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# **Concealed Carry in the Show-Me State: Do Voters In Favor of Right-to-Carry Legislation End Up Packing Heat?**

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Linda S. Ghent will share all data and coding for replication purposes.

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## **Abstract**

*Objectives* – The objectives of this study were to examine the relationship between a public vote on the right-to-carry concealed weapons in the state of Missouri and the subsequent demand for concealed-carry permits. *Methods* – Weighted logit analysis of the referendum vote and the proportion of the population holding concealed-carry permits was performed to investigate the factors that influence them. *Results* – We find vast differences in the factors that significantly influenced the vote and the decision to hold a concealed-carry permit. Crime rates are positively related to the vote, but have no influence on the decision to carry. *Conclusions* - Our analysis shows that most voters do not appear to vote for the right to carry based on a latent desire to carry concealed weapons. Instead, our evidence suggests that voters in favor of concealed carry may be voting for moral or philosophical reasons, and that they may be hoping to free ride on the concealed carry of others.

## **I. Introduction.**

Currently, 49 states allow individuals to carry concealed weapons. In most states, gun owners must meet state requirements for a permit, but once these conditions are met, local law enforcement officials are required to issue the permit. These laws are known as “shall-issue” laws. Several states have more restrictive laws (“may-issue” laws) and only allow gun owners to carry a concealed weapon if they can prove that it is necessary to do so. Illinois is the only state that does not allow the right to carry for any reason.<sup>1</sup> Figure 1 shows the distribution of these right-to-carry (RTC) laws across states.

Grossman and Lee (2008) provide a short history of the development of RTC legislation over time. Prior to the 1960s, only Vermont and New Hampshire allowed the RTC. In 1961, the state of Washington created a “shall-issue” law, and Connecticut followed suit in 1969. Twenty-one years lapsed before the next state, Indiana, enacted RTC legislation, but over the subsequent 25 years, 35 more states enacted “shall-issue” laws.

Missouri was the 45<sup>th</sup> state to enact a concealed carry provision. However, Missouri was the only state to call a referendum on the RTC issue. That referendum, called in 1999, was created to appease then-Governor Mel Carnahan, who had pledged to veto any RTC legislation passed without a public vote. The vote took place in November 1999, and the measure was defeated with 51.7 percent against and 48.3 percent in favor. While most of the counties in the state voted for the RTC law, residents in those counties were outnumbered by urban voters in the St. Louis and Kansas City areas. Figure 2 shows the distribution of votes across the state’s counties.

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<sup>1</sup> In July 2013, the Illinois legislature authorized concealed carry, overriding Governor Pat Quinn’s veto. While concealed carry is therefore legal in Illinois, the technical details of the concealed carry provision have not yet been decided, and permits are unlikely to be issued until sometime in 2014.

In May 2003, legislators decided to ignore the public referendum and voted to create a “shall-issue” law. Both houses approved the measure overwhelmingly. Two months later, Governor Bob Holden vetoed the legislation, but that veto was overridden. The state began processing applications in spring of 2004, and by March 2010, 96,105 concealed-carry permits had been issued.

This paper examines referendum voting and gun permit data from Missouri. Using county-level demographic and economic information, the study looks for similarities between voting behavior and permit demand to examine whether the vote for a concealed-carry law was driven by a latent demand for concealed-carry permits or whether it possibly reflected voters’ desire to free ride on the concealed carry of others.

## **II. Review of the Literature.**

Much of the literature regarding concealed carry has focused on the effects of RTC on crime rates. This debate centers on Lott and Mustard (1997), who use pooled time-series and cross-section data over the period 1977-1992 to show that RTC laws deter violent crime. Lott and Mustard argue that if the states that did not allow RTC had done so in 1992, thousands of violent crimes would have been prevented. Most important for our purposes, Lott and Mustard’s work posits a deterrent effect on violent crimes, but not on property crimes.

