed based on the variance restrictions. Similarly, define:

$$f_{2k}(g_{kn}, s_{1n}, s_{2n}, x_{kn}, z_{2kn}|\phi) \;\; = \;\; z_{2kn}\; h_{2k}(s_{1n}, s_{2n}|\phi_k) \tag{54}$$

and:

$$f_{3k}(V_{kn}, s_{1n}, s_{2n}, x_{kn}, z_{3kn}|\phi) \;\; = \;\; z_{3kn}\; h_3(V_{kn}, s_{1n}, s_{2n}, x_{kn}|\phi_k) \tag{55}$$

Define $z'_{kn} = (z'_{1kn}, ...z'_{3kn})$, and $s'_n = (s_{1n}, s_{2n})$. Stacking the orthogonality conditions, we have:

$$f(g_{kn}, V_{kn}, s_n, x_{kn}, z_{kn}|\phi_k) \;\; = \;\; \begin{pmatrix} f_{1k}(g_{kn}, s_{1n}, s_{2n}, x_{kn}, z_{1kn}|\phi_k) \\ f_{2k}(g_{kn}, s_{1n}, s_{2n}, x_{kn}, z_{2kn}|\phi_k) \\ f_{3k}(V_{kn}, s_{1n}, s_{2n}, x_{kn}, z_{3kn}|\phi_k) \end{pmatrix} \tag{56}$$

and note that

$$E\Big(f(g_{kn}, V_{kn}, s_n, x_{kn}, z_{kn}|\phi_k^0)\Big) = 0 \tag{57}$$

where ϕ_k^0 is the true parameter value. The optimally weighted GMM estimator is then defined as:

$$\tilde{\phi}_{kN} = \text{argmin} \left[\frac{1}{N}\sum_{n=1}^{N} f(g_{kn}, V_{kn}, s_n, , x_{kn}, z_{kn}|\phi_k)\right]' W_{kN} \left[\frac{1}{N}\sum_{n=1}^{N} f(g_{kn}, V_{kn}, s_n, x_{kn}, z_{kn}|\phi_k)\right]$$

where W_{kN} is a consistent estimator of the optimal weighting matrix. Note that we can estimate the optimal weighting matrix using the following estimator:

$$W_{kN} = \left[\frac{1}{N}\sum_{n=1}^{N} f(g_{kn}, V_{kn}s_n, x_{kn}, z_{kn}|\hat{\phi}_{kN})\ f(g_{kn}, V_{kn}s_n, x_{kn}, z_{kn}|\hat{\phi}_{kN})'\right]^{-1} \tag{58}$$

where $\hat{\phi}_{kN}$ is a consistent estimator.

The choice of instruments is discussed in detail in the paper. In the model without spillovers, we use the following instruments:

$$\begin{aligned} z_{1kn} &= (1, s_{1n}, x_{kn}, s_{1n}\ x_{kn}, s_{2n}\ x_{kn}, \frac{1}{s_{1n}}, \frac{1}{s_{2n}})' \\ z_{2kn} &= (1, s_{1n})' \\ z_{3kn} &= (1, x_{1n}, s_{1n}, \frac{1}{s_{1n}}, \frac{1}{s_{2n}})' \end{aligned} \tag{59}$$

We have conducted a Monte Carlo study and found that our estimator performs quite well using simulated data.

E Estimates of The Population Weighted Model

In this section, we report some results from the simpler population-weighted voting model and conduct some hypotheses tests to derive our parsimonious, preferred model specification. Table 10 contains estimates of the model when $\gamma_{1k} = 1/2 = \gamma_{2k}$ using the observed characteristics as instruments. Recall that the key identifying assumption is that households do not sort across voting districts in response to unobserved characteristics that affect the ideal points of the different voter types. Column 1 estimates the model without spillovers with a full set of interactions. Column 2 estimates the constrained model without spillovers model restricting $\beta_1 = \beta_2$. Columns 3 through 6 repeat this exercise using 2SLS for the model with spillovers discussed above. Overall, we find that we cannot reject the restriction that $\beta_1 = \beta_2$ at conventional levels of significance. However, we reject the null that $\alpha_1 = \alpha_2$.

Next, we implement the sequential estimator of the probabilistic voting model. We pick a grid for plausible values of the parameter $\frac{\gamma_{k2}}{\gamma_{k1}}$ and estimate the model for each value of the grid. Figure 9 plots the R^2 of these regressions as function of $\frac{\gamma_{k2}}{\gamma_{k1}}$. The plot suggests that we can reject the hypothesis of equal treatment, i.e. the hypothesis that $\frac{\gamma_{k2}}{\gamma_{k1}} = 1$. Instead, politicians assign a larger weight to the wet voter type.

