Article

One Small Problem with Administrative Driver's License Suspension Laws: They Don't Reduce Drunken Driving

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I. INTRODUCTION

The advent of the automobile brought with it the need to regulate drunken driving. The first documented drunken driving conviction is traced to London cab driver George Smith who on September 10, 1897, drove his taxi into the front entrance of a building after drinking "two or three glasses of beer."[1] Today there are more than one billion registered automobiles worldwide and nearly 240 million in the United States alone.[2] An alcohol related automobile crash injures someone every two minutes[3] and kills someone every fifty-three minutes.[4] In the United States, drunken driving accounts for one-third of all automobile crash fatalities, and on average kills 11,000 people annually.[5] The number of fatalities involving an alcohol-impaired driver with a blood alcohol concentration ("BAC") of .08 grams per deciliter (g/dl) or greater reached 9,967 in 2014.[6] The economic and societal cost of drunken driving is estimated at $201.1 billion dollars each year,[7] with medical cost alone exceeding $23 billion dollars annually.[8]

1. PATRICK ROBERTSON, THE NEW SHELL BOOK OF FIRSTS 232 (1995). England's Licensing Act of 1872 made it an offense to be "drunk in charge on any highway or other public place of any carriage, horse, cattle or steam engine." *Id.* England's courts interpreted "carriage" to include automobiles. *Id.* at 232-233.

2. John Sousanis, *World Vehicle Population Tops 1 Billion Units*, WARDS AUTO (Aug. 15, 2011), http://wardsauto.com/news-analysis/world-vehicle-population-tops-1-billion-units.

3. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., NAT'L CTR. FOR STATISTICS & ANALYSIS, DOT HS 809 606, TRAFFIC SAFETY FACTS 2002: ALCOHOL (2002), *available at* http://www-nrd.nhtsa.dot.gov/Pubs/2002alcfacts.pdf.

4. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., NAT'L CTR. FOR STATISTICS & ANALYSIS, DOT HS 812 231, ALCOHOL-IMPAIRED DRIVING: 2014 DATA (2015), *available at* http://www-nrd.nhtsa.dot.gov/Pubs/812231.pdf [hereinafter *2014 Data*].

5. *Id.* at 1, 2. In 2014, there were 11,231 fatalities involving a driver with a BAC of .01 or greater. *Id.* at 5.

6. *Id.* at 1.

7. *Id.* at 2.

8. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DOT HS 812 013, THE ECONOMIC AND

A national campaign against drunken driving was launched in the early 1980s and included the formation of Mothers Against Drunk Driving ("MADD"), creation of the President's Commission on Drunk Driving, passage of the Alcohol Traffic Safety Act of 1983, a national mass media campaign, and adoption of 729 state-level laws pertaining to DUI.[9] These governmental and private efforts led to a reduction in drunken driving nationwide with the greatest declines occurring in 1982 and 1983.[10] At the federal level, Congress acted by passing the Drunk Driving Prevention Act ("DDPA") in 1988.[11] The DDPA encouraged states to implement anti-DUI polices such as check point saturation patrols, lower permissible BAC, increased punishment for high risk drivers, DUI courts, underage drinking programs, and administrative license suspension[12] ("ALS") laws in exchange for federal grant money.[13]

Since 1982, these initiatives reduced the annual number of driver fatalities with BAC of at least .08 by 54%.[14] Fatalities of "hardcore" drunken drivers,[15] those with a BAC of .15 or higher, have also seen substantial declines.[16] However, the progress began to slow and plateaued in the mid-1990s.[17] This left the states seeking new and innovative methods

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SOCIETAL IMPACT OF MOTOR VEHICLE CRASHES, 2010 (REVISED) i, 2, 5, 11 (2015), *available at* http://www-nrd.nhtsa.dot.gov/pubs/812013.pdf.

9. *See generally* William N. Evans, Doreen Neville & John D. Graham, *General Deterrence of Drunk Driving: Evaluation of Recent American Policies*, 11 RISK ANALYSIS 279, 279-289 (1991).

10. Paul L. Zador, Adrian K. Lund, Michele Fields & Karen Weinburg, *Fatal Crash Involvement and Laws Against Alcohol-Impaired Driving*, 10 J. PUB. HEALTH POL'Y 467, 480 tbl.5 (1989).

11. Drunk Driving Prevention Act of 1988, Pub. L. No. 100-690, 102 Stat. 4521 (repealed 2012).

12. Many state statutes and the literature on the subject refer to these laws as administrative license revocation statutes. For simplicity, this article refers to these laws collectively as administrative license suspension (ALS) laws.

13. 102 Stat. at 4521-24.

14. *See Fatality Facts: Alcohol-impaired driving (2013)*, INS. INST. HIGHWAY SAFETY, http://www.iihs.org/iihs/topics/t/alcohol-impaired-driving/fatalityfacts/alcohol-impaired-driving (last visited Jan. 10, 2016) [hereinafter *2013 Fatality Facts*]; *Alcohol-Related Traffic Deaths*, NAT'L INSTS. HEALTH, https://report.nih.gov/NIHfactsheets/ViewFactSheet.aspx?csid=24 (last updated Mar. 29, 2013).

15. The term "hardcore" drunken driver is used in the literature to identify "those who drive with a high blood alcohol concentration of .15 percent or above; or who drive repeatedly with a .08 or greater BAC, as demonstrated by having more than one impaired driving arrest; and who are highly resistant to changing their behavior despite previous sanctions, treatment or education." *Hardcore Drunk Driving Judicial Guide: A Resource Outlining Judicial Challenges, Effective Strategies and Model Programs (2d. ed.)*, NAT'L ASSOC. STATE JUDICIAL EDUCATORS, http://responsibility.org/wp-content/uploads/2015/02/HCDD_JudicialGuide.pdf (last visited Jan. 10, 2016).

16. *See 2013 Fatality Facts*, *supra* note 14.

17. *Id.*; *see also* HSIAO-YE YI, GERALD D. WILLIAMS & MARY C. DUFOUR, NAT'L INST. ON ALCOHOL ABUSE & ALCOHOLISM, SURVEILLANCE REPORT NO. 61, TRENDS IN ALCOHOL-RE-

of reducing drunken driving. Policies designed to catch drunken drivers in the act are not optimal since it is estimated the typical first time DUI offender has driven drunk eighty times before being apprehended behind the wheel.[18] Policies that deter drunken driving are considered ideal since they dissuade potential offenders from getting behind the wheel in the first place.[19]

ALS laws are largely an American and Canadian development[20] and are in place in forty-one U.S. states, Washington, D.C.,[21] and all Canadian provinces and territories.[22] The first ALS laws were passed in the United States in the 1970s.[23] These laws come with "theoretical and common sense expectations" that they reduce drunken driving.[24] The effectiveness of ALS laws in reducing drunken driving is an empirical question; however, the literature on their effectiveness reveals inconsistent findings. Stakeholders charged with reducing drunken driving propagandize the findings supporting their position while ignoring the contrary literature. For example, the Insurance Institute for Highway Safety ("IIHS") reports that ALS laws reduce drunken driving by 5% to 9%[25] and MADD publicizes that ALS laws reduce drunken driving by 9%.[26] The National Transportation Safety Board ("NTSB") also reports

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LATED FATAL TRAFFIC ACCIDENTS, UNITED STATES, 1977-2000 (2002); NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DOT HS 811 727, COUNTERMEASURES THAT WORK: A HIGHWAY SAFETY COUNTERMEASURE GUIDE FOR STATE HIGHWAY SAFETY OFFICES, SEVENTH EDITION, 2013 (2013), *available at* http://www.nhtsa.gov/staticfiles/nti/pdf/811727.pdf [hereinafter COUNTERMEASURES].

18. Gwen Bergen, et al., *Publicized Sobriety Checkpoint Programs*, 46 AM. J. PREVENTIVE MED. 529, 530 (2014) (in 2010, CDC estimated there were 112 million episodes of drunk driving, and FBI estimated there were 1,412,223 arrests for driving under the influence).

19. Davis W. Soole, Narelle L. Haworth & Barry C. Watson, *Immediate license suspension to deter high-risk behaviours*, 2008 JOINT AUSTRALASIAN C. ROAD SAFETY-TRAVELSAFE NAT'L CONF. 163, 166, *available at* http://eprints.qut.edu.au/15397/1/15397.pdf.

20. *See id.*

21. *Alcohol-impaired driving—DUI/DWI*, INS. INST. HIGHWAY SAFETY, http://www.iihs.org/iihs/topics/laws/dui (last updated Jan. 2016) [hereinafter *DUI/DWI*].

22. John Helis, *Canada's Blood Alcohol Laws—An International Perspective*, CANADA SAFETY COUNCIL, Apr. 2009, at 4-7, *available at* https://canadasafetycouncil.org/sites/default/files/PDF_en/bac-update-09_0.pdf.

23. Alexander C. Wagenaar & Mildred M. Maldonado-Molina, *Effects of Drivers' License Suspension Policies on Alcohol-Related Crash Involvement: Long-Term Follow-Up in Forty-Six States*, 31 ALCOHOLISM: CLINICAL & EXPERIMENTAL RES. 1399, 1402 tbl.1 (2007).

24. H. Laurence Ross, *Deterring Drunken Driving: An Analysis of Current Efforts*, 1985 J. STUD. ON ALCOHOL (Supp. 10) 122, 126.

25. *Q&As—Administrative License Suspension*, INS. INST. HIGHWAY SAFETY, http://www.iihs.org/iihs/topics/t/alcohol-impaired-driving/qanda#alcohol—administrative-license-suspension (follow "4. How effective are ALS laws?" hyperlink) (last updated Apr. 2015) [hereinafter *Q&As*].

26. *Administrative License Revocation*, MADD, http://www.madd.org/laws/law-overview/Administrative_License_Revocation_Overview.pdf (last updated June 2012).

ALS laws are responsible for a decline in drunken driving of 5% to 9%,[27] while the National Highway Traffic Safety Administration ("NHTSA") declares the reduction is actually between 9% and 12%.[28] NHTSA identifies 35 private companies, special interest groups, and governmental agencies that support ALS laws.[29] Numerous stakeholders in the war on drunken driving report positive findings associated with ALS laws.[30] Yet, these proponents of ALS laws fail to acknowledge the equivalent body of literature finding ALS laws to be ineffective.

A closer examination of the literature urged on the public and politicians reveals that most of the research is flawed methodologically. Moreover, scholarly journals show bias towards publishing research showing DUI deterrence policies to be effective, and also, publishing major findings.[31] These influences have created a widespread belief that ALS laws are an effective deterrent of drunken driving and are directly responsible for reducing drunken driving. This article posits that ALS laws are not an effective deterrent to drunken driving, which is evident by their failure to reduce drunken driving after their effective dates.

Part II of this paper discusses deterrence theory in general and the effectiveness of specific drunken driving deterrence policies. Part III reviews prior research on the effectiveness of ALS laws in reducing drunken driving. Part IV provides an overview of this paper's empirical research. Part V explains the methods and statistical analyses employed. Part VI presents the results of the analyses. Part VII discusses the findings, and finally, Part VIII concludes the paper.

II. Deterring Drunken Drivers

Before considering whether ALS laws are a deterrent, it is necessary

27. Nat'l Transp. Safety Bd., NTSB/SR-13/01, Reaching Zero: Actions to Eliminate Alcohol-Impaired Driving 27 (2013), *availabe at* http://www.ntsb.gov/safety/safety-studies/Documents/SR1301.pdf.

