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Unintended consequence of Proposition 47 on DUI – Evidence from Los Angeles

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Abstract

This study investigates the impact of Proposition 47 on driving under influence (DUI) related to drugs within Los Angeles. Results of interrupted time series analysis as well as event study and difference-in-difference analyses indicate a short-term increase in DUI related to drugs to be an unintended consequence of this proposition. In the longer term, there appears to be a declining trend in DUI related to drugs, however, it does not go back to levels that existed prior to the enactment of the proposition. The absence of such trends for DUI related to alcohol corroborate the results.

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1. Introduction

Proposition 47 (hereafter Prop-47), also known as "The Safe Neighborhoods and Schools" Act came into effect on November 5, 2014 after being approved by voters of the State of California. One of three main changes imparted by this referendum was the re-classification of certain non-violent theft and drug possession offenses from felonies to misdemeanors[2]. While Prop-47 was enacted in order to reduce California's prison population, it is possible that a lower penalty for drug possession is likely to increase drug sale and consumption by lowering the cost (or increasing the net benefit) of drug possession. In Becker (1968)'s model, a criminal act is preferred and chosen if the expected benefits exceed the expected costs of committing it. This, in turn, is likely to affect incidents of driving-under-influence (DUI) related to drugs. The current study aims to investigate the unintended impact that Prop-47 may have on DUI related to drugs in Los Angeles.

According to the Center for Disease Control[3], 1.8% – amounting to 471,589 – California drivers reported getting behind the wheel while being under influence. Further, according to the California Office of Traffic Safety Annual Report for 2017[4], DUI injuries and fatalities in California increased by more than 9% and 17%, respectively, in 2016 compared to the previous year. Such accidents and fatalities lead to property damage, impairments as well as loss of life. Therefore, it is crucial to consider the impact that policies such as Prop-47 may have on DUI related to drugs by altering the incentive for drug possession. Such analysis will be informative in implementing additional measures to counteract any unintended negative effect of such policies on DUI. With majority of the DUI fatal injuries – ranging between 11% - 13% – in California occurring within Los Angeles county renders it as a significant area for studying the impact of Prop-47 on DUI related to drugs.

While studies investigate the impact of Prop-47 on crime rates as well as on racial disparities in arrests (Mooney et. al. (2018), Lofstrom et. al. (2020)), the literature lacks studies exploring the consequences of this proposition on incidents of DUI driving related to drugs. These studies found overall substantial declines in booked arrests. According to Crodelle et. al. (2021)'s study within Santa Monica, CA, reclassified crimes increased city-wide after enactment of Proposition 47 while reported non-reclassified crimes decreased. A decrease in arrest for drug possession could potentially serve as an incentive to increased drug use. The current study proposes to investigate the unintended consequence of Prop-47 on DUI related to drugs in Los Angeles.

The remainder of the paper is organized as follows. Section 2 describes the data, section 3 discusses methodology, section 4 discusses the results, and section 5 concludes.

2. Data Description

Incident-level data on driving under influence was obtained from arrest data provided by Los Angeles Police Department via City of Los Angeles' open data portal and crime data provided by Los Angeles Sheriff Department for unincorporated counties of Los Angeles. Only incidents that were unambiguously identified as DUI related to drugs (DUI-drug) and DUI related to alcohol

[2] https://www.courts.ca.gov/prop47.htm
[3] https://www.cdc.gov/motorvehiclesafety/pdf/impaired_driving/drunk_driving_in_ca.pdf
[4] https://www.ots.ca.gov/media-and-research/publications-and-reports/

(DUI-alcohol) were included in the analysis. The data was aggregated by month and zipcode. Annual zipcode-level population estimates were obtained from American Community Survey. The period of study includes 4 years before and 3 years after the passage of Prop-47. Table ((I) provides summary statistics of these variables.

Table I: Summary Statistics for Total Arrests for DUIs by Category

	Mean	Standard Deviation	Minimum	Maximum
DUI-Drugs	0.300	0.826	0	19
DUI-Alcohol	6.728	7.864	0	92
Number of Observations: 15,449				

3. Empirical Methodology

First, in order to estimate and compare the immediate and long-term effects of Proposition 47 on DUI-drug, an interrupted time-series analysis (ITSA) for the time span of Jan-2010 through Dec-2017 is performed as follows:

$$y_t = \beta_0 + \beta_1 T_t + \beta_2 Prop47_t + \beta_3 Prop47T_t + \varepsilon_t \ \ldots (1)$$

where y_t is the number of DUI-drug incidents for month *t*, T_t is the linear time-trend, $Prop47$ is a dummy variable that takes the value 1 for November 14 or later and 0 otherwise, the fourth term is an interaction term.