In contrast, Ayres and Donohue (2003) find that in some cases, RTC laws may lead to an increase in crime. Their study has led to widespread debate amongst empirical economists about the correct way to estimate the true impact of RTC laws on violent crime. Some studies (Bartley and Cohen (1998), Heland and Tabarrok (2004), and Plassman and Whitely (2003)) have found results similar to those of Lott and Mustard. Others (Black and Nagin (1998), Hood and Neeley

(2000), Kovandzic and Marvell (2003), and Kovandzic et al. (2005)) have found that RTC laws exert no systematic effect on crime rates.

Less attention has been devoted to *why* states create RTC laws. Mixon and Gibson (2001, 2002) use an ordered logit model to examine the factors influencing the enactment of RTC laws across states. They conclude that the “property-rights movement” has led many states to adopt RTC laws, as well as political variables such as executions, party affiliation and gender of legislators, and the length of legislative sessions.

Grossman and Lee (2008) use a Cox proportional hazards model to estimate the timing of states switching from “may-issue” laws to “shall-issue” laws. They find that a state’s level of urbanization is negatively related to the probability that a state makes such a change. Further, a state that borders a “shall-issue” state is more likely to become a “shall-issue” state as well, perhaps out of concern for crime spillovers as posited by Bronars and Lott (1998). Grossman and Lee find no significant effect of legislators’ political ideology on the decision to enact “shall-issue” laws, nor do they find that crime rates have any impact on the decision. They do, however, find that recent changes in crime rates have a significant impact.

### **III. Research Question and Empirical Estimation**

While the body of literature devoted to concealed carry issues is fairly well developed, very little attention has been devoted to the questions this paper addresses. First, we ask who votes for concealed carry. This study differs from the work of Mixon and Gibson in the following way: Mixon and Gibson (2001 & 2002) use categorical data on state-level concealed-carry regimes to assess constituent support for RTC. Those categorical outcomes (0 if a state has “shall-issue,” 1 if a state has “may issue,” or 2 if a state has “no issue”) are the joint product of

interest group and voter characteristics and legislative behaviors. But as detailed in the introduction, legislatures may sometimes produce outcomes that their constituents don't want. By using direct vote counts at the county level, we avoid this potential problem and shed light on the question, "What kind of person wants RTC?" in a way that Mixon and Gibson do not. Second, we ask who actually applies for concealed carry permits. Finally, we ask if these two groups of people look alike: Are voters in favor of concealed carry expressing a latent demand, or do they support RTC for other reasons?

The Missouri RTC initiative went to a vote in 1999. As indicated in Table 1, the initiative failed to garner enough votes for passage. But Missouri's 115 voting districts (114 counties plus St. Louis City, which is not in a county) displayed substantial variation in their voting patterns: St. Louis City rejected RTC by a 3 to 1 margin, while 83 percent of Shannon County voters voted in favor.

Voters may be motivated to approve RTC legislation because they wish to carry a concealed weapon themselves. In other words, voters may be expressing a latent demand. A second possibility is that a voter with no intention of carrying a concealed weapon might support RTC because he believes that armed bystanders might be able to protect him should he find himself endangered by a criminal. In other words, the voter may want to free ride on the concealed carry of others. That free-riding hypothesis extends to general deterrence as well: Voters may believe that arming citizens causes the general crime rate to fall and that they will benefit from that drop in crime. In that case, the benefits of free riding appear less direct, but no less real.<sup>2</sup>

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<sup>2</sup> This 'more guns, less crime' hypothesis, despite extensive testing, remains controversial; given the lack of robust empirical evidence it may well be possible that voters cast ballots against RTC in the belief that more guns may actually foster more crime.

Finally, it is possible that people who vote in favor of RTC legislation may be voting expressively: Even though they don't perceive RTC as being in their narrow self-interest, and even though they don't believe their vote will be decisive, voters may use the ballot box to express moral or ideological principles they hold dear (see Brennan and Lomasky, 1997). They may, for example, vote in favor of RTC legislation because they support the right to bear arms as fundamental freedom embodied in the Bill of Rights.