28. Nat'l Highway Traffic Safety Admin., DOT HS 810 878, Traffic Safety Facts: Administrative License Revocation 1 (2008) [hereinafter 2008 Traffic Safety Facts].

29. Nat'l Highway Traffic Safety Admin., Traffic Safety Facts: Administrative License Revocation 2-3 (2004), *available at* http://www.ems.gov/pdf/Laws-ALR.pdf.

30. *See generally* Advocates for Highway & Auto Safety, Stuck in Neutral: Recommendations for Shifting the Highway and Auto Safety Agenda into High Gear (2001); *see also License Suspension/Revocation*, AAA DUI Justice Link, http://duijusticelink.aaa.com/issues/sanctions/administrative-license-suspensionrevocation-alr-judicial-license-suspensionrevocation (last visited Jan. 23, 2016).

31. Alexander C. Wagenaar, Terry S. Zobeck, Gerald D. Williams & Ralph Hingson, *Methods Used in Studies of Drink-Drive Control Efforts: A Meta-Analysis of the Literature From 1960 to 1991*, 27 Accident Analysis & Prevention 307, 312 (1995). *See generally* Duncan Lindsey, The Scientific Publication System in Social Science: A Study of the Operation of Leading Professional Journals in Psychology, Sociology, and Social Work (1978).

to understand the principles of deterrence theory and its limitations. Criminal laws seek to control conduct society deems harmful by punishing offenders and providing methods of retribution, rehabilitation, incapacitation, and deterrence of crime.[32] Deterrence, "the preventive effect which actual or threatened punishment of offenders has upon potential offenders,"[33] is "at the heart of criminal law."[34] Society is served best by criminal laws deterring "the harm from taking place in the first instance .... To accomplish this end, the offender must expect that the cost of the crime committed will exceed its benefit."[35] In general, the research concludes that drunken driving is a crime that can be deterred through appropriate policies.[36]

Deterrence policies are either specific or general. Specific deterrence policies seek to deter offenders from repeating their conduct after apprehension.[37] Specific deterrents for repeat DUI offenders include enhanced jail sentences,[38] electronic monitoring,[39] DUI courts,[40] ignition interlocks,[41] and others.[42] While these policies are effective, specific deterrence in the DUI arena is not optimal; punishing a drunken driver after a fatal crash does not provide the protection the public expects.

In contrast, general deterrence is designed to discourage the citi-

32. Darren Bush, *Law and Economics of Restorative Justice: Why Restorative Justice Cannot and Should Not be Solely About Restoration*, 2003 UTAH L. REV. 439, 452-455 (2003).

33. John C. Ball, *The Deterrence Concept in Criminology and Law*, 46 J. CRIM. L. & CRIMINOLOGY 347, 347 (1955).

34. Jerome S. Legge, Jr. & Joonghoon Park, *Policies to Reduce Alcohol-Impaired Driving: Evaluating Elements of Deterrence*, 75 SOC. SCI. Q. 594, 595 (1994) (citing FRANKLIN E. ZIMRING & GORDON J. HAWKINS, DETERRENCE: THE LEGAL THREAT IN CRIME CONTROL (1973)).

35. Bush, *supra* note 32 at 450. Deterrence theory is typically credited to philosophers Cesare Beccaria and Jeremy Bentham. *See generally* Cesare Beccaria, ON CRIMES AND PUNISHMENTS (1963); Jeremy Bentham, THE WORKS OF JEREMY BENTHAM VOL. I (1843); Jeremy Bentham, AN INTRODUCTION TO THE PRINCIPLES OF MORALS AND LEGISLATION (1948).

36. Donald S. Kenkel, *Drinking, Driving, and Deterrence: The Effectiveness and Social Costs of Alternative Policies*, 36 J. L. & ECON. 877, 878 (1993).

37. James D. Stuart, *Deterrence, Desert, and Drunk Driving*, 3 PUB. AFF. Q. 105, 105 (1989).

38. COUNTERMEASURES, *supra* note 17, at 1-31. *See generally* Robert E. Mann et al., *Sentence Severity and the Drinking Driver: Relationships with Traffic Safety Outcome*, 23 ACCIDENT ANALYSIS & PREVENTION 483 (1991).

39. *See e.g.*, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DOT HS 807 571, USERS' GUIDE TO NEW APPROACHES AND SANCTIONS FOR MULTIPLE DWI OFFENDERS 31-34 (1989), *available at* http://ntl.bts.gov/lib/25000/25800/25820/DOT-HS-807-571.pdf.

40. *See e.g.*, JEFFREY TAUBER & C. WEST HUDDLESTON, III, NAT'L DRUG COURT INST., DUI/DRUG COURTS: DEFINING A NATIONAL STRATEGY 4 (1999), *available at* http://www.ndci.org/sites/default/files/nadcp/Mono1.DWI%20v2.pdf.

41. *See e.g,* Robert B. Voas et al., *The Alberta Interlock Program: the evaluation of a province-wide program on DUI recidivism*, 94 ADDICTION 1849, 1849-50 (1999).

42. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN. & NAT'L INST. ON ALCOHOL ABUSE & ALCOHOLISM, DOT HS 810 555, A GUIDE TO SENTENCING DWI OFFENDERS (2d ed. 2005), *available at* http://www.nhtsa.gov/people/injury/alcohol/dwioffenders/.

zenry from offending in the first place and is "considered to be the main social benefit of punishment."[43] General deterrence policies are only effective if potential offenders perceive the certainty, severity, and celerity of punishment to outweigh the benefit of the offense.[44] Severity of punishment is most effective when potential offenders perceive the anticipated punishment to outweigh the benefits of offending.[45] Certainty of punishment is realized when potential offenders believe there is a high probability of arrest, prosecution, and conviction.[46] Celerity of punishment indicates the offender understands punishment will be administered quickly after the offense is committed.[47] DUI deterrence policies attempt to increase the levels of these three components until maximum deterrence is achieved.

A. Efforts to Increase the Severity of Punishment

Policies increasing the severity of punishment for drunken drivers include mandatory minimum jail sentences and increased fines.[48] While mandatory jail sentences deter first time DUI offenders,[49] the literature finds that longer jail sentences provide little or no deterrent effect.[50] Typically, the public believes that increasing the severity of the punishment is the means to decreasing crime. However, "once the severity of punishment reaches a moderate level, increases in the severity of a penalty are unlikely to add significantly to its deterrent effect."[51] While tougher DUI sentencing has an initial deterrent effect, this effect quickly wears off and

43. Stuart, *supra* note 37, at 106.

44. Anne Schneider & Helen Ingram, *Behavioral Assumptions of Policy Tools*, 52 J. Pol. 510, 516 (1990).

45. Anthony N. Doob & Cheryl M. Webster, *Sentence Severity and Crime: Accepting the Null Hypothesis*, 30 Crime & Just. 143, 190 (2003).

46. Charles R. Tittle & Alan R. Rowe, *Certainty of Arrest and Crime Rates: A Further Test of the Deterrence Hypothesis*, 52 Soc. Forces 455, 456 (1974).

47. H. Laurence Ross, *Social Control Through Deterrence: Drinking-And-Driving Laws*, 10 Ann. Rev. Soc. 21, 25-26 (1984).

48. Legge, Jr. & Park, *supra* note 34 at 596; *see also* Ross, *supra* note 47, at 25-26.

49. Carol L. Falkowski, Nat'l Highway Traffic Safety Admin., DOT HS 806 839, The Impact of Two-day Jail Sentences for Drunk Drivers in Hennepin County, Minnesota 63 (1984); Zador et al., *supra* note 10, at 479-80; R.K. Jones et al., Nat'l Highway Traffic Safety Admin., DOT HS 807 325, Field Evaluation of Jail Sanctions for DWI 44 (1988), *available at* http://ntl.bts.gov/lib/25000/25800/25813/DOT-HS-807-325.pdf. *Contra* H. Laurence Ross, Richard McCleary & Gary LaFree, *Can mandatory Jail Laws Deter Drunk Driving? The Arizona Case*, 81 J. Crim. L. & Criminology 156, 157 (1990).

50. Legge, Jr. & Park, *supra* note 34, at 596.

51. Stuart, *supra* note 37, at 108. Stuart indicates that harsh sentences lead to a distortion of the criminal justice system. This means "as penalties increase in severity, a smaller percentage of those arrested are convicted, the number of jury trials increases and jails become so overcrowded that many accused of drunken driving are released."

the long-term benefit is discouraging.[52] State legislatures are faced with the reality that increasing the severity of punishment for DUI offenses is unlikely to further reduce drunken driving.

B. Efforts to Increase the Certainty of Punishment

Policies increasing the certainty of punishment include sobriety checkpoints, implied consent laws, and illegal *per se* statutes.[53] Illegal *per se* statutes criminalize the operation of a vehicle when a driver's BAC is over .08.[54] Illegal *per se* statues increase the public's perception that being arrested and convicted of DUI is more certain since the issue is resolved with a simple blood or breath test.[55] Illegal *per se* statutes have been highly effective in reducing drunken driving by increasing the certainty of conviction.[56]

Certainty of punishment is also increased by implied consent laws, which deem anyone operating an automobile on the public roads to consent to BAC testing.[57] New York adopted the first implied consent law in 1924.[58] By the early 1950s, forty-two states allowed the use of chemical tests to determine a driver's BAC.[59] By 1972, pursuant to a federal government mandate, all states had implemented implied consent laws.[60]

In contrast, post-conviction implied consent laws are ineffective in deterring drunk driving.[61] This is due to a lack of uniformity in the states, offenders knowing DUI conviction is less certain if the BAC test is re-

52. Ross, *supra* note 24, at 122.

53. *DUI/DWI*, *supra* note 21.

54. Ralph B. Taylor & Patrick McConnell, *BAC and Beer: Operationalizing Drunk Driving Laws in a Research Methods Course Exercise*, 29 Teaching Soc. 219, 220 (2001). "[I]f you are pulled over and breathalyzed and your blood alcohol content exceeds the maximum permitted in your state, you are per se guilty of drunk driving and subject to arrest. No guilty mind (mens rea) is required, nor is evidence that you were driving dangerously or poorly . . . Prior to the introduction of per se DUI laws, drunk driving arrests depended on subject driving behavior, demeanor during a traffic stop, and performance on field sobriety tests such as waking a straight line. In court, the defendant could contest the officer's description in each of these three areas. Per se laws were intended to render these disputes irrelevant." (citations omitted).

55. Legge, Jr. & Park, *supra* note 34, at 595-596.

56. Ross, *supra* note 47, at 21-35.

57. Nina J. Sines & John Ekman, *Double Jeopardy: A New Tool in the Arsenal of Drunk Driving Defenses*, 68 Wis. Law. 14, 15, 17 (1995).

58. Richard A. Shupe, *Constitutional Law: Validity of New York Statute Setting out Motorists Implied Consent to Chemical Tests for Intoxication*, 51 Mich. L. Rev. 1195, 1196 n.1 (1953).

59. *Id.* at 1196.

60. Tina W. Cafaro, *Fixing The Fatal Flaws in OUI Implied Consent Laws*, 34 J. Legis. 99, 104, 122 n.42 (2008) (asserting that a federal mandate came in the National Uniform Standards for State Highway Safety Programs issued by the Secretary of the U.S. Department of Transportation).