Next, to investigate the dynamic effects of Prop-47 at the zipcode level for the time span of Oct-2013 through Dec-2017, a monthly event-study specification is used as follows:

$$y_{zty} = \beta_q \sum_{q=-10, q\neq -1}^{40} Prop47_{zqy} + \vartheta_t + \mu_z + \varepsilon_{zty} \ \ldots (2)$$

where y_{zty} as the number of DUI-drug incidents for zipcode, *z*, in month, *t*, and year, *y*; $Prop47_{zqy}$ is a set of dummy variables that equal one in each month before and after Prop-47 came into effect. November is represented by $q = 0$ since the proposition came into effect on November 2014 (month 11). The month before Prop47 came in effect, that is, $q = -1$, is excluded from the analysis as the baseline period. ϑ_t represents month-by-year fixed effects to account for seasonality; and μ_z represents zipcode fixed effects. Standard errors are clustered at the zipcode level and population is used as weights.

While the event study analysis captures the time-varying effect of the proposition, it does not measure the average effect over the post-Prop-47 period. Thus, I employ a difference-in-differences (DID) design that uses Jan-2013 – Oct-2014 monthly zipcode-level DUI incidents as the comparison group for monthly zipcode-level crimes for Nov-2014 – Dec-2015[5]. The differences in these treatment and control months prior to and after November 2014 when the proposition came into effect is estimated. The identifying assumption underlying this approach is that changes in the number of drug-related DUI arrests in the comparison months provide a good counterfactual for the changes that would have been observed in the absence of the enactment of Proposition 47. It is important to note that a shorter time frame is used for DID analysis to minimize the impact of the bias that may emanate from long pre and post treatment series (see Bertrand, et. al. 2004). The following equation is estimated using Ordinary Least Squares (OLS):

$$y_{zty} = \beta_0 + \beta_1 PostProp47 + \vartheta_t + \mu_z + \varepsilon_{zty} \ \ldots (3)$$

[5] Incident level data is aggregated by month.

where subscripts z and t, variables y, ϑ, and μ are same as in equation (2); *PostProp47* is a dummy variable that takes the value 1 for November 2014 or later and 0 otherwise; population for each zipcode are used as weights and standard errors are clustered at zipcode. This analysis is repeated for the longer series (2011-2017) as a robustness check. Additionally, equation (3) is also estimated using a Negative Binomial (NegBin) regression analysis since there is overdispersion, that is, standard deviation is greater than the mean.

As robustness check, all of the above analyses are repeated with DUI-alcohol as the dependent variable since Prop-47 did not include any provisions related to alcohol.

4. Discussion of Results

Results of ITSA based on equation (1), exhibited in column (1) of Table (II), suggest that DUI-drug incidents increased significantly every month prior to November 2014 by 1.11. Immediately after Prop-47 came into effect, the number of DUI-drug incidents increased by 40.65, followed by a decline in long term trend of 1.78 per month. Such conclusion cannot be claimed for DUI-alcohol.

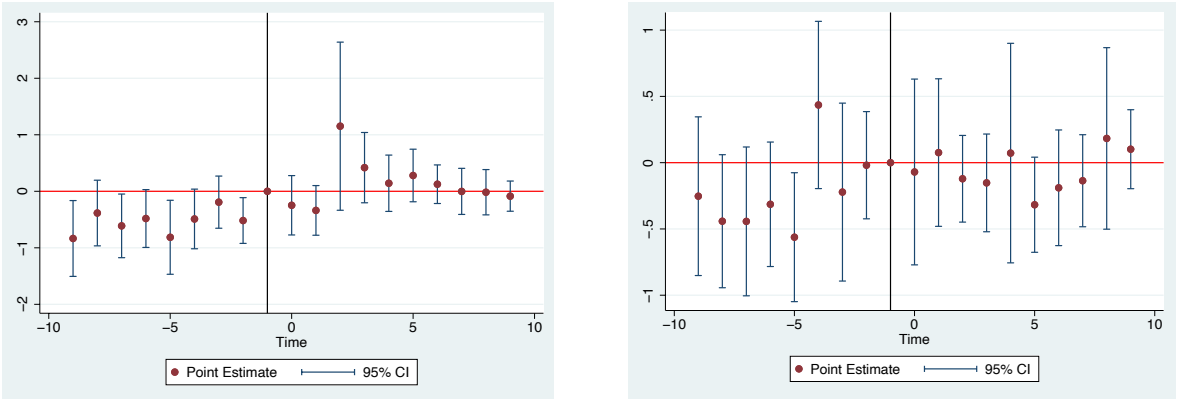
Table II: Prop 47 Effects on DUI in Los Angeles, January 2010 – December 2017