To examine the determinants of voting behavior, we specify a county-level cross-sectional voter approval regression that uses both demographic and economic variables to explain variation in voting patterns.<sup>3</sup> Demographic variables include *MALE* (the proportion of adult county population that is male), *BLACK* (the proportion of county residents that are African-American), *HISPANIC* (the proportion of county residents that are Hispanic), and *AGE65* (the proportion of county residents aged 65 years or more). We also include *MARRIED* (the proportion of county residents that are married), *VETS* (the proportion of county residents that are veterans of the armed services), and *UNDER18* (the proportion of households with minor children living in the home). We control for the education level of voters by including *NOHS* (the fraction of the adult population without a high school diploma) and *COLLDEG*, the fraction of the adult population with at least a bachelor's degree. We also include *MEDINC* (median household income), population density (*POPDENS*), and two measures of county crime rates, *VIOLENT01* and *PROPERTY01*, which reflect violent and property crimes per 1,000 county

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<sup>3</sup> Unless otherwise specified, data are drawn from the 2000 Census.

residents in 2001.<sup>4</sup> Finally, we control for political philosophy by including *DEM*, the proportion of county residents that voted for the Democratic candidate in the Presidential election of 2000.<sup>5</sup>

The dependent variable in the *VOTE* regression reflects voter approval. Individual Missouri voters faced a binary choice of either voting for or voting against RTC legislation. These votes were aggregated into grouped data by county, with  $n_i$  denoting the number of votes cast and  $Y_i$  denoting the proportion of votes in favor of RTC. Because proportions data are bounded below by zero and above by one, we use econometric procedures outlined in Greene (2000). Grouped data are transformed into logit form, with  $Z_i$  being our constructed variable measuring voter approval, expressed as a function of our explanatory variables,  $X_i$ . Specifically,

$$Z_i = \ln \left[ \frac{Y_i}{(1-Y_i)} \right] = \mathbf{X}_i \boldsymbol{\beta} + \varepsilon_i, \quad (1)$$

where  $Y_i$  is the proportion of ‘yes’ votes in county  $i$  in the RTC referendum. Estimation of (1) using OLS produces heteroskedastic errors. Greene suggests a two-stage weighted least squares procedure in which (1) is first estimated by OLS, and the fitted values of  $Z_i$ , denoted  $\hat{Z}_i$ , are used to generate estimates of  $Y_i$  (denoted  $\hat{y}_i$ ). Specifically,

$$\hat{Z}_i = \mathbf{X}_i \hat{\boldsymbol{\beta}} \quad (2)$$

and

$$\hat{y}_i = \frac{e^{\hat{Z}_i}}{(1+e^{\hat{Z}_i})}. \quad (3)$$

Values from (3) are then used to generate appropriate weights,  $w_i$ , for re-estimation of (1).

Specifically,

$$w_i = [n_i \hat{y}_i (1 - \hat{y}_i)]^{0.5}. \quad (4)$$

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<sup>4</sup> Crime statistics were not collected in a uniform fashion prior to 2001. In 2001, Missouri counties began a systematic county-level effort to compile data for the FBI Uniform Crime Reports. Given the proximity in time of this data and the 1999 vote, we feel reasonably comfortable using 2001 data as a proxy for 1999 crime.

<sup>5</sup> In our original specification we proxied an interest in and familiarity with firearms by including the per capita number of hunting licenses issued in each county. This variable had virtually no explanatory power in either our *VOTE* regression or in the subsequent *PERMITS* regression, and was subsequently omitted.



The two-stage procedure is completed with estimation of (1), incorporating the weights generated in (4). Results of this estimation are presented in Table 2.

Demographic characteristics have little influence over voter approval of RTC legislation. Gender, age, race, and children in the home have no significant power to explain voter approval. Likewise, cross-county variation in prior military service (which might indicate both a familiarity with weapons and an interest in defending the Constitution) has no power to explain the vote.<sup>6</sup> The only demographic variable that contains any explanatory power is the proportion of county residents that are married, which is both positive and highly significant.