61. Mann et al., *supra* note 38, at 489.

fused, and many states simply allow first offenders to refuse the test.[62] By refusing the BAC test request, offenders may be able to frustrate their DUI prosecution.[63] Nationally, NHTSA estimates 22.4% of all DUI offenders refuse the test.[64] NHTSA reports high refusal rates in nearly all states, with rates as high as 81% in New Hampshire,[65] and a staggering 84.9% in Rhode Island.[66] NHTSA sums the situation up as follows:

> Generally, if a person refuses the BAC test, that person is more likely to contest the case. The lack of BAC test results clouds the case just enough to give the defense an advantage it does not have when there are test results. Defense attorneys usually attack the police reports and the behavioral cues reported by the officer or trooper. Without a BAC test, these reported cues are the only evidence the state has of the person's intoxication at the time of arrest.[67]

ALS laws are another method of increasing the certainty of punishment. License suspension becomes a near certainty once it is removed from the judicial process and assigned to an administrative process.[68]

C. Efforts to Increase the Celerity of Punishment

Policies authorizing administrative action, such as vehicle seizure,[69]

62. Cafaro, *supra* note 60, at 110-112. All states provide license suspension for refusing a BAC test request. Suspensions range from 90 days to 18 months. Some states provide no driving privileges during the suspension period, others provide for "hardship" licenses to attend work, church and school. Some states provide incentive for offenders to submit to BAC testing such as making it a criminal offense for refusal, providing civil penalties for refusal, admitting the refusal into evidence at the underlying DUI trial and in some instances at civil trials. Since punishment varies from state to state, DUI offenders cannot balance the risk of punishment against their refusal. *See generally* Nat'l Highway Traffic Safety Admin., DOT HS 810 884W, Traffic Safety Facts: Blood Alcohol Concentration Test Refusal Laws (2008), *available at* http://www.nhtsa.gov/DOT/NHTSA/Communication%20&%20Consumer%20Information/Articles/Associated%20Files/810884.pdf [hereinafter BAC Test Refusal Laws].

63. Cafaro, *supra* note 60, at 110-112.

64. A. Berning et al., Nat'l Highway Traffic Safety Admin., DOT HS 811 098, Refusal of Intoxication Testing: A Report to Congress 5, 9, 18 (2008), *available at* http://www.nhtsa.gov/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/811098.pdf.

65. *Id.* at 5, 18.

66. T.J. Zwicker et al., Nat'l Highway Traffic Safety Admin., DOT HS 809 876, Breath Test Refusals in DWI Enforcement: An Interim Report 6 tbl.1 (2005), *available at* http://www.nhtsa.gov/staticfiles/nti/pdf/809876.pdf

67. *Id.* at 21.

68. Robert B. Voas, A. Scott Tippets & Eileen P. Taylor, *Impact of Ohio Administrative License Suspension*, 42 Ann. Proc. Assoc. for Advancement Automotive Med. 401, 401, 407 fig.2, 408 (1998).

69. B.M. Sweedler & K. Stewart, Nat'l Transp. Safety Bd., Vehicle Sanctions: An Effective Means to Reduce Impaired Driving 1 (2000), available at http://www.icadtsinternational.com/files/documents/2000_128.pdf.

vehicle and license plate impoundment,[70] and ALS laws,[71] operate quicker than the judicial system and increase the celerity of punishment. ALS laws are "intended to provide swift and certain license sanctions to impaired driving offenders who are lawfully apprehended and who are in violation of the impaired driving laws either through driving with a prohibited level of alcohol . . . or refusal to submit to a chemical test to determine the presence and level of the [alcohol]."[72] ALS laws authorize the immediate suspension of an offender's license as opposed to post-conviction laws, which may take years before the offender's license is suspended.[73]

The typical ALS law authorizes law enforcement to immediately confiscate the offender's driver's license when a BAC test is refused or failed.[74] The officer issues the offender a notice advising him of his hearing rights.[75] This notice serves as a temporary license until an administrative hearing.[76] If the offender does not request a hearing, his driving privileges are automatically suspended for a specified period.[77] If a hearing is requested, it can be conducted by a non-judicial-branch official.[78] This hearing is convened quickly and unrelated to the underlying DUI charge.[79] Early studies in Minnesota,[80] Iowa,[81] and New Mexico[82] indicated the celerity effect of ALS laws reduced drunken driving more effec-

70. David J. Deyoung, *An Evaluation of the Specific Deterrent Effect of Vehicle Impoundment on Suspended, Revoked and Unlicensed Drivers in California*, 31 ACCIDENT ANALYSIS & PREVENTION 45, 52 (1999).

71. Zador et al., *supra* note 10, at 468; *see also* TERRY M. KLEIN, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DOT HS 807-511, CHANGES IN ALCOHOL-INVOLVED FATAL CRASHES ASSOCIATED WITH TOUGHER STATE ALCOHOL LEGISLATION 28-29 (1989), *available at* http://ntl.bts.gov/lib/25000/25800/25805/DOT-HS-807-551.pdf.

72. JOHN H. LACEY, PAC. INST. FOR RES. & EVALUATION, ASSESSMENT OF HAWAII'S ADMINISTRATIVE DRIVER'S LICENSE REVOCATION PROCESS FOR DRIVING UNDER THE INFLUENCE 1 (2006).

73. Voas et al., *supra* note 68, at 401.

74. David G. Dargatis, *Put Down That Drink!: The Double Jeopardy Drunk Driving Defense is Not Going to Save You,* 81 IOWA L. REV. 775, 780 (1996).

75. Jeffrey S. Sheridan, *Revoke First, Ask Questions Later: Challenging Minnesota's Unconstitutional Pre-Hearing Revocation Scheme*, 31 WM. MITCHELL L. REV. 1461, 1476 (2005).

76. *Id.*

77. *Id.*

78. *Id.* at 1470.

79. Sines & Ekman, *supra* note 57, at 15-16.

80. Ross, *supra* note 24, at 126; NAT'L TRANSP. SAFETY BD., NTSB/SS-84/01, DETERRENCE OF DRUNK DRIVING: THE ROLE OF SOBRIETY CHECKPOINTS AND ADMINISTRATIVE LICENSE REVOCATIONS 11 (1984), *available at* http://www.ntsb.gov/safety/safety-studies/Documents/SS8401.pdf [hereinafter NTSB DETERRENCE].

81. NTSB DETERRENCE, *supra* note 80, at 11.

82. H. Laurence Ross, *Administrative License Revocation in New Mexico: An Evaluation*, 9 LAW & POL'Y 5, 5-6 (1987).

tively than other DUI policy initiatives and were promising.[83] NHTSA quickly became an advocate for ALS laws[84] and established a grant program encouraging states to implement ALS law.[85]

D. Limitations on Deterring Drunken Driving

There are limitations on deterring drunken driving. Research shows that DUI deterrent policies are most effective with moderate social drinkers and tend to be ineffective with hardcore problem drinkers.[86] ALS laws, like most DUI deterrence laws, are largely ineffective in deterring "hardcore" drunken drivers.[87] Alcohol is a highly addictive drug with a greater proclivity for dependence than LSD, marijuana, and amphetamines.[88] It is an addiction characterized by a preoccupation with alcohol, over consumption, and the development of tolerance to its effects.[89] Long-term use of alcohol likely alters neural function leaving those addicted to alcohol highly vulnerable to relapse when attempting to quit.[90] This is significant since it has been estimated that 54% of first offense DUI offenders regularly abuse alcohol and are referred to in the literature as either alcoholics or pre-alcoholics.[91] These hardcore drunken

83. Ross, *supra* note 47, at 25-26.

84. 2008 Traffic Safety Facts, *supra* note 28, at 1.

85. BAC Test Refusal Laws, *supra* note 62, at 2. To be eligible for these federal grants, the state's ALS program must provide a minimum 90-day suspension for first offense DUI and no restricted license can be issued during the first 15 days. *Id.* Second time offenders must suffer a one year suspension and no restricted license can issue during the first 45 days. *Id.* The suspension must occur within 30 days of refusing or failing the BAC test. *Id.*

86. David J. Houston & Lilliard E. Richardson, Jr., *Drinking-and-Driving in America: A Test of Behavioral Assumptions Underlying Public Policy*, 57 Pol. Res. Q. 53, 62-63 (2004); *see also* James Nichols & H. Laurence Ross, U.S. Dep't Health & Human Servs., *The Effectiveness of Legal Sanctions in Dealing with Drinking Drivers*, 1989 Surgeon General's Workshop on Drunk Driving: Background Papers 93, 100.

87. Houston & Richardson, Jr., *supra* note 86, at 55-56.

88. David Nutt et al., *Development of a Rational Scale to Assess the Harm of Drugs of Potential Misuse*, 369 Lancet 1047, 1050 (2007); David Nutt et al., *Drug Harms in the UK: A Multicriteria Decision Analysis*, 376 Lancet 1558, 1561 (2010).

89. Friedbert Weiss & Linda J. Porrino, *Behavioral Neurobiology of Alcohol Addiction: Recent Advances and Challenges*, 22 J. Neuroscience 3332, 3332 (2002).

90. *Id.* at 3334; Jennifer M. Mitchell et al., *Alcohol Consumption Induces Endogenous Opioid Release in the Human Orbitofrontal Cortes and Nucleus Accumbens*, 4 Sci. Translational Med. 116 (2012).

91. Eric W. Fine, Pascal Scoles & Michael Mulligan, *Under the Influence: Characteristics and Drinking Practices of Persons Arrested the First Time for Drunk Driving with Treatment Implications*, 90 Pub. Health Rep. 424, 426 (1975). Offenders typically fit into one of three categories: (1) individuals that typically drink socially once or twice per week and on average consume less than three quarts of beer, less than 6 shots of whiskey, or less than three water glasses filled with wine; (2) individuals frequently labeled "pre-alcoholics", that consume alcohol at least twice per week and on average consume either five quarts of beer, one fifth of wine, or two pints of liquor; and (3) individuals frequently referred to as "alcoholics", who consume five quarts of beer, or one fifth of wine, or three pints of liquor each day. *Id.*

drivers exhibit pathological behaviors not subject to deterrence.[92] Accordingly, frequent drunken drivers, those who report drinking and driving six or more times per year, are undeterred by anti-DUI measures.[93]

Before a potential drunken driver can be deterred, he must perceive an actual or moral benefit to avoiding the conduct.[94] These benefits fit into one of three categories: First, there is "mere deterrence", where the prospect of the specific punishment is contrary to one's self interest and that alone deters the conduct.[95] Second, there is "normative validation", where the act is perceived as morally wrong and the conduct is deterred.[96] Third, there is "socially mediated deterrence", where the act and resulting punishment are stigmatizing among the offender's friends, colleagues, employer, and peers, and the conduct is avoided.[97] These benefits are not present with hardcore drunken drivers who have a higher utility for their conduct, and therefore, willingly assume the risk of more severe, certain, and swift punishment.[98] Hardcore drunken drivers are also less likely connected to mainstream society, and therefore, assign little weight to the societal cost of their behavior.[99]

Additionally, people are deterred only to the extent they perceive the legal sanctions as severe, certain, and swift.[100] This assumes that potential offenders know something about the existence of the legal sanctions and process.[101] "In short, [an offender's] knowledge of [the] penalties logically precedes perceptions of the certainty and severity of

92. *Id.*

93. Houston & Richardson, Jr., *supra* note 86, at 57, 60. Deterrence measures are unnecessary for non-drunk drivers (non-sinners) because they tend to be "responsive to the authoritative or educational component of policy that teaches "the right thing to do." *Id.* at 56. On the other extreme, "hardcore" drunk drivers (frequent sinners) "derive a higher level of utility" from their conduct and some may be exhibiting pathological behavior. *Id.* at 55. "Hardcore" drunk drivers tend to be aware of governmental deterrence policies, but are likely to be the least responsive group to deterrents even when the cost is very high. *Id.* at 56. However, the group that falls between these extremes, occasional drunk drivers (occasional sinners), are aware of the governmental deterrence policies from their social groups. *Id.* Unlike "hardcore" drunk drivers, occasional drunk drivers are connected to mainstream society and are deterred by the treat of punishment and the potential shame it will bring. *Id.*

94. Michael Wenzel, *The Social Side of Sanctions: Personal and Social Norms as Moderators of Deterrence*, 28 Law & Hum. Behav. 547, 550 (2004).