Figure 9: R-squared Maximizing Value of Gamma

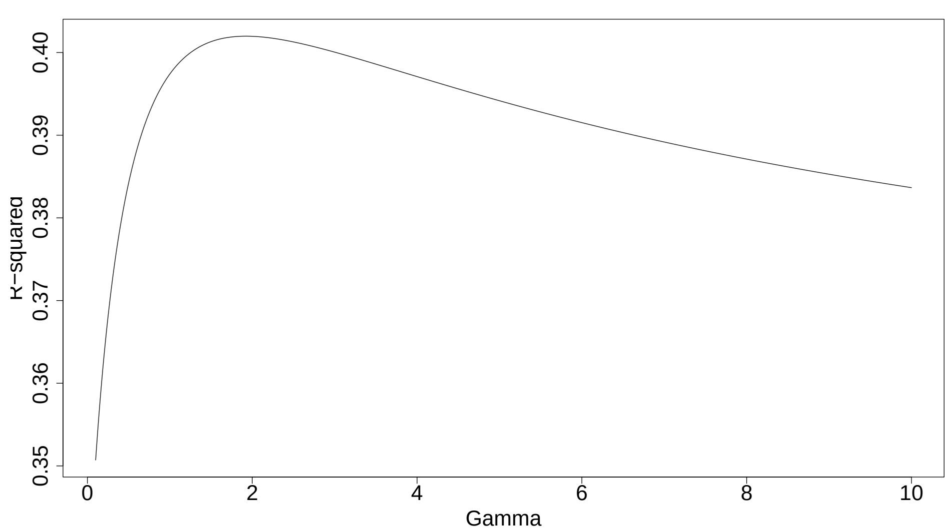

Table 10: Estimates of the Population Share Weighted Model

	Dependent variable: g_n					
	(1)	(2)	(3)	(4)	(5)	(6)
s_{1n} (% Dry Religion)	−8.194	0.969***	−6.657	0.931*	−8.226	0.914***
	(6.751)	(0.176)	(8.083)	(0.477)	(6.843)	(0.243)
% Minority	−0.005	−1.014***	0.275	−0.986**	0.012	−1.013***
	(0.871)	(0.229)	(1.218)	(0.399)	(0.930)	(0.230)
% High School	3.170	0.011	2.858	−0.014	3.187	0.005
	(2.570)	(0.758)	(2.743)	(0.814)	(2.601)	(0.760)
Logged Mean Income	−1.364*	−0.497**	−1.169	−0.482*	−1.371*	−0.499**
	(0.770)	(0.196)	(0.968)	(0.263)	(0.790)	(0.197)
% Urban	−0.314	0.190	−0.444	0.178	−0.308	0.199
	(0.825)	(0.264)	(0.916)	(0.302)	(0.842)	(0.266)
Population Density	−1.110**	−0.365***	−1.062**	−0.358**	−1.117**	−0.367***
	(0.441)	(0.135)	(0.477)	(0.156)	(0.456)	(0.135)
$s_{1n}\times$ % Minority	−1.768		−2.062		−1.791	
	(1.193)		(1.665)		(1.268)	
$s_{1n}\times$ % High School	−5.506		−5.075		−5.533	
	(4.106)		(4.314)		(4.159)	
$s_{1n}\times$ Logged Mean Income	1.603		1.346		1.614	
	(1.110)		(1.342)		(1.137)	
$s_{1n}\times$ % Urban	0.585		0.729		0.573	
	(1.281)		(1.362)		(1.311)	
$s_{1n}\times$ Population Density	1.411*		1.352*		1.422*	
	(0.744)		(0.782)		(0.772)	
$\overline{g}_n$			0.235	0.030		
			(0.678)	(0.356)		
$s_{1n} \times \overline{g}_n$			−0.278			
			(0.982)			
$\overline{s}_n$					0.020	0.041
					(0.457)	(0.127)
$s_{1n} \times \overline{x}_n$					−0.030	
					(0.577)	
Constant	7.866	2.954**	6.692	2.879*	7.890	2.966**
	(4.766)	(1.204)	(5.911)	(1.492)	(4.833)	(1.208)
Observations	173	173	173	173	173	173
Adjusted R^2	0.390	0.376	0.381	0.374	0.382	0.372

Note: *p<0.1; **p<0.05; ***p<0.01

F Roll Call Threshold Analysis

Table 11 compares the GMM estimates based on the two different roll call thresholds. Column (1) contains GMM estimates with a threshold of 20 roll call votes. Column (2) contains GMM estimates with a threshold of 13 votes. Overall, we find that the results in both columns are quite similar."