Education and income are both strong predictors of voter behavior. Consistent with Mixon and Gibson (2001), the proportion of adults without a high school diploma is positively associated with approval of RTC legislation. The third column measures the marginal effects of the explanatory variables. For each one-percentage-point increase in the proportion of residents without a diploma, the proportion of “yes” votes increases by about half of one percentage point. However, unlike Mixon and Gibson (2001), we find that RTC approval is negatively associated with income: Each \$1,000 of median household income is linked to a decline in the proportion of “yes” votes of almost four-tenths of one percentage point.

Other variables also contain significant explanatory power. Voters appear to be motivated by violent crime. All else equal, a one-unit increase in the violent crime rate is linked to about a seven-tenths percentage point increase in voter approval for concealed carry. Property crime, too, has some explanatory power, though the coefficient has an unexpected sign. The effect of property crime, however, is economically small: relative to violent crime rates, the coefficient and marginal effects of the property crime variable are about an order of magnitude smaller. The

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<sup>6</sup> Mixon and Gibson (2001) use age as a proxy for military service, and find that the right to carry is directly related to age. Our results, based on county-level data, suggest that neither age nor veteran status has significant explanatory power.

importance of violent crime coupled with the small coefficient and marginal effect for property crime may be linked to the results of Lott and Mustard (1997), who conclude that concealed carry deters violent crime but not property crime. Finally, we note that as in Mixon and Gibson (2001), political philosophy matters: Counties with higher proportions of voters who chose Gore in the election of 2000 were much less likely to vote in favor of concealed carry.

Taken as a whole, our *VOTE* regression displays a great deal of explanatory power. It also paints a picture of the typical county characteristics where RTC is more heavily favored: a rural county with a high proportion of married persons, more heavily Republican, with comparatively lower average income and relatively low average educational achievement. We believe those results are interesting in and of themselves. However, we also believe that there is something to learn in comparing how people express their desires at the ballot box and how people express their desires in the marketplace. In other words, are the people who vote in favor of concealed carry doing so because they wish to carry concealed weapons themselves?

To answer that question, we assess whether the factors that determine voter approval of RTC also determine *%PERMIT*, the percentage of county population ages 21 and older who have been issued a permit to carry a concealed weapon.<sup>7</sup> Counties in Missouri vary as to the number of permits issued. Figure 3 shows the distribution of permits per 1,000 persons in each county. We express *%PERMIT* as a function of the same variables that were included in the *VOTE* regression. We also include, in one specification, the predicted vote from the *VOTE* regression.

There are two ways that we can confirm a latent-demand hypothesis. One is to examine the sign and significance of the predicted vote ( $\hat{y}_i$ ) in the *%PERMIT* regression. If it is positive

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<sup>7</sup> *%PERMIT* is based on the total number of permits issued to residents of a particular county between 2004 (when RTC began) and 2010. In contrast, most of our explanatory variables are drawn from the year 2000. Changes in the explanatory variables between 2000 and 2010 may make drawing inferences problematic. However, we feel that it is important to use the most inclusive measure of permits possible, and given that demographic variables generally change gradually, we feel reasonably confident in the results.

and significant, it means that there is information in the vote that is linked to the demand for permits. The comparative approach used by Scott and Garen (1994) suggests that even if the coefficient on  $\hat{y}_i$  turns out to be insignificant, we can still confirm a voter-carrier link by examining the signs and significance of the regressors. Because both models include the same explanatory variables, similarity between the coefficients from one equation to the other may serve as loose confirmation of latent demand driving the vote. We follow the same logit procedure to estimate %*PERMIT* as we used in the *VOTE* regression; results are presented in the first column of Table 3.