95. *Id.*

96. *Id.*

97. *Id.*

98. Houston & Richardson, Jr., *supra* note 86, at 62-63.

99. *Id.* at 55.

100. Harold G. Grasmick & Donald E. Green, *Legal Punishment, Social Disapproval and Internalization as Inhibitors of Illegal Behavior*, 71 J. Crim. L. & Criminology 325, 326 (1980); H. Laurence Ross, Confronting Drunk Driver: Social Policy for Saving Lives 43-76 (1992).

101. Kirk R. Williams, Jack P. Gibbs & Maynard L. Erickson, *Public Knowledge of Statutory Penalties: The Extent and Basis of Accurate Perception*, 23 Pac. Soc. Rev. 105, 106 (1980).

penalties."[102] This does not mean the potential offender must have accurate knowledge of the penalties.[103] However, a potential offender must have at least some appreciation that the behavior is subject to punishment. Mass media campaigns effectively inform potential offenders of the consequences of drunken driving and they also stigmatize drunken driving by changing social norms.[104] On the national level, mass media campaigns through public service announcements have successfully educated the public about the risk of drunken driving.[105] These campaigns added terms like "designated driver" to the nation's vernacular and informed the public, "Friends don't let friends drive drunk."[106] Local efforts through newspaper, radio, and word of mouth, have also been highly effective in reducing DUI.[107] Anti-DUI campaigns targeting high school students have been particularly beneficial.[108] An analysis of high school based campaigns in Minnesota, Illinois, Massachusetts, and Maine revealed substantial reductions in teen alcohol related behaviors.[109]

In summary, two caveats apply to all DUI deterrence policies including ALS laws. First, even draconian levels of punishment will not deter all drunken driving. Some hardcore drunken drivers will always value the behavior greater than the punishment and will choose to offend. Second, there must be a corresponding effort to educate the public of the penalties for drunken driving before the public can weigh the risk of offending. If the public is not educated on the severity, certainty, and swiftness of the punishment, there will be no deterrent effect.

III. Prior Research

While there is a large body of literature on drunken driving deterrence policies, much of the research is flawed.[110] Studies on ALS laws are no exception, and there is far from a consensus in the literature that

102. Kirk R. Williams & Jack P. Gibbs, *Deterrence and Knowledge of Statutory Penalties*, 22 Soc. Q. 591, 591 (1981).

103. Williams et al., *supra* note 101, at 122.

104. William Dejong & Charles K. Atkin, *A Review of National Television PSA Campaigns for Preventing Alcohol-Impaired Driving, 1987-1992*, 16 J. Pub. Health Pol'y 59, 72 (1995).

105. *Id.* at 63.

106. *Id.* at 63, 65.

107. Roy E. L. Watson, *The Effectiveness of Increased Police Enforcement as a General Deterrent*, 20 L. & Soc'y Rev. 293, 299 (1986).

108. *Teen Drivers: Get the Facts*, Ctrs. for Disease Control & Prevention, http://www.cdc.gov/motorvehiclesafety/teen_drivers/teendrivers_factsheet.html (last updated Oct. 14, 2015) (explaining that automobile accidents are the leading cause of deaths among teens and approximately one-fourth of teen fatalities are alcohol related).

109. Kate Callen, *The Secretary's Conference for Youth on Drinking and Driving: Special Report*, 98 Pub. Health Rep. 336, 337-38 (1983).

110. Wagenaar et al., *supra* note 31, at 312. This meta-analysis identified 6500 peer reviewed/technical papers on drunken driving published between 1960 and 1991including 815 empirical

these laws reduce drunken driving. The majority of the literature fails to control for spurious variables such as other DUI sanctions and enforcement efforts, heterogeneity of the variables, data selection, public awareness, and methodology. Moreover, periods of decline in drunken driving are typically short-lived. Unfortunately, special interest groups and government agencies charged with reducing drunken driving tend to generalize findings supporting their positions and disregard contrary findings.[111] In addition, publicity by special interest groups, and the "theoretical and common sense expectations"[112] that ALS laws work, helps explain why these laws are presumed to be effective.

Studies of ALS laws tend to be either single jurisdictional using interrupted time series models or multijurisdictional using regression models and pooled cross-sectional data.[113] Early single jurisdictional studies typically failed to control for variables such as public awareness of the law, contemporaneous anti-DUI policies, and traffic conditions. Later multijurisdictional studies attempted to control for the numerous variables involved by considering cross sectional data. However, analysis of the literature demonstrates these multijurisdictional studies are tainted by omitted variable bias and are equally invalid. A limited number of more recent studies do a better job controlling for these deficiencies by using advanced statistical models, but these studies have also produced inconsistent findings.[114]

A. Single Jurisdictional Studies

Some of the earliest research, such as Ross' 1988 examination of New Mexico's ALS law, produced inconsistent results.[115] Ross' study considered self-reported data from law enforcement, judicial officers, and the public along with an analysis of alcohol involved fatalities from 1980 to 1986.[116] Ross found a 10% decline in alcohol involved crash fatalities

studies on DUI deterrence policies including ALS programs. *Id.* at 311. The authors determined only 125 of the studies used valid methodologies. *Id.*

111. *Q&As*, *supra* note 25; *see also* Mothers Against Drunk Driving, Administrative License Revocation (2012), *available at* http://www.madd.org/laws/law-overview/Administrative_License_Revocation_Overview.pdf.

112. Ross, *supra* note 24, at 126.

113. Wagenaar & Maldonado-Molina, *supra* note 23, at 1400.

114. Wagenaar and Maldonado-Molina used ARIMA models for forty-six states then pooled the ARIMA estimates from all states and analyzed using inverse variance weighting methods. *Id.* at 1401. Ruhm used econometrics derived from fixed effect models. Christopher J. Ruhm, *Alcohol Policies and Highway Vehicle Fatalities*, 15 J. Health Econ. 435, 442-46 (1996). Noland and Karlaftis contrasted a Poisson/negative binomial regression on counts and linear regression on expoposure rates. Robert B. Noland & Matthew G. Karlaftis, *Sensitivity of Crash Models to Alternative Specifications*, 41 Transp. Res., Part E, at 439, 445 (2005).

115. Ross, *supra* note 82, at 14.

116. *Id.* at 6.

in the first twenty months after the program's implementation, *but* the self-reported data indicated the public continued to drink and drive at the same levels as before the ALS law.[117] Additionally, Ross found the public was "badly informed about the procedures and penalties of administrative license [suspension]."[118] In 1990, Ross published another study of the effectiveness of the ALS laws in New Mexico, Delaware, and Minnesota.[119] This study analyzed alcohol related crash fatalities and nighttime vehicle crashes for each of these states from 1979 to 1989.[120] Contrary to his previous findings, this effort concluded New Mexico's ALS program had *no* effect on reducing drunken driving.[121] Ross found a 3.5% decline in drunken driving in Minnesota and 13.9% in Delaware.[122] These before and after comparisons of the ALS law's effect are typical of early research, which failed to control for spurious variables,[123] or account for the downward trend in drunken driving caused by changing public attitude towards drunken driving that began around 1980.[124]

In 2006, Lacey improved on these methods when he sought to gauge the effectiveness of Hawaii's ALS law.[125] To control for spurious traffic variables, Lacey used a ratio of nighttime injury crashes to daytime injury crashes.[126] By using a ratio of the two data sets, the author was able to control for traffic and driving related variables, such as weather, road conditions, gas prices, enforcement patterns, and vehicle safety improvements present in both data sets.[127] This pre-ALS law ratio of data was used to forecast the future rate of drunken driving.[128] The forecasted data set was compared to the actual experience after the ALS law's effective date.[129] This comparison indicated a significant initial reduction in

117. *Id.* at 13.

118. *Id.* at 12.

119. H. LAURENCE ROSS, AAA FOUND. FOR TRAFFIC SAFETY, ADMINISTRATIVE LICENSE REVOCATION FOR DRUNK DRIVERS: OPTIONS AND CHOICES IN THREE STATES (1991).

120. *Id.* at 43-48. Intervention dates were: August 1982 in Minnesota, July 1984 in New Mexico, and January 1983 in Delaware. Minnesota's ALS program was effective in 1978. The law was strengthened in 1982. Crash data was not available for the period of the original enactment, therefore, the 1982 date was used. *Id.* at 11.

121. *Id.* at 47.

122. *Id.* at 32-33.

123. These studies used statistical models that accommodated for the seasonal variations in the data. *Id.* at 42-43.

124. John R. Snortum & Dale E. Berger, *Drinking-Driving Compliance in the United States: Perceptions and Behavior in 1983 and 1986*, 50 J. STUD. ON ALCOHOL 306, 309 (1989); Robert B. Voas, A. Scott Tippetts & James Fell, *The Relationship of Alcohol Safety Laws to Drinking Drivers in Fatal Crashes*, 32 ACCIDENT ANALYSIS & PREVENTION 483, 491 (2000).

125. *See* LACEY, *supra* note 72.

126. *Id.* at 22.

127. *Id.*

128. *Id.* at 22-23.

129. *Id.*

nighttime injury crashes; however, this reduction only lasted for approximately four years before the data returned to the pre-ALS law trend.[130] This is consistent with previous studies finding that the efficacy of DUI deterrence policies tend to be short-lived.[131] Lacey ventured that the erosion of the law's effectiveness was likely correlated to a decline in publicity about the law.[132] Oddly, these data also indicated an *increase* in drunken driving after the effective date of Hawaii's Youth Zero Tolerance Law and when Hawaii lowered its BAC limit from .10% to .08%.[133] These findings may result from Lacey's use of nighttime *injury* crashes, which are not as strongly correlated to drunken driving as nighttime *fatalities* crashes.[134]

Much of the literature is distorted by failing to account for the public's awareness of the sanctions and procedures imposed by the ALS law among other factors.[135] Only a small percentage of DUI offenders are aware of the sanctions; therefore, sanctions must be well publicized to deter potential offenders.[136] The 1990 Lacey et al. study of Nevada's experience with ALS law supports this assertion.[137] Nevada's ALS law became effective in 1983 along with other anti-DUI sanctions.[138] Nevada was selected for study because a preliminary survey found very low public awareness of the law.[139] Beginning in 1986, in conjunction with the study, Nevada launched a 14-month media campaign about the ALS law and its strict enforcement objectives.[140] This campaign included brochures, key chains, public service announcements on television and radio, billboards, and press releases.[141] Law enforcement, MADD, and Students Against Destructive Decisions ("SADD") also initiated educational programs.[142] A follow-up survey determined the media campaign significantly increased the public's awareness of the ALS law's penalties and proce-

130. *Id.*

131. Ross, *supra* note 47, at 32.

132. LACEY, *supra* note 72, at 23.

133. *Id.* at 22.

