

Breaking Bad: Are Meth Labs Justified in Dry Counties?

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Abstract

This paper examines the influence of alcohol prohibition in terms of wet/moist/dry status on the number of methamphetamine lab seizures in Kentucky. Applying four different estimation methods and controlling for religious affiliation at time of vote, we find dry counties have two additional meth lab seizures per 100,000 population than in wet and moist counties. Alcohol prohibition status is influenced by the percentage of the population that is Baptist, consistent with the bootleggers and Baptists model. The state could reduce the number of meth lab seizures by 17 to 30 percent per year if all counties were wet.

Chief Mullen: “Someone in Harlan is going into the meth business in a big way.”
Arlo: “Or the folks in Harlan are really, really congested” from *Justified*

The 21st amendment repealed the federal ban on alcohol sales/production, but still allowed states to impose local bans of alcohol. Local option ordinances allow municipalities or counties to choose their wet/dry status. Most previous studies have considered the effects of these bans on alcohol related events.¹

This paper extends the literature by studying the influence of local alcohol laws on the prevalence of methamphetamine (herein meth) labs in wet and dry counties within Kentucky. We apply four different methods to estimate the relationship between alcohol restrictions and meth lab seizures. We find that, relative to wet counties, dry counties have roughly two additional meth lab seizures annually per 100,000 population.

¹ See, e.g., Campbell et al. (2009), and Conlin et al. (2005).

I. Background

The federal prohibition of alcohol sales and production was repealed in 1933 ending a 14 year ban. After repeal, some states permitted localities to adopt local option ordinances, and 12 states still contain jurisdictions where the sale of alcohol is prohibited. Four types of alcohol local option ordinances exist: (1) “Wet” status allows the sale of alcohol; (2) “Dry” status bans the sale of alcohol in all forms; (3) “Moist” status is where a wet municipality exists within the borders of an otherwise dry county; and (4) “Limited” allows the sale of alcohol only in restaurants where some percentage of total receipts are from food expenditures.

Toma (1988) argues that local options are endogenous and give voters an opportunity to affect the price of alcohol through the way that it is obtained. A ban increases the costs of obtaining alcohol; thereby discouraging alcohol consumption. As Yandle (1983) argues, bootleggers and Baptists have both historically supported such bans: Baptists for religious reasons and bootleggers for economic reasons. In either case, local alcohol laws would be affected by the religious, cultural and economic characteristics of the area. Furthermore, local restrictions may be enacted to decrease the incidence of alcohol related events such as DUI. Campbell et al. (2009) survey the literature and find that alcohol bans are most effective when the dry county does not border a wet county.

Access to alcohol can also have indirect effects on property crime, public nuisance crime, and drug use. Carpenter (2005) finds that zero tolerance policies against drunken driving have been found to reduce property crime among 18-21 year old males by 3.4 percent and reduce the incidence of nuisance crimes, but have no effect on violent crime. Substantial evidence exists that higher alcohol excise taxes reduce alcohol consumption as well as certain types of property and violent crime (Carpenter and Dobkin 2008).

Importantly for this study, alcohol bans flatten the punishment gradient for alcohol drinkers to engage in other illicit activities (Miron and Zwiebel 1995), thus encouraging illicit drug use by raising the relative price of a substitute. Conlin et al. (2005) find a change in the status of Texas counties from “dry” to “wet” lowers drug-related mortality by approximately 14 percent. DiNardo and Lemieux (2001) use state variation in minimum drinking age laws to find that higher minimum drinking ages reduce alcohol consumption by high school seniors, but increase marijuana consumption.

We contribute to this literature by considering the effects of alcohol restrictions on meth laboratory seizures in Kentucky. Gonzales et al. (2010) report that meth use has increased threefold between 1997-2007. In an effort to limit the supply of meth, several states and the federal government passed laws between 1995-2006 restricting access to over-the-counter pseudoephedrine (e.g., Sudafed), a key input in the production of meth. Early attempts to disrupt the supply of meth in the 1990’s resulted in a temporary decrease in meth production but had no influence on property or violent crime (Dobkin and Nicosia 2009). However, reforms in 2005-2006 restricting pseudoephedrine had a significant influence on meth production reducing the number of DEA recorded meth lab seizures nationally by nearly 300 which remained three years after the law passed (Weisheit and Wells, 2010).