Inspection of the coefficient for the predicted vote,  $\hat{y}_i$ , allows us to explicitly compare voting and carrying behavior. Given the insignificant estimate, it appears that the vote contains little information relevant to the “Who carries?” question beyond what is already captured by the other regressors.

Because of the strong statistical association between the vote and the regressors (the adjusted  $R^2$  of the *VOTE* regression was 0.87), leaving the predicted vote in the %*PERMIT* regression is likely to introduce some degree of multicollinearity. Given the insignificance of the predicted vote, we re-estimate the permits regression with  $\hat{y}_i$  omitted. Those results are presented in the last two columns of Table 3.

Those results are striking, particularly when juxtaposed against the results of the *VOTE* regression. Of the demographic variables, *MARRIED* played a strong and positive role in both the *VOTE* and the %*PERMIT* regressions. But while counties with large populations of veterans were no more likely to vote in favor of RTC, they were much more likely to use that right once established: a one-percentage-point increase in the proportion of veterans leads to approximately six-hundredths of a percentage point increase in the number of permits issued. While that

number appears small in magnitude, context is important: only about two percent of residents obtain a concealed carry permit. Relative to that low overall participation, the marginal effect of veteran status is quite meaningful.

Education variables contain significant explanatory power. *NOHS* is both positive and significant in the *%PERMIT* regression; it was also strongly and positively linked to the vote. The real surprise in the education variables is the predictive power of a college degree. Compared to the omitted “high school and maybe some college” group, college graduates are much more likely to obtain a concealed carry permit; a one-percentage-point increase in college diplomas leads to a four-hundredths of one percentage point increase in per capita permits. We find that while both income and political affiliation explained the vote, neither has any power to explain permits. In other words, the poorer and more Democratic a county is, the more likely its residents are to vote for RTC, yet its residents are no more likely to utilize that right once established.

Finally, we implicitly examine the hypothesis that individuals are interested in concealed carry out of a desire for greater personal protection or out of a belief that more guns translates to less crime. The insignificant coefficient for violent crime suggests that whatever peoples’ motivations to carry a concealed weapon may be, they are not systematically linked to a desire to protect oneself against violent crime. Taken in concert with the fact that violent crime rates were positively related to the vote, it appears that voters may have been voting not because they wanted to carry themselves, but because they wanted to free ride on deterrence and protection provided by others. Coupled with the positive and statistically significant relationship between property crime rates and concealed carry permits, our evidence suggests that individuals’ desire

to carry concealed weapons may be motivated more out of concern for protecting property than protecting people.

To summarize, concealed carry permits are more likely to be issued in counties with more property crimes, a high proportion of males, a high proportion of married persons, strong veteran representation, and a population that is disproportionately a bit undereducated or disproportionately highly educated. When we compare those characteristics to the characteristics that drove the vote, we do find some similarities. But the differences are stark, and we note significant disagreement between the coefficients for gender, income, veteran status, a college education, political philosophy, and crime rates.

#### **IV. Conclusions**

What does this tell us about concealed carry legislation? Given that about 48 percent of Missouri voters favored RTC, and that only about two percent of these residents actually obtained a permit, there are large numbers of people who are voting for motivations beyond latent demand. Either these voters believe in a deterrent effect, or they have some fundamental belief in a right to carry, or their behavior is linked to something else of which we are unaware. But even the two percent of residents who do obtain a carry permit are not typical in that their characteristics do not fully reflect those of the typical “yes” voter. Further, given that violent crime was able to explain the concealed carry vote but not its application, we suggest that some people were motivated to vote for RTC because they were concerned about crime and thought concealed carry might help reduce it. Thus, we conclude that the desire for RTC legislation is not being driven wholly by latent demand, but by other concerns that may well include, but are not limited to, general deterrence or moral and philosophical considerations.