134. Frank J. Chaloupka, Henry Saffer & Michael Grossman, *Alcohol-Control Policies and Motor-Vehicle Fatalities*, 22 J. LEGAL STUD. 161, 165 & n.13 (1993).

135. David L. McArthur & Jess F. Kraus, *The Specific Deterrence of Administrative Per Se Laws in Reducing Drunk Driving Recidivism*, 16 AM. J. PREVENTIVE MED. Supp. 68, 73 (1999).

136. ROSS, *supra* note 100, at 46.

137. JOHN H. LACEY ET AL., NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DOT HS 807 600, AN ASSESSMENT OF THE EFFECTS OF IMPLEMENTING AND PUBLICIZING ADMINISTRATIVE LICENSE REVOCATION FOR DWI IN NEVADA 2 (1990), *available at* http://ntl.bts.gov/lib/25000/25800/25894/DOT-HS-807-600.pdf.

138. *Id.*

139. *Id.*

140. *Id.* at 10-11.

141. *Id.* at 14-19.

142. *Id.* at 20.

dures.[143] A time-series analysis of alcohol related crash data found no reduction in drunken driving at the effective date of the law, but a 12% reduction *after* the media campaign.[144] The research does not explain whether this reduction was traceable to the deterrent effect of the ALS law or the public's response to the general anti-DUI message of the media campaign. The study's ultimate findings were established on an analysis of only seven months of data acquired after the media campaign ended.[145] The study did not indicate how long the decline in drunken driving continued.

Public awareness likewise impacted the Mann et al. study of Ontario, Canada's ALS law in 2000.[146] A telephone survey of Ontario residents found public awareness of the law was high at its commencement.[147] The researchers analyzed the trend of DUI fatalities nine years before and thirteen months after Ontario's ALS law.[148] This analysis found an immediate reduction of 17.3%,[149] predominately on light to moderate drinkers, with implementation of the law.[150] The time period considered after the intervention of the ALS program was too short to firmly gauge the long-term effect, but the data's trend indicated the decline was temporary.[151] Likewise, Howard's 2005 study of the ALS law in Alberta, Canada, found a significant reduction in drunken driving during the first year after the law became effective, which was attributed to public awareness.[152] Media coverage and public awareness of Alberta's law was high when it was implemented, but decreased overtime.[153] The study determined "much of the reductions occurred in the first year [of the program]

143. *Id.* at 27.

144. *Id.* at 37-38.

145. *See id.* at 11, 36. The 14-month media campaign began in April 1986 and continued through May 1987. *Id.* at 11. The researchers' findings were based on alcohol related traffic data reviewed through December 1987. *Id.* at 36.

146. Robert E. Mann et al., *Changing Drinking- and-Driving Behavior: The Effects of Ontario's Administrative Driver's Licence Suspension Law*, 162 CAN. MED. ASSOC. J. 1141, 1141-42 (2000).

147. *Id.* at 1141-1142 (citing E. M. ADLAF ET AL., ADDICTION RESEARCH FOUND., NO. 132, ONTARIO DRUG MONITOR 1996: TECHNICAL GUIDE (1997) and E. M. ADLAF ET AL., ADDICTION RESEARCH FOUND., NO. 140, ONTARIO DRUG MONITOR 1997: TECHNICAL GUIDE (1998)).

148. Robert E. Mann et al., *The Early Effects of Ontario's Administrative Driver's License Suspension Law on Driver Fatalities with a BAC > 80 mg%*, 93 CAN. J. PUB. HEALTH 176, 177 (2002).

149. *Id.*

150. Robert E. Mann et al., *The effects of drinking-driving laws: a test of the differential deterrence hypothesis*, 98 ADDICTION 1531, 1534-35(2003).

151. Mann et al., *supra* note 148, at 178.

152. HOWARD RESEARCH & MGMT. CONSULTING, INC., EVALUATION OF THE ALBERTA ADMINISTRATIVE LICENCE SUSPENSION PROGRAM 6 (2005), *available at* http://www.transportation.alberta.ca/Content/docType47/Production/aalsevaluationfinalreport.pdf [hereinafter HOWARD RESEARCH].

153. *Id.* at 73-74.

. . . and that rates returned to previous trends in the second and third years."[154] All of these studies found an initial reduction in drunken driving likely generated by media efforts to inform the public, and typically, the trend erodes shortly after the media coverage slows and public awareness wanes.

Some research was confounded by contemporaneous legislative acts to combat drunken driving. Rogers used an intervention time series of data from 1985-1994 to determine that California's ALS law reduced drunken driving by 9% to 13%.[155] However, California's ALS law went into effect six months after California lowered its BAC limit from .10% to .08%.[156] California was only the fourth state to adopt a .08% BAC limit and the amendment received considerable media coverage.[157] As the author noted, "the temporal proximity of the two laws (only six months apart) makes it very difficult to unravel the separate effects of each."[158] Additionally, a media campaign publicizing California's ALS law, unlike previous studies, had little to no impact on drunken driving.[159] In fact, during the media campaign, DUIs increased in California's four largest counties.[160] At the same time, the 12-month moving average of the ten years of data studied showed a consistent decline in drunken driving.[161] This finding indicates the decline was likely a continuation of the general downward trend in drunken driving in the 1980s correlated to the synergistic effects of all anti-DUI policies and shifts in the public's attitude towards drunken driving.

Roger's results are also contrary to McCarthy's 2003 study finding California's ALS law had no effect on reducing drunken driving.[162] McCarthy sought to compare the effectiveness of DUI and highway speed policies on older drivers as opposed to younger drivers.[163] Various data

154. *Id.* at 34.

155. PATRICE N. ROGERS, CAL. DEP'T MOTOR VEHICLES, CAL-DMV-RSS-95-158, THE GENERAL DETERRENT IMPACT OF CALIFORNIA'S 0.08% BLOOD ALCOHOL CONCENTRATION LIMIT AND ADMINISTRATIVE PER SE LICENSE SUSPENSION LAWS 84 (1995), *available at* http://www.dmv.ca.gov/portal/wcm/connect/6b69e326-009d-4f1b-8103-879ec4b30426/S5-158.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=6b69e326-009d-4f1b-8103-879ec4b30426. Data included police officers' notations that a driver "had been drinking," all nighttime accidents, single vehicle nighttime accidents with a male driver, and nighttime accidents occurring between 2 and 3 a.m. *Id.* at 8. Data were acquired from the California Highway Patrol. *Id.* at 10.

156. *Id.* at 2.

157. *Id.* at 7.

158. *Id.* at 77.

159. *Id.* at 83.

160. *Id.* at 71-74.

161. *Id.* at 25-72, figs. 2.1-17.2.

162. Patrick McCarthy, *Effects of Alcohol and Highway Speed Policies on Motor Vehicle Crashes Involving Older Drivers*, 6 J. TRANSP. & STAT., nos. 2/3, 2003, at 51, 59.

163. *Id.* at 52.

were obtained and analyzed from California agencies including alcohol control measures, gas prices, alcohol prices, DUI arrest data, and socio-economic data from 1981-1998.[164] The study found no influence of California's ALS law on either younger or older drivers in reducing drunken driving.[165]

Research efforts are further complicated when legislatures implement contemporaneous anti-DUI policies with ALS laws. Beirness et al. confronted this issue when considering Manitoba's 1989 ALS and vehicle seizure and impoundment law.[166] Government data, e.g. injury and fatality crashes, single-vehicle nighttime crashes, criminal charges of impaired driving, and hit and run accidents, from five years prior and six years after implementation of the law were analyzed using an interrupted time series model.[167] Saskatchewan, which did not have a similar program, was used for comparison.[168] The authors found a reduction in drunken driving but were unable to separate the effect of the ALS law from that of the vehicle seizure law.[169] The study was further complicated by the fact that Saskatchewan inexplicably experienced a decline in drunken driving over the same period.[170] In 2000, Voas et al. confronted this same issue when testing Ohio's ALS law to determine if it reduced DUI recidivism.[171] Ohio contemporaneously implemented a vehicle seizure and impoundment law targeting repeat offenders.[172] This study identified DUI or implied consent offenders from Ohio's driving records prior to the ALS law, then followed these drivers for twenty-four months after the ALS law's effective date.[173] The authors found a significant reduction in post-ALS law convictions, but re-offenders also were subject to vehicle seizure, making it impossible to separate the effects of the two sanctions.[174]

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164. *Id.* at 53.

165. *Id.* at 59-61. The study identified a reduction in property damage only crashes among older drivers. *Id.* at 60. However, property damage only crashes are not a recognized proxy for drunken driving.

166. DOUGLAS J. BEIRNESS, HERB M. SIMPSON & DANIEL R. MAYHEW, TRANSPORT CANADA, TP-13096 E, EVALUATION OF ADMINISTRATIVE LICENCE SUSPENSION AND VEHICLE IMPOUNDMENT PROGRAMS IN MANITOBA 23-28 (1997); *see also* Douglas J. Beirness et al., *The Impact of Administrative License Suspension and Vehicle Impoundment for DWI in Manitoba*, 14 INT'L CONF. ALCOHOL, DRUGS & TRAFFIC 919, 919-20 (1997) [hereinafter *Impact of ALS & VI*]. The ALS program authorized an automatic license suspension of 90 days for offenders with a BAC of .08 or who refuse a BAC test. *Id.* at 922.

167. *Impact of ALS & VI*, *supra* note 166, at 920.

168. *Id.*

169. *Id.* at 924.

170. *See id.* at 920.

171. Voas et al., *supra* note 68, at 401.

172. *Id.* at 403. Ohio's Vehicle Action (VA) law required temporary impoundment or immobilization in addition to license suspension for multiple offenders. *See id.* at 405, 412.

173. *Id.* at 408.

174. *Id.* at 405, 412.

B. Multi-Jurisdictional Studies

In an effort to strengthen the statistical analysis and control for specious variables, research efforts expanded to test data from multiple jurisdictions using cross-sectional data. Some studies found equivocal support that ALS laws reduced drunken driving. Zador et al. measured the national effects of BAC *per se* laws, ALS laws, and first offense minimum incarceration laws.[175] This study analyzed traffic fatalities occurring from 1978 to 1985 in all 50 states and the District of Columbia using a multivariate regression model.[176] Addressing a common flaw in previous research, the authors acknowledged and attempted to isolate the unrelated, existing downward trend in drunken driving during these years.[177] After controlling for this decline, the authors determined the three laws *combined* only reduced drunken driving by 0.8% nationally.[178] The authors went on to warn that this small decline might be attributable to the "effects of media and public interest generated by the laws . . . as well as enthusiasm of local police and judicial officials."[179]

Stewart et al. sought to determine if recidivism rates were lessened by implementation of the ALS laws in Louisiana, North Dakota, and Mississippi.[180] The driving records of offenders arrested or convicted of DUI before the ALS law were identified and reviewed post-ALS law for recidivism.[181] California's DUI recidivism rates were used for comparison since it did not have an ALS law at the time.[182] The study found no deterrent effect in Mississippi or Louisiana, but a significant effect in North Dakota.[183] The authors cautioned that the North Dakota finding may be spurious and correlated to state-level factors such as police priorities and practices.[184]

Chaloupka et al. produced a multijurisdictional study seeking to test the effectiveness of all major DUI laws including ALS laws.[185] This work analyzed alcohol involved fatalities and nighttime fatalities from 1982-1988 for the forty-eight contiguous states.[186] Data from the Fatal Accident Reporting System ("FARS") database maintained by NHTSA were

175. Zador et al., *supra* note 10, at 468.
176. *Id.* at 473, 485.
177. *Id.* at 472.
178. *Id.* at 483.
179. *Id.*
180. Kathryn Stewart, Paul J. Gruenewald & Robert Nash Parker, *Assessing Legal Change: Recidivism and Administrative Per Se Laws*, 8 J. Quantitative Criminology 375, 375 (1992).
181. *Id.* at 378-379.
182. *Id.* at 379.
183. *Id.* at 384-87.
184. *Id.* at 391.
185. Chaloupka et al., *supra* note 134, at 162.
186. *Id.* at 164.

used, including fatalities with known BAC levels.[187] The FARS database did not start collecting BAC levels for fatalities until 1982, and this study claims to be the first to use this variable.[188] These data were paired with typical socio-economic variables, e.g. age, gender, income, employment, and also, state specific variables such as alcohol tax, seatbelt usages, and other DUI laws.[189] Simulations of the data indicated that ALS laws were ineffective if the suspension period was less than one year.[190] The study concluded "that existing laws with relatively weak penalties have no deterrent effect."[191] This finding is consistent with the conclusion of Paulsrude and Klingberg that a direct threat of a 30-day license suspension did not deter chronic traffic offenders.[192] It is also in accord with Homel's finding that suspension periods of less than twelve months are ineffective in altering driving behavior.[193]

Some research finds unequivocal reductions in drunken driving attributable to ALS laws. In 1994, Legge and Park noted the flaws in previous single jurisdiction studies that failed to control for extraneous factors such as economic conditions, alcohol consumption in general, average miles traveled, traffic congestion, mandatory seatbelt laws, and the increase in the minimum drinking age.[194] Their study analyzed single vehicle nighttime fatalities for all states for 1980, 1984, and 1987,[195] using

187. *Id.* at 165.