The Drug Enforcement Administration (DEA) reports the number of meth lab seizures per 100,000 residents is highest in the Midwestern United States at 9.12 (Weisheit and Wells 2010). In Kentucky, the meth lab seizure rate is 15.24 per 100,000 residents. Kentucky contains 120 counties with large variation in wet and dry status across counties, making it an ideal area to study the effects of alcohol restrictions on meth use and production.

II. Data

The data are a panel of meth lab seizures and local option ordinances for Kentucky counties from 2004 to 2010. The lab seizure counts are from the DEA's National Clandestine Laboratory Register.² The DEA provides the physical street addresses for all meth lab seizures as a public service due to the potential public health risk from chemical contamination.

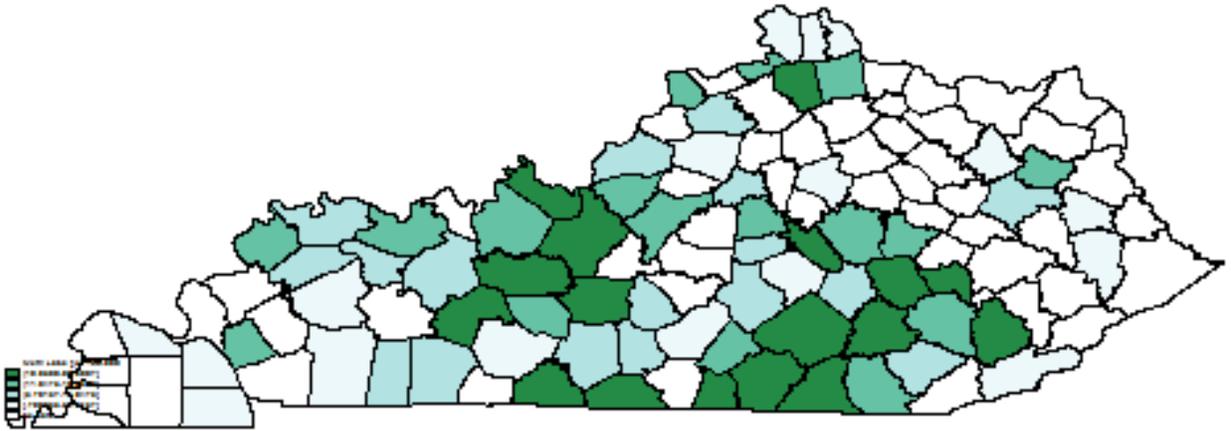


Figure 1: Meth Lab Seizures per county (darker green higher values)