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**Table 1: Summary Statistics and Data Sources**

<b>Variable Name</b>	<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
VOTE	Proportion in favor of approving RTC	48.814	15.231	25.9	83.2
%PERMIT	Proportion of residents (ages 21+) with permit	0.024	0.142	0.0004	0.064
VIOLENT01	Violent crimes per 1,000 in 2001	4.611	4.74	0	22.014
PROPERTY01	Property crimes per 1,000 in 2001	39.200	26.837	2.099	131.225
MALE	% of population that is male	47.716	1.795	44.036	62.704
BLACK	% of population that is African-American	11.269	13.446	0	51.2
HISPANIC	% of population that is Hispanic	2.178	1.807	0.3	15.8
AGE65	% of population ages 65 and older	13.703	3.09	6.6	26.1
MARRIED	% of population that is married	52.806	10.689	32.7	66.4
VETS	% of population who are veterans	14.050	2.170	9	26.6
UNDER18	% households with children under 18	34.549	3.881	15.8	44.9
NOHS	% of population without high school diploma	20.652	7.119	8.3	41.8
COLLDEG	% of population with college degree	19.704	7.922	6.8	41.7
MEDINC	Median income (\$1,000s)	39.184	9.554	20.878	57.258
POPDENS	Population per square mile	942.862	1,410.73	8.25	5,623.21
DEM	% voted for Gore in 2000 presidential election	47.159	11.303	26.5	77.4

VOTE provided by the Missouri Secretary of State. %PERMIT, VIOLENT01, and PROPERTY01 provided by the Missouri Attorney General. DEM provided by the Center for Congressional and Presidential Studies, American University. All remaining data provided by the Bureau of the Census.



**Table 2: Voter Behavior**  
**Dependent Variable = VOTER APPROVAL =  $\ln[Y_i/(1 - Y_i)]$**

Variable	Coefficient (T-statistic)	Marginal Effect on $Y_i$
<u>Demographic Characteristics:</u>		
MALE	104.886 (0.95)	0.232
BLACK	-0.774 (-1.22)	-0.171
HISPANIC	1.320 (0.96)	0.292
AGE65	-1.682 (-1.43)	-0.373
MARRIED	2.203*** (4.48)	0.486
UNDER18	-0.711 (-0.81)	-0.158
VETS	1.494 (1.33)	0.033
<u>Education and Income:</u>		
NOHS	2.485*** (4.09)	0.548
COLLDEG	-0.286 (-0.43)	-0.063
MEDINC	-0.002*** (-4.69)	-0.375
<u>Other Variables:</u>		
VIOLENT01	0.031** (2.57)	0.678
PROPERTY01	-0.003* (-1.78)	-0.082
POPDENS	-0.007 (-1.34)	-0.002
DEM	-1.638*** (-4.18)	-0.004
CONSTANT	-0.348 (-0.36)	----
<b>N</b>	115	
<b>Adjusted R<sup>2</sup></b>	0.8713	
* $\alpha < 0.10$ ** $\alpha < 0.05$ *** $\alpha < 0.01$		