188. *Id.*

189. *Id.* at 173-174, tbls.1 & 2.

190. *Id.* at 184.

191. *Id.* at 179.

192. STEPHEN P. PAULSRUDE & CARL L. KLINGBERG, WASH. DEP'T MOTOR VEHICLES, REPORT NO. 32, DRIVER LICENSE SUSPENSION: A PAPER TIGER? 23 (1975). Offenders were placed on probation by the DMV and subject to a discretionary 30-day license suspension for traffic infractions during the probationary period. *Id.* at 1-2. The study excluded DUI offenders who are subject to a mandatory suspension. *Id.* at 1-2. Since the suspension was discretionary, DMV assigned offenders to one of three groups for study. *Id.* at 4-6. Group 1 met with DMV personnel and was told any infraction during probation would result in a 30-day suspension. *Id.* at 4. Group 2 also met with DMV personnel, but the 30-day suspension was not discussed and DMV would not impose the suspension on this group. *Id.* at 4-5. Group 3 was not contacted by DMV and was unaware of the risk of suspension. *Id.* at 5. The direct threat of a 30-day suspension had no effect on driving habits. *Id.* at 25-31.

193. R. Homel, *Penalties and the Drink-Driver: A Study of One Thousand Offenders,* 14 AUSTL. & N.Z. J. CRIMINOLOGY 225, 235-238 (1981). Australia's statute authorized discretionary license suspension of up to 12 months for first time offenders and up to three years for second or subsequent offenders. *Id.* at 227. Homel monitored the driving records of 1,000 DUI offenders for 36 months after conviction and found 37.5% re-offended and of these 13% committed another DUI. *Id.* at 229. Re-offenders were paired with the suspension period for the original conviction. *Id.* at 227-229. The study found only suspension periods of more than 12 month but less than 18 months effective. *Id.* at 235-236.

194. Legge, Jr. & Park, *supra* note 34, at 597.

195. *Id.* These years were selected because 1980 represented the beginning of the national effort to combat DUI, 1984 represented a time when many anti-DUI laws were effective, and 1987 was the year by which many states had imposed mandatory seatbelt usage. *Id.*

multivariate regression and controlling for many policy and environmental variables.[196] The authors determined that states with ALS laws had reductions in drunken driving in comparison to states without ALS laws, but no specific measure was provided.[197]

Later, Voas et al. used a similar multivariate regression model to analyze crash data of all fifty states from 1982 to 1997.[198] In reviewing the effects of .10% BAC *per se* laws, .08% BAC per se laws, and ALS laws, the study found significant reductions in DUI fatalities attributable to each of these laws.[199] The authors cautioned the results might be unsound because variables addressing media coverage, public awareness of policies, and changes in public attitude towards drinking and driving were not included.[200]

In 2003, Villaveces et al. analyzed alcohol related crash fatalities from 1980 to 1997 for all fifty states and the District of Columbia.[201] The authors sought to isolate the effectiveness of major DUI sanctions including .08% *per se* laws, zero tolerance laws, ALS laws, mandatory incarceration for first offenders, sobriety checkpoint laws, and mandatory seatbelt and motorcycle helmet laws.[202] This study controlled for the general declining "trend in traffic mortality rates,"[203] but did not control for other factors such as alcohol control policies, price variations among states, economic conditions, or changes in public attitude.[204] The authors noted that it did not include a measurement for police efforts in enforcing the laws.[205] The study concluded that ALS laws were associated with a 5% decline in "overall mortality and alcohol-related mortality."[206]

Similar studies find ALS laws have no impact on drunken driving. In 2000, Young and Likens considered alcohol involved fatalities from the FARS database for the forty-eight contiguous states from 1982 to 1990 to test the effectiveness of various DUI sanctions including ALS laws.[207] The authors included a large number of socioeconomic, state specific

196. *Id.* at 597-602, 600 tbl.1.

197. *Id.* at 602.

198. Voas et al., *supra* note 124, at 484.

199. *Id.* at 489.

200. *Id.* at 491.

201. Andres Villaveces et al., *Association of Alcohol-Related Laws with Death Due to Motor Vehicle and Motorcycle Crashes in the United States, 1980-1997*, 157 AM. J. EPIDEMIOLOGY 131, 132 (2003).

202. *Id.* at 131-32.

203. *Id.* at 132.

204. *See id.* at 134-38 tbls.1-5.

205. *Id.* at 136.

206. *Id.*

207. Douglas J. Young & Thomas W. Likens, *Alcohol Regulation and Auto Fatalities*, 20 INT'L REV. L. & ECON. 107, 108, 113-14 (2000).

DUI policies, and alcohol control variables in the analysis.[208] This study concluded that ALS laws had no effect in reducing drunken driving and no deterrent effect.[209]

Likewise, Eisenberg sought to test the effectiveness of several major DUI sanctions including ALS laws using alcohol related FARS data for all fifty states and the District of Columbia from 1982 to 2000.[210] The study employed the same socioeconomic, traffic, alcohol control, and DUI sanction variables as prior works, but also included new variables to control for the effect of MADD on enforcement and graduated driver's licenses for minors.[211] This study also included fixed effects to control for states with constant atypical data.[212] Eisenberg found "no clear pattern" that ALS laws are effective in reducing drunken driving.[213]

Studies using self-reported data have consistently found ALS laws ineffective in reducing drunken driving. In 1993, Kenkel considered the relationship between DUI sanctions, including ALS laws and alcohol control policies, on deterring heavy alcohol usage and drunken driving.[214] Kenkel used self-reported drinking and driving data from the 1985 National Health Interview Survey.[215] Kenkel controlled for alcohol access variables, e.g. alcohol cost, government control of alcohol sales, and legal drinking age, and also typical socio-economic variables, e.g. age, marital status, employment, and race.[216] Kenkel found that ALS laws in combination with alcohol control measures reduced *heavy drinking*;[217] however, "the relationship between the deterrence variables and the amount of drunk driving [was] unclear."[218] This finding points to a synergistic effect of all anti-DUI policies as well as alcohol control policies in reducing drunken driving.

Sloan et al. also used self-reported data from the Behavioral Risk

208. *Id.* at 111-14.

209. *Id.* at 122.

210. Daniel Eisenberg, *Evaluating the Effectiveness of Policies Related to Drunk Driving*, 22 J. POL'Y ANALYSIS & MGMT. 249, 250 (2003).

211. *Id.* at 251.

212. *Id.* at 254. Utah consistently has lower fatality rates. This is likely due to state policies and public attitudes towards drinking and driving. *See id.* at 254. The statistical model accepts this as a fixed effect of the state and controls for it regardless of its origin. *Id.*

213. *Id.* at 270.

214. Kenkel, *supra* note 36, at 878.

215. *Id.* at 879.

216. *Id.* at 886-888, 905 tbls.A1 & A2.

217. *Id.* at 889-90. Kenkel defines heavy drinkers as males who report consuming 5 or more alcoholic drinks an average of 17 days per year, and females who consume 5 or more alcoholic drinks an average of 2.6 days per year. *Id.* at 885 tbl.1.

218. *Id.* at 892; *see also* Chaloupka et al., *supra* note 134, at 163 ("holding the [ALS] laws effect on heavy drinking constant, however, no independent effect on drunk driving is observed.")

Factor Surveillance Survey ("BRFSS") from 1989-1990 to study the effects of state-level deterrents on drunken driving.[219] Alcohol usage data from the BRFSS are consistent with other national surveys and considered reasonably valid.[220] This study included typical socio-economic variables, such as age, income, employment, and also state specific variables, such as alcohol prices, the state's tort liability system, compulsory liability insurance, and dramshop legislation, in its analysis.[221] The authors concluded that alcohol control policies are effective in reducing drunken driving by limiting access to alcohol, but many DUI sanctions including ALS laws have no deterrent effect on drunken driving.[222]

Stout et al. also used self-reported data from the 1984–1995 BRFSS to examine various alcohol related behaviors.[223] The authors controlled for a set of typical socio-economic variables and also state specific variables such as driving habits, alcohol price, and state laws.[224] This study also included state variables for religiosity and whether states adopted prohibition before 1920 when national prohibition took effect under the 18th Amendment.[225] This study identified effective DUI sanctions, e.g. mandatory jail sentences, increased fines, and open container laws, but found that other criminal sanctions including ALS laws had mixed results and did not significantly deter drunken driving.[226]

The clear defect in all these multivariate, cross-sectional studies is omitted variable bias. In 1996, Rhum demonstrated that most of these studies overstate DUI deterrent effects due to omitted variable bias.[227] Previous research ignored anti-drunken driving variables such as grassroots activities and the public's changing attitude toward drunken driving.[228] Additionally, this research disregarded the general decline in all highway fatalities attributable to modern vehicle safety features, such as airbags and anti-lock brakes.[229] Even when a large set of variables are included, it is not possible to hold these variables constant and isolate the effect of a specific policy.[230] By including additional variables, Ruhm

219. Frank A. Sloan, Bridget A. Reilly & Christoph Schenzler, *Effects of Tort Liability and Insurance on Heavy Drinking and Drinking and Driving*, 38 J.L. & ECON. 49, 49 (1995).

220. M. Kirsten Bradstock et al., *Drinking-Driving and Health Lifestyle in the United States: Behavioral Risk Factors Surveys*, 48 J. STUD. ON ALCOHOL 147, 149 (1987).

221. Sloan et al., *supra* note 219, at 57-64.

222. *Id.* at 69, 70, 74.

223. Emily M. Stout et al., *Reducing Harmful Alcohol-related Behaviors: Effective Regulatory Methods*, 61 J. STUD. ON ALCOHOL 402, 402, 405 (2000).

224. *Id.* at 407 tbl.3.

225. *Id.*

226. *Id.* at 410.

227. Ruhm, *supra* note 114, at 446.

228. *Id.* at 438.