	DUI-Drug (1)	DUI-Alcohol (2)
Pre-Trend	1.110***	-0.183
	(0.192)	(0.111)
Immediate Effect	40.65***	3.811
	(9.094)	(5.500)
Post-Trend	-1.781***	0.013
	(0.307)	(0.247)
Intercept	-7.432*	130.067
	(4.163)	(3.491)
Observations	96	

Note: *** p < 0.001, ** p < 0.05, * p < 0.01; Newey-West standard errors in bracket

Event study analysis for zipcodes in equation (2), demonstrated in figure (1a), presents the trends in the outcome variable before and after the enactment of Prop-47. In order for the identifying assumption to be valid, the treated and control groups should follow parallel trends in the outcomes of interest had Prop-47 not been introduced. Based on the results of the event study, it is possible to conclude that there is no evidence of differential pre-trends. There was an increase in DUI-drug upon enactment of Prop-47, followed by a downward trend. However, the decrease did not lower DUI-drug incidents to pre-Prop-47 levels. Evidently, as seen in figure (1b), since Prop-47 did not include any alcohol related changes, DUI-alcohol does not exhibit any significant difference pre and post Prop-47, lending support to the hypothesis that Prop-47 incentivized drug use and consequently, DUI.

Figure 1: Event Study Analysis



(a) DUI-Drug (b) DUI-Alcohol

Note: Each figure plots monthly coefficients of interest and their 95% confidence interval, from equation 2, for each type of DUI. The vertical line represents the month prior to enactment of Prop-47.

Results of the difference-in-difference analysis across zipcodes within Los Angeles, based on equation (3), is exhibited in Table (III). Both OLS and Negative Binomial specification in columns (1) and (3), respectively, provide further evidence to what is demonstrated by the event study analysis. An additional advantage of difference-in-difference analysis is that the coefficients reflect a relatively more straightforward interpretation of the magnitude of the increase in DUI-drug. DUI-drug incidents increased by 0.509 after Prop-47 came into effect implying a 102.2% increase, given the pre-Prop-47 mean of 0.498.

Table III: Difference-in-Difference specification

	DUI Drugs				DUI Alcohol			
	OLS	OLS	NegBin	NegBin	OLS	OLS	NegBin	NegBin
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1(PostProp47)	0.509***	0.397*	0.483***	0.319***	0.208	0.158	0.121	0.083
	(0.200)	(0.213)	(0.142)	(0.134)	(0.219)	(0.194)	(0.115)	(0.102)
R^2	0.469	0.435			0.617	0.615		
Observations	4,270	7,855	4,270	7,855	4,270	7,855	4,270	7,855
Pre-Prop47 Mean	0.498				7.538			

Note: Cluster robust standard errors; *** p < 0.001, ** p < 0.05, * p < 0.01; Dependent variable is the number of arrests

Based on columns 5 and 7 in Table (III), it can be said that there was no significant impact of Prop-47 on DUI-alcohol. Therefore, it can be concluded that enactment of Prop-47 contributed to the increase in DUI-drugs. These results remain stable when including the entire time span (2011-2017) in the analysis, as shown in columns 2, 4, 6 and 8 of table (III). Enactment of Prop-47 altered the incentive for drug possession by lowering its penalty, thereby, increasing drug use and consequently DUI related to drugs.

5. Conclusion

Driving under influence is a serious concern in society as it can lead to life-threatening incidents, including impairments and fatalities as well as property damage. This paper studies the

unintended consequence of Prop-47 on DUI-drugs in Los Angeles between January 2010 and December 2017. Results indicate a short-term increase in DUI-drugs to be an unintended consequence of this proposition which was originally intended to reduce California's prison population. In the longer term, the study finds a decreasing trend in DUI related to drugs. However, it does not go back to pre-Prop-47 level. Based on these results, it can be recommended that policies relating to criminal justice be implemented after evaluating such unintended consequences to maximize the benefit and minimize any unintended cost of these policies. Future studies investigating the impact of Prop-47 on traffic fatalities caused by DUI-drugs would be a natural next step.

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