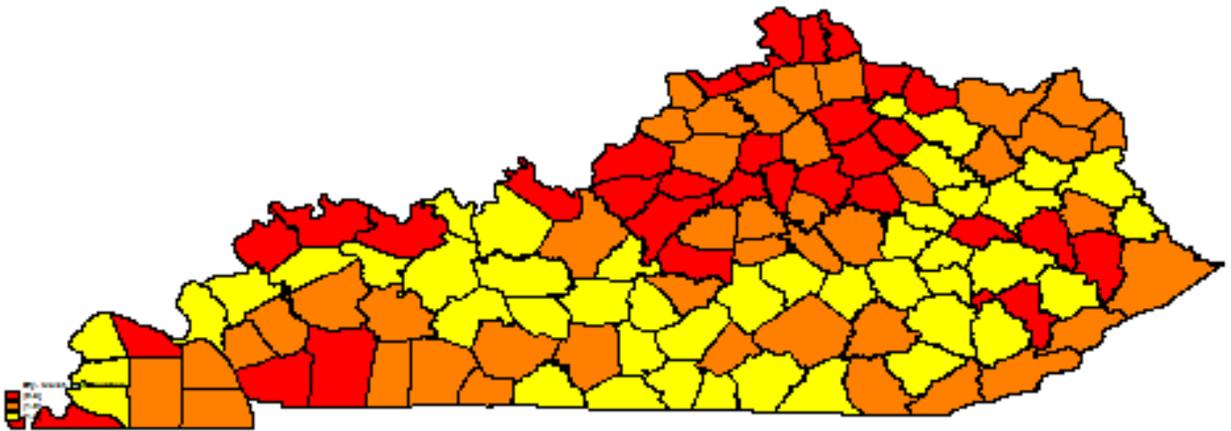


Figure 2: Wet (darkest, red), Moist, and Dry (lightest, yellow) County Status

Similar to national trends, meth lab seizures in Kentucky initially fell by 50 percent in between 2004 to 2007, but have increased more than three-fold by 2010. Our data indicate that the number of meth lab seizures per capita is higher in dry counties than in wet counties. Further,

² These data do not include independent seizures conduct by the Kentucky State Police.

the level of alcohol restrictions is associated with the number of meth lab seizures in descending order: dry > moist > wet. As seen in Figure 1, the highest rates of meth lab seizures occur in the southern counties bordering Tennessee and in the center of the state.

Comparing Figure 1 with Figure 2, which shows wet/dry status, the relationship between dry status and higher meth lab seizures appears to hold. The mean meth lab seizure rate is 2.14 in wet, 2.07 in moist, 3.35 in limited, and 4.2 in dry counties. The means are consistent with Campbell et al. (2009) who find that alcohol bans are less effective when the county is not sufficiently geographically isolated. Moist counties are arguably less geographically isolated with respect to alcohol bans than dry counties.

County local option ordinance data are from the Kentucky Department of Alcoholic Beverage Control. We group the ordinances into three major groups: wet; dry; and moist as described above. In 2013, Kentucky had 33 wet counties, 38 dry counties, 35 moist counties, and 15 counties (excluded from our analysis) with limited alcohol restrictions.

Next, we collect county-level demographic variables from the U.S. Census and American Community Survey. As suggested by Yandle (1983), the demographic composition of voters influences local option ordinances. Counties are more likely to adopt restrictive alcohol policies as population, income, percent black, and percent college educated decrease; or as poverty and unemployment increase. In addition, we collect data on religious membership from 1936 to capture religious attitudes at the time of wet/dry status votes.³ The effect of religion depends on the mixture of religious types. As the percentage of Baptist congregations increases relative to other religious groups the likelihood of alcohol restrictive policies increases. Table 1 shows the

³ The historic religious data are obtained from Michael Haines, "Historical, Demographic, Economic, and Social Data: The United States, 1790-2002 (ICPSR 2896)"

means of several key variables and how they vary by county status each of which is statistically different at the 1% between wet and dry.

Table 1: Means of control variables

County Demographic Variables	Wet	Moist	Dry
Meth lab seizures per 100,000	2.14	2.07	4.2
Population	69310	34741	21376
Pct. Black	5.67	4.02	2.83
Pct. College	15.93	14.90	11.82
Baptist/All Religion in 1936	.388	.351	.472
Pct. Poverty	17.35	19.14	21.44
Pct. Unemployed	6.74	6.81	7.41
Median Household Income	40751	37144	32489
Pct. Any Religion	.380	.301	.278

These observational differences between wet and dry counties suggest the adoption of local option ordinances should not be treated as exogenous. Votes for local option ordinances experienced great activity immediately after the repeal of prohibition from 1933 – 1936. Since then some counties have had votes to repeal dry county status. Since vote totals are not available for all counties we use the percentage of the population in each county belonging to churches of various denominations including Methodist, Baptist, Other Protestant; and percentage of the population belonging to any religious organization in 1936 as an instrument.