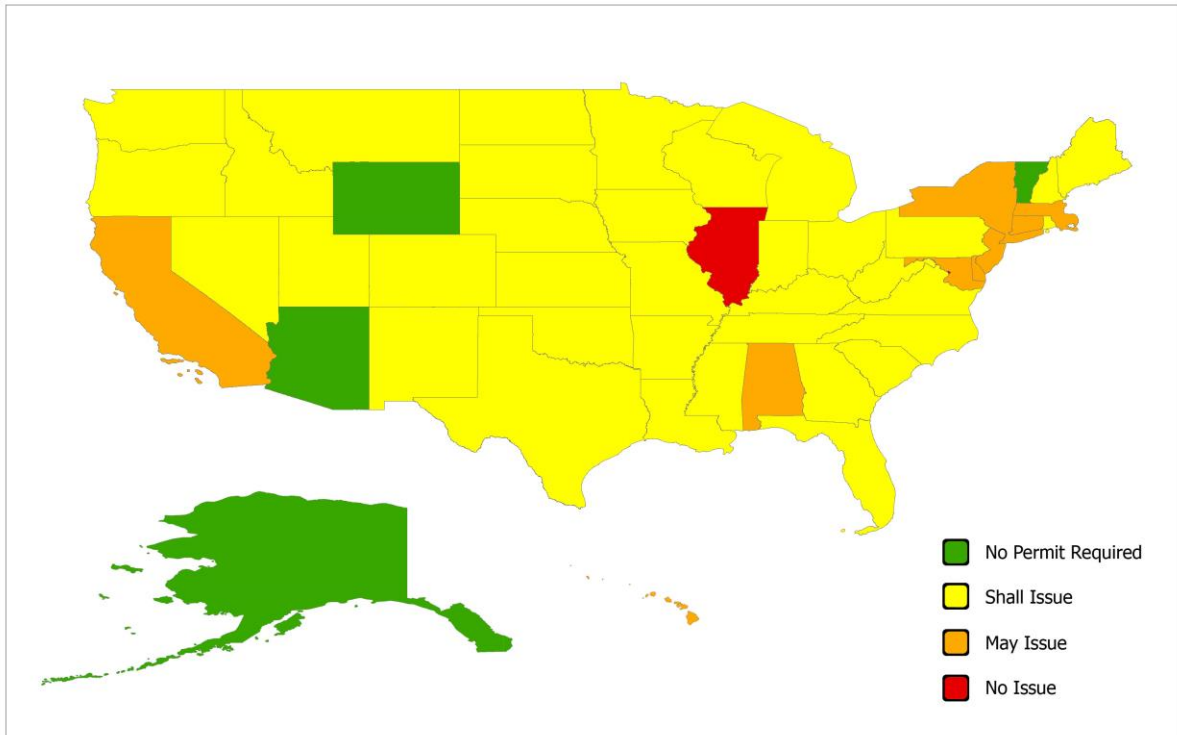
$Y_i$  is the proportion of voters (out of 100) in county  $i$  voting in favor of RTC.

**Table 3: Concealed Weapon Permit Demand**  
**Dependent Variable = % of POPULATION WITH PERMIT =  $\ln[P_i/(1 - P_i)]$**