229. *Id.* at 436-37.

230. *Id.* at 438.

demonstrated that drunken driving fatality reductions credited to ALS laws were a meager 0.1%.[231] He elaborated that even this paltry decline may be inflated by variables he omitted such as the effect of community based efforts to combat drunken driving.[232] Ultimately, Ruhm concluded that prior studies on DUI sanctions were flawed because they failed to adequately control confounding factors.[233]

Whetten-Goldstein et al. followed up on Ruhm's effort by examining alcohol related data from the FARS database from 1984 to 1995.[234] The authors acknowledged that past studies were flawed due to omitted variable bias.[235] This study likewise included fixed effects for constant atypical data.[236] The analysis controlled for a large number of variables, e.g. socioeconomic factors, major DUI sanctions, alcohol control policies, and tort liability variables.[237] These authors determined that ALS laws had some effect in reducing drunken driving, but this finding was not otherwise quantified.[238]

In 2005, Noland and Karlaftis further acknowledged flaws in the analyses of alcohol related crash data including inconsistencies in the data sets used, differences in the variables used in the model specifications (omitted variable bias), and differences in the methodology used.[239] Their study considered alcohol related fatalities from the FARS database from 1990 to 1997 to determine the effects of safety-belt laws and ALS laws in reducing driver fatalities.[240] This study utilized advanced statistical methods designed to eliminate much of these inconsistencies.[241] The study concluded that ALS laws had no statistically significant effect on reducing drunken driving.[242]

In 2007, Wagenaar and Maldonado-Molina made novel use of auto regression with an integrated moving average ("ARIMA") time series

231. *Id.* at 449-50.

232. *Id.* at 451.

233. *Id.*

234. Kathryn Whetten-Goldstein et al., *Civil Liability, Criminal Law, and Other Policies and Alcohol-Related Motor Vehicle Fatalities in the United States: 1984-1995*, 32 ACCIDENT ANALYSIS & PREVENTION 722, 726 (2000).

235. *See id.* at 732.

236. *Id.* at 727-28.

237. *Id.* at 730-31 tbls.4& 5.

238. *Id.* at 729.

239. Noland & Karlaftis, *supra* note 114, at 440.

240. *Id.* at 441.

241. *Id.* at 444-45. The authors contrasted ordinary least square (OLS) fixed-effect models with negative binominal fixed effect models. Binominal fixed effect models were used because they displayed less variation in results than linear regression models that account for serial correlation.

242. *Id.* at 454.

intervention modeling to test the effectiveness of ALS laws.[243] The authors sought to improve on the limitations of single jurisdictional studies, and also, on multijurisdictional studies using multivariate models that included a "selection of an idiosyncratic limited set of covariates."[244] The study considered single vehicle nighttime crashes and driver fatalities with a BAC finding from the FARS database from 1976 to 2002 for forty-six states.[245] Multi-vehicle daytime crashes and driver fatalities with .00 BAC were included as covariates to control for traffic related variables affecting the data sets.[246] ARIMA estimates for each state were pooled to increase the validity of the findings.[247] The pooled findings led the researchers to conclude that ALS laws resulted in a reduction of 5.2% in all alcohol related fatalities.[248] The study acknowledged that it failed to account for all factors, such as alcohol excise tax and mandatory seatbelt laws, which might confound the results.[249] Additionally, NHTSA did not require states to provide driver fatalities BAC information to FARS database until 1982, which required the researchers to estimate the missing pre-1982 data.[250]

IV. Study Overview

This study posits that ALS laws are ineffective in deterring drunken driving, as evidenced by their failure to reduce drunken driving after their effective date. If prior studies finding ALS laws to deter drunken driving are valid, then there should be a statistically significant reduction in drunken driving in these states after the effective dates of the ALS law. Additionally, if such studies are valid, the reduction in drunken driving should range from a minimum of 5% to possibly as high as 17%. Declines in drunken driving of this magnitude should be readily apparent in the data.

This study analyzed accepted proxies for drunken driving from eight states having ALS laws to determine if such a decline existed. States were selected for analysis based on their demographic, geographic, and chronological diversity. Two diverse data sets, single vehicle nighttime ("SVN") fatalities and driver fatalities with .01 or greater BAC, were secured for analysis from the FARS database maintained by the NHTSA. Appropriate steps were taken to ensure that potentially confounding fac-

243. Wagenaar & Maldonado-Molina, *supra* note 23, at 1401.
244. *Id.* at 1400.
245. *Id.*
246. *Id.*
247. *Id.*
248. *Id.* at 1404.
249. *Id.* at 1403.
250. *Id.* at 1401.

tors were eliminated from the statistical analysis. The statistical computations were performed using IBM SPSS Statistics. ARIMA modeling was employed to accommodate for the seasonal nature of traffic data.

This research adds to the literature on the effectiveness of ALS laws by: (1) analyzing the impact of ALS laws in multiple states that adopted ALS law between 1985 and 1998; (2) using two diverse proxies for drunken driving; (3) using the best data available obtained from the FARS database; (4) employing statistical methods that reflect the seasonality of traffic data; (5) and by eliminating potentially confounding variables. Additionally, this research appears to be the first to introduce the length of the suspension period by selecting states that administratively suspend an offender's license for as few as seven days to as long as one year.

V. METHODS

A. STATE SELECTION

States were chosen based on geographical and demographical diversity. States that were identified as having potential issues that would confound the results were eliminated from consideration. For example, Arkansas, Colorado, Mississippi, North Carolina, North Dakota, Nevada, Utah, and Washington passed other major anti-DUI policies contemporaneously with their ALS laws.[251] Therefore, these states were eliminated from consideration. To avoid the existing downward trend in drunken driving that began in the early 1980s, states implementing ALS laws before 1985 were likewise rejected.[252]

Drunken driving is also affected by population density.[253] Research confirms that drunken driving is more prevalent in rural areas than in urban areas,[254] due to higher speeds, two-lane roads, and a lack of public transportation.[255] Thus, jurisdictions with highly urban or highly rural populations were not considered for this study.[256]

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251. *Id.* at 1403 tbl.2.

252. *Id.* at 1402 tbl.1. These states include Alabama (1983), Delaware (1982), Iowa (1982), Kansas (1982), Louisiana (1984), Maine (1984), Minnesota (1978), Missouri (1983), New Mexico (1984), Oklahoma (1983), and West Virginia (1981).

253. *See* Jesse Blatt & Susanne M. Furman, *Residence Location of Drivers Involved in Fatal Crashes,* 30 ACCIDENT ANALYSIS & PREVENTION 705, 705 (1998).

254. *Id.*

255. *Id.* at 709-10.

256. Highly urban population: Arizona (89.8%), California (94.9%), Connecticut (88%), District of Columbia (100%), Florida (91.2%), Hawaii (92), Illinois (88.5%), Maryland (87.2%), Massachusetts (92%), New York (88%), Ohio (78%), Oregon (81%), and Texas (85%). Highly rural population: Vermont (60%) was excluded because of its high rural population and this factor's influence on DUI rates. All figures are rounded. *2010 Census Urban and Rural Classification and Urban Area Criteria*, U.S. CENSUS BUREAU, http://www.census.gov/geo/reference/

Each state's per capita alcohol consumption was also considered. In general, states with low levels of per capita alcohol consumption have restrictive alcohol access policies such as high taxes on alcohol, limitations on who may retail alcohol, and limitations on hours of sale, all of which decrease drunken driving.[257]

Based on these forgoing criteria, the states identified in Table 1 below are demographically, geographically, and chronologically diverse, and eliminate potentially confounding factors such as population density and per capita alcohol consumption.

TABLE 1

State	ALS Date	Alcohol Fatalities 1998	Alcohol Fatalities 2004	Per Capita Consumption Alcohol Gal.	Urban Population[258]	Rural Population[259]
Virginia	1995	38.4%	39.4%	2.11	75.5%	24.5%
South Carolina	1998	37.2%	44.3%	2.31	66.3%	33.7%
Idaho	1994	37.7%	35.6%	2.67	70.6%	29.4%
Nebraska	1993	38.2%	36.3%	2.31	73.1%	26.9%
Wyoming	1985	46.1%	36.2%	2.61	64.8%	35.2%
New Hampshire	1993	48.9%	34.5%	4.44	60.3%	39.7%
Wisconsin	1988	42.5%	45.2%	2.76	70.2%	29.8%
Georgia	1995	33.7%	32.8%	1.97	75.1%	24.9%

This assortment of states also provides ALS law data that suspend an offender's license for periods ranging from as few as seven days to as long as one year. There is some indication in the literature that short license suspension periods have no deterrent effect on drunken driving.[260] It is plausible that very short suspension periods, such as Virginia's seven-day suspension, offer little incentive for potential offenders not to offend, while states with long suspension periods, such as Georgia's one-year suspension period, provide great incentive. No prior research was found

ua/urban-rural-2010.html (follow *List of Population, Land Area, and Percent Urban and Rural in 2010 and Changes from 2000 to 2010*) (last visited Jan. 6, 2015) [hereinafter *2010 Census*].

257. *Cf.* Andreas Muller, *Business Recession, Alcohol Consumption, Drinking and Driving Laws: Impact on Oklahoma Motor Vehicle Fatalities and Fatal Crashes*, 79 AM. J. PUB. HEALTH 1366, 1369 (1989) (per capita consumption of pure alcohol dropped by about 0.4 gallons from 1981-1986, linked to an estimated 12-14 percent decrease in motor vehicle death and fatal crash rates after controlling for changes in drinking and driving laws).

258. *2010 Census*, *supra* note 256.

259. *Id.*

260. PAULSRUDE & KLINGBERG, *supra* note 192, at 29.

considering the impact of the suspension period on the effectiveness of ALS laws.

Since the effective date of the ALS law is crucial to securing the appropriate data sets, independent legal research was undertaken to confirm the exact date each state's ALS law became effective. The effective date for each state's ALS law, each state's primary statute codifying the law, and the range of penalties is listed in Table 2 below.

TABLE 2

State	Code Section	Effective Date	Failure 1st Offense	Failure 2nd Offense	Refusal 1st Offense	Refusal 2nd Offense
Virginia	46.2-391.2	1/1/1995	7 days	60 days	1 year	1 year
South Carolina	56-5-2950 56-5-2951	6/29/1998	30 days	60 days	6 mon.	9 mon.
Idaho	18-8002 18-8002A	7/1/1994	90 days	1 year	Jud. sus. 1 year	Jud. sus. 2 year
Nebraska	60-498.01 60-498.02	1/1/1993	90 days	1 year	1 year	1 year
Wyoming	31-6-102 31-6-103	7/1/1985	90 days	90 days	6 mon.	18 mon.
New Hampshire	265-A:30 265-A:4 264-A:14	1/1/1993	6 mon.	2 years	180 days	2 years
Wisconsin	343.305	1/1/1988	6 mon.	6 mon.	1 year	2-3 years
Georgia	40-5-67.1 40-5-67.2	1/1/1995	1 year	3 years	1 year	1 year

B. DATA

NHTSA's FARS database became operational in 1975 and includes motor vehicle fatalities from all fifty states, the District of Columbia, and

Puerto Rico.[261] NHTSA, through the National Center for Statistics and Analysis ("NCSA"), has a cooperative agreement with an agency in each jurisdiction designated to provide crash fatality information.[262] Each jurisdiction designates a FARS Analyst to gather, translate, and transmit data to NCSA in a standardized format.[263] Data are acquired from multiple sources, including accident reports, death certificates, vehicle registrations, coroner reports, and medical records.[264] All FARS Analysts attend formal training and received on-the-job training from other FARS Analysts.[265] Continuing training is provided to ensure all FARS data are properly coded.[266] Additionally, the FARS computerized recording system has built-in processes to ensure consistency, and NHTSA employees review the data entered by FARS Analysts for quality.[267] State-level data are unreliable due to reporting disparities and standards that vary from state to state.[268] This research used standardized data acquired from the FARS database, which is far superior to any other traffic data source.