Table 11: Parameter Estimates: Liquor Policy

	(1)	(2)
	Liquor Policy	
α_1 (Intercept Dry)	4.09	4.03
	(0.29)	(0.03)
α_2 (Intercept Wet)	3.10	2.91
	(0.14)	(0.06)
β_1 (% Minority)	-0.81	-0.95
	(0.17)	(0.03)
β_2 (% High School)	0.12	0.06
	(0.08)	(0.02)
β_3 (Logged Mean Income)	-0.52	-0.51
	(0.05)	(0.01)
β_4 (% Urban)	0.24	0.24
	(0.03)	(0.02)
β_5 (Population Density)	-0.29	-0.26
	(0.08)	(0.03)
γ_2/γ_1 (Weight Wet)	1.94	1.94
	(0.03)	(0.01)
σ_1^u (Variance Dry)	0.60	0.68

	(1)	(2)
	(0.08)	(0.05)
σ_2^u (Variance Wet)	0.50	0.53
	(0.02)	(0.01)
	Referenda	
g_{1s} (Status Quo)	0.74	0.41
	(0.14)	(0.10)
g_{1r} (Alternative)	-0.69	-0.62
	(0.09)	(0.06)
σ_2^ϵ (Variance Wet)	0.89	1.02
	(0.06)	(0.04)
Number of Representatives	173	211
Number of Referenda	122	122
	(1)	(2)

G Voter Turnout Analysis

Figure 10 shows the distribution of referendum turnout, measured as the total number of votes cast in a county referendum divided by the county's voting age population, in our sample of 302 referenda.

Figure 10: Turnout in 302 Local Referenda

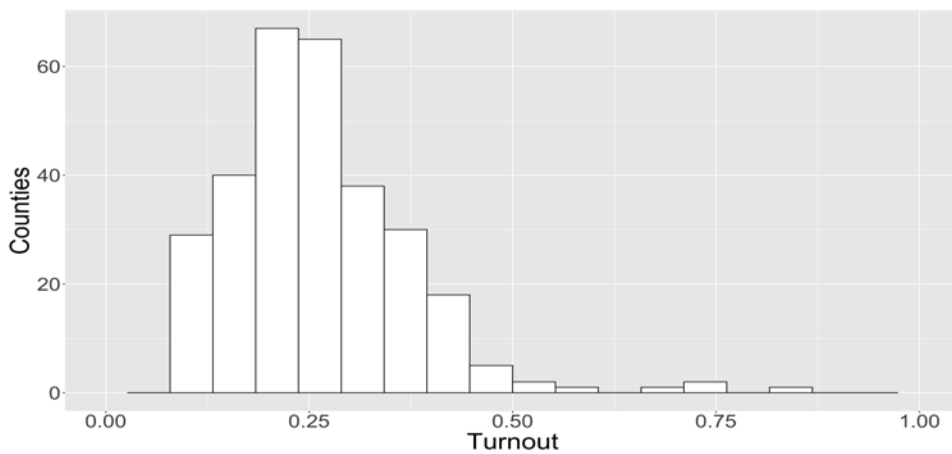

Figure 11 shows the same histogram on the sample of 122 averaged elections that we use in our preferred estimation specification. These statistics are comparable to the ones reported in Coate and Conlin (2004) who analyze turnout during a longer time period than we do.

Table 12 shows the results of regressing turnout on the share of voter types across counties. Column (1) shows the regression on the full set of 302 elections, and Column (2) repeats the regression on the sample of 122 averaged elections that we use in our preferred estimation specification. The share of dry religion voters in all specifications is insignificant and close to zero. We thus do not find any evidence that suggests differential voter turnout among the two types in our model.

Table 12: Turnout Regressions

	Individual Referenda	Averaged Referenda
% Anti-alcohol Religion	-0.011	-0.047
	(0.042)	(0.050)
% Minority	-0.208***	-0.218***
	(0.054)	(0.067)
% High School	0.145	0.220
	(0.107)	(0.142)
Logged Mean Income	0.064*	0.035
	(0.038)	(0.047)
% Urban	-0.143***	-0.156***
	(0.041)	(0.050)
Population Density (× 100)	-0.016	-0.009
	(0.024)	(0.024)
Observations	302	122
Adjusted R^2	0.165	0.252
Note:	*p<0.1; **p<0.05; ***p<0.01	

Figure 11: Turnout in 122 Averaged Referenda