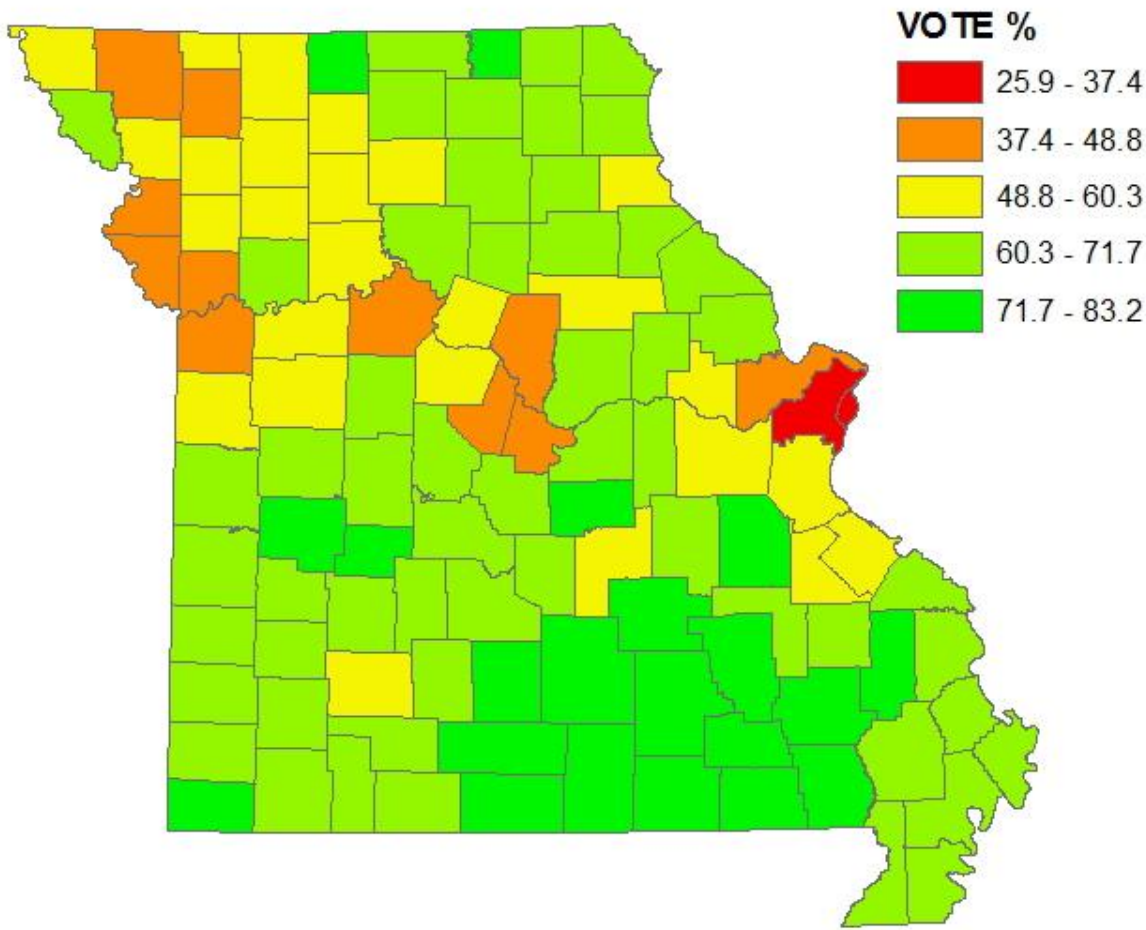
	(1)	(2)	(3)	(4)
Variable	Coefficient (T-statistic)	Marginal Effect	Coefficient (T-statistic)	Marginal Effect
<u>Demographic Characteristics:</u>				
MALE	200.999 (0.75)	0.025	433.176*** (2.61)	0.081
BLACK	1.393 (1.01)	0.017	0.196 (0.23)	0.004
HISPANIC	-4.551* (-1.70)	-0.054	-2.342 (-1.33)	-0.041
AGE65	1.073 (0.34)	0.013	-1.973 (-1.27)	-0.036
MARRIED	1.494 (0.37)	0.018	5.777*** (5.46)	0.109
UNDER18	0.041 (0.03)	0.001	-1.101 (-1.00)	-0.020
VETS	0.964 (0.36)	0.012	3.401** (2.38)	0.064
<u>Education and Income:</u>				
NOHS	-2.600 (-0.67)	-0.031	1.545* (1.92)	0.029
COLLDEG	3.157** (2.47)	0.039	2.161** (2.40)	0.040
MEDINC	0.003 (0.96)	0.037	-0.0004 (-0.63)	0.007
<u>Other Variables:</u>				
VIOLENT01	-0.054 (-0.99)	-0.065	0.004 (0.25)	0.007
PROPERTY01	0.012* (1.95)	0.015	0.006** (2.11)	0.012
POPDENS	0.005 (0.24)	0.0001	-0.013 (-1.34)	0.0002
DEM	3.998 (1.39)	0.005	0.906 (1.56)	0.0002
CONSTANT	-13.316*** (-3.81)	----	-9.912*** (-6.23)	----
$\hat{y}_i$	8.139 (1.10)	0.103	----	----
N	115		115	
Adjusted R <sup>2</sup>	0.4122		0.4115	
* $\alpha < 0.10$ ** $\alpha < 0.05$ *** $\alpha < 0.01$				

$P_i$  is the proportion of voters (out of 100) in county  $i$  voting in favor of RTC.

**Figure 1**  
**Right-to-Carry Laws in the United States**



**Figure 2**  
**The Missouri RTC Referendum**



**Figure 3**  
**Concealed Weapons Permits per 1,000 Population**