The best available empirical measures of drunken driving are vehicle fatality rates.[269] Fatally injured drivers are twice as likely to have consumed alcohol as drivers who survive a crash.[270] Since 1982, NHTSA has collected the BAC of all drivers involved in traffic fatalities in the United States and entered this information into FARS within thirty days of the incident.[271] This means that the presence of any detectable amount of alcohol is reported to FARS. Research finds that even at the lowest BAC levels, the brain's ability to process information is slowed, visual perception is degraded, and the ability to allocate one's attention to multiple tasks is limited.[272] Necessary driving skills are "impaired at .01 to .02 percent BAC or, in other words, at the lowest levels that can be measured

261. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DOT HS 811 855, FATALITY ANALYSIS REPORTING SYSTEM (FARS): ANALYTICAL USER'S MANUAL 1975-2012, at 6 (2014) *available at* http://www-nrd.nhtsa.dot.gov/Pubs/811855.pdf [hereinafter FARS MANUAL].

262. *Id.* at 7.

263. *Id.*

264. *Id.*

265. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DOT HS 809 726, FATALITY ANALYSIS REPORTING SYSTEM: FATAL CRASH DATA OVERVIEW (2005), *available at* http://www-nrd.nhtsa.dot.gov/Pubs/FARSBROCHURE.pdf [hereinafter FARS FATAL CRASH DATA].

266. FARS MANUAL, *supra* note 261, at 7.

267. FARS FATAL CRASH DATA, *supra* note 265.

268. *See* Phillip Cook & George Tauchen, *The Effect of Minimum Drinking Age Legislation on Youthful Auto Fatalities, 1970-1977*, 13 J. LEGAL STUD. 169, 176 (1984).

269. Chaloupka et al., *supra* note 134, at 165.

270. RAJESH SUBRAMANIAN, NAT'L HIGHWAY TRANSP. SAFETY ADMIN., DOT HS 809 579, ALCOHOL INVOLVEMENT IN FATAL CRASHES 6 (2003).

271. Wagenaar & Maldonado-Molina, *supra* note 23, at 1400-01.

272. Marcelline Burns & Herbert Moskowitz, *Effects of Alcohol on Driving Performance*, 14 ALCOHOL HEALTH & RES. WORLD 12, 12-14 (1990).

reliably."[273] For a portion of this research, a "drunken driver" is defined as a driver killed while having a BAC of .01 or greater. For each of the eight states, driver fatalities identified with BAC of .01 or higher were analyzed for declines after the effective date of each state's ALS law. Additionally, three subsets of these data were analyzed for declines in drivers killed with BAC levels of .01-.07, .08-.14, and .15↑.

This study also examined a second recognized proxy for drunken driving. For this portion of the research, a "drunken driver" is defined as a SVN driver fatality. SVN fatalities occur between the hours of 9:00 p.m. and 5:59 a.m. and only involve the driver's vehicle and no other vehicle, bicycle, or pedestrian. Drivers killed in nighttime crashes are four times more likely to have consumed alcohol compared to drivers killed in daytime crashes.[274] Drivers killed in single vehicle crashes are three times more likely to have consumed alcohol than drivers killed in multiple vehicle crashes.[275] A study of all vehicle crash fatalities in northern Sweden from 1980-1989 found that 58% of single vehicle fatalities were intoxicated at the time of the crash, compared with only 10% of fatalities in multivehicle accidents.[276] The same study reported that 52% of SVN fatalities occured between the hours of 9:00 p.m. and 6:00 a.m.[277] SVN fatalities are considered a valid proxy for drunken driving.[278]

Numerous factors other than alcohol contribute to driver fatalities, including weather, driving volume, enforcement efforts, the economy, vehicle quality, vehicle safety, and roadways.[279] Two proxies for non-alcohol related fatalities were also secured from the FARS database for the relevant time frame. These were driver fatalities with .00 BAC and multivehicle daytime ("MVD") fatalities. Driver fatalities with .00 are drivers who were killed in traffic crashes whose postmortem blood test revealed no measurable amount of alcohol.[280] MVD fatalities are

273. *Id.* at 14.

274. SUBRAMANIAN, *supra* note 270, at 11.

275. *Id.* at 13.

276. Mats Ostrom & Anders Ericksson, *Single-Vehicle Crashes and Alcohol: A Retrospective Study of Passenger Car Fatalities in Northern Sweden*, 25 ACCIDENT ANALYSIS & PREVENTION 171, 172 (1993).

277. *Id.* at 174.

278. *See* James C. Fell & Carl E. Nash, *The Nature of the Alcohol Problem in U.S. Fatal Crashes*, 16 HEALTH EDUC. & BEHAV. 335, 336 (1989).

279. Voas et al., *supra* note 124, at 483.

280. A BAC of .00 does not eliminate the possibility that the fatally injured driver was impaired by another drug. Alcohol is the most common drug associated with driver fatalities followed by marijuana, benzodiazepines, and stimulants. *See* Marie C. Long et al., *The Prevalence of Alcohol, Cannabinoids, Benzodiazepines and Stimulants Amongst Injured Drivers and their Role in Driver Culpability*, 32 ACCIDENT ANALYSIS & PREVENTION 613, 615, tbl.1 (2000). However, one small study found the majority of drivers involved in accidents impaired by marijuana also test positive for alcohol. *See* Asbjorg S. Christophersen et al., *Prevalence of Alcohol and*

driver's killed between the hours of 6:00 a.m. and 8:59 p.m. in crashes involving two or more vehicles.[281] MVD fatalities represent the lowest indication of alcohol involvement.[282] Specious factors that may confound the results of the statistical analyses are present in both alcohol related fatalities data sets (SVN and .01↑BAC driver fatalities) and also the non-alcohol related fatalities data sets. Using a ratio of alcohol related fatalities to non-alcohol related fatalities controls for these specious factors. "This approach—analyzing a ratio series of the intervention series to a baseline/control series (or as a proportion of the total of the two)—tends to create more stable series, providing greater statistical power to detect real changes if they are present."[283] The five ratios of these data are expressed as SVN/MVD, .01↑/.00BAC, .01-.07/.00BAC, .08-.14/.00BAC, and .15↑/.00BAC.

C. Statistical Analysis

Traffic data are influenced by such factors as the season, holidays, weather, and the economy. Box and Jenkins developed a time series model designed for evaluating seasonal data such as traffic data known generally as ARIMA modeling.[284] Research confirms that ARIMA models are best suited for analyzing and forecasting traffic data.[285] ARIMA modeling was employed in this study because it is uniquely able to account for the time-related dynamics (trends, drift, and other auto-correlated processes) as well as cyclical/seasonal patterns using autoregressive ("AR"), integrative ("I"), and moving average ("MA") components.[286]

For each of the eight states, thirty-six months of pre-ALS law data

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Drugs in Blood Samples from Norwegian Drivers Involved in Road Traffic Accidents, 13 Int'l Conf. Alcohol, Drugs & Traffic Safety 768, 770 (1995). Another small study found the number of drivers fatally injured while impaired by benzodiazepines and stimulants are very low compared to those killed while impaired by marijuana and alcohol. *See* Wayne K. Jeffery et al., *Drug and Alcohol Concentrations of Drivers Involved in Fatal Motor Vehicle Accidents in British Columbia, Canada: A 1-Year Study*, 13 Int'l Conf. Alcohol, Drugs & Traffic Safety 746, 750-751 (1995).

281. *See* Richard L. Douglass & Lyle D. Filkins, *Empirical Development of a Surrogate Measure of Alcohol Involvement in Official Accident Data*, 4 HIT Lab Rep., at 7 (1974).

282. *Id.* at 10; Cherian Varghese & Umesh Shankar, Nat'l Highway Traffic Safety Admin., DOT HS 810 637, Passenger Vehicle Occupant Fatalities by Day and Night – a Contrast 2-3 (2007), *available at* http://www-nrd.nhtsa.dot.gov/Pubs/810637.pdf.

283. Lacey, *supra* note 72, at 21.

284. Terrence C. Mills, A very British Affair: Six Britons and the Development of Time Series Analysis During the 20th Century 216 (2013); George E. P. Box, Gwilym M. Jenkins & Gregory C. Reinsel, Time Series Analysis: Forecasting and Control (4th ed. 2008).

285. Billy M. Williams & Lester A. Hoel, *Modeling and Forecasting Vehicular Traffic Flow as a Seasonal ARIMA Process: Theoretical Basis and Empirical Results*, 129 J. TRANSP. ENGINEERING 664, 670 (2003).

286. Lacey, *supra* note 72, at 21.

and thirty-six months of post-ALS law data for both drunken driving proxies (SVN and .01↑BAC fatalities) and both non-alcohol related fatalities (MVD and .00 BAC fatalities), were acquired from the FARS database. The intervention date for each state was the effective date of the state's ALS law. These data were used to create five ratios of alcohol related fatalities to non-alcohol related fatalities: SVN/MVD, .01↑/.00BAC, .01-.07/.00BAC, .08-.14/.00BAC, and .15↑/.00BAC.

For each state and each data set, seventy-two months of actual data ratios were used to create an ARIMA model or the "actual model."[287] The thirty-six months of pre-ALS law actual data were used to predict a successive thirty-six months post-ALS law ARIMA model without considering the law's intervention or the "predicted model." This predicted model was then compared to the actual model using a paired-samples t-test. If the ALS laws reduced either of the drunken driving proxies, there should be a statistically significant difference between the predicted model and actual model.

VI. Results

First, the SVN/MVD ratios were analyzed for each state. In the graphs following these analyses, the "actual" lines are ARIMA models of the actual SVN/MVD fatalities for the relevant 72-month period. The intervention dates are the effective dates of the ALS laws and are represented by the horizontal lines. The "predicted" lines in these graphs are ARIMA model predictions of SVN/MVD fatalities for the thirty-six months post-ALS law data using the previous thirty-six months of actual data. These predictions were made without considering the ALS laws' intervention effect.

Next, the .01↑/.00BAC ratios were analyzed for each state. In the graphs following these analyses, the "actual" lines are ARIMA models of the actual ratios of .01↑/.00BAC driver fatalities for the relevant 72-month periods. The intervention dates are the effective dates of the ALS law in each state and are represented by the horizontal lines. The "predicted" lines in these graphs are ARIMA model predictions of .01↑/.00BAC driver fatalities for the thirty-six months post-ALS law data using the previous thirty-six months of actual data. These predictions were made without considering the ALS laws' intervention effect.

Lastly, for each state, three subsets of BAC data were analyzed to determine if the ALS laws produced declines in driver fatalities in the BAC ranges of .01-.07, .08-.14, or .15↑. As in the previous analyses, ratios of driver fatalities with alcohol involvement to driver fatalities without

287. IBM's SPSS program was used. The model of best fit was selected using IBM SPSS's expert modeler function.

alcohol involvement were used to control for specious factors. These three ratios are expressed as .01-.07/.00BAC, .08-.14/.00BAC, and .15↑/.00BAC. Again, ARIMA models of actual post-ALS law data