To determine the robustness of our results we apply four different models. First, we consider a standard least squares model with year fixed effects and county level demographics to estimate the treatment effect.

$$Meth\ lab\ rate_{it} = \alpha_t + \gamma_1 wet_{it} + \gamma_2 moist_{it} + X_{it}\beta + e_{it}$$

We cannot consider county fixed effects because the wet/dry status was determined before our sample time period. We use a rich set of demographic controls including median household income; county population and population density; county location (latitude and longitude);

female labor force participation; and the percentage of the population who are married, male, black, living in poverty, receiving public assistance, under age 21 and over 65.

The second model uses a propensity score as a regression adjustment. We estimate a multinomial logit model using the previously described covariates and include the predicted probabilities for each status as regressors. These regressors dilute the treatment effect parameters when either the moist or wet indicator equals one and the predicted probabilities of each status is high, but place greater weight on counties that have low predicted probabilities but still adopt either ordinance.

Third, we utilize the ability of religion following Prohibition to influence a county's status. We use the religious membership by denomination data from 1936 as a proxy for votes. We find strong evidence that as past religious membership increases, particularly among some protestant groups (e.g. Baptists) the likelihood of current dry county status increases. A likelihood ratio test of all the religious parameters equaling zero is rejected at the 1 percent level. We use simulated maximum likelihood with 500 draws to maximize limited information treatment effect models linking the outcome equation and the multinomial logit model for treatment.

Finally, we use the county demographic variables and religion instruments to perform propensity score matching. Given multiple treatment groups, we separate the analysis into wet versus dry and moist versus dry. We use kernel matching within each year to estimate the average treatment effect and then bootstrap the standard errors. Due to the large number of predicted probabilities near zero and one, common support restrictions take a heavy toll on our data. We are able to use 168 of the 627 observations for the wet-dry sub-sample match and 226 of the 632 observations for the moist-dry sub-sample match. In the matched samples, we fail to

reject the null hypothesis of equal means for the covariates between the treatment and control group with p -values near 1.00. There is a mean bias of 10% and a median bias of 8%, but these are not significant. The results remain robust to less restrictive balancing test.

III. Results

The results from the four models are found in Table 2. Results are consistent across all models showing that relative to dry counties, wet counties have between 1.8 and 2.7 fewer meth lab seizures per 100,000 population and moist counties have between 1.3 and 2.2 fewer meth lab seizures.

Table 2: DEA Meth Lab Seizures

VARIABLES	OLS	RA	IV	PS
Wet	-2.724*** (0.905)	-2.735** (1.184)	-2.186*** (0.846)	-1.824** (0.917)
Moist	-1.495* (0.758)	-2.166** (0.863)	-1.825** (0.738)	-1.275* (0.76)
Observations	840	840	840	168 (wet-dry) 226 (moist-dry)
R-squared	0.211	0.212		

Robust standard errors clustered by county in parentheses, except for propensity score which is bootstrapped with 500 replications. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

All specifications use current county demographic information and religious organization membership from 1936.

If we take these estimates at face value, then removing all forms of alcohol prohibition would decrease the total number of meth lab seizures in the state of Kentucky by 30 to 43 labs or an equivalent decrease of 17.8 to 26 in meth lab within 2010.

Finally, we run the four models on property and violent crime as a falsification test. If our results are driven by unobservable differences in enforcement or overall criminal activity, we should see differences in other crimes by county status. When we test for the joint significance of

the status indicators we cannot reject the null hypothesis of no effect for on any property or violent crime rate.⁴

IV. Conclusion

Local option ordinances have led to a variety of alcohol sales restrictions. Local alcohol bans increase the costs of obtaining alcohol, which reduces the relative price of illicit drugs. Additionally, these restrictions flatten the punishment gradient encouraging individuals who are willing to obtain alcohol illegally to also obtain illicit drugs. The results of this research are consistent with the unintended consequences of local alcohol bans predicted by economic theory. We exploit variation in religious membership following the repeal of Prohibition to identify the effect of alcohol restrictions on the prevalence of known meth labs. We find legal access to alcohol reduces per capita meth lab seizures by about 17.5%

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⁴ We used the rates of all violent crime, all property crime, rape, robbery, burglary, sex offenses, and assault. These data are extracted from the FBI Uniform Crime Reports by county by year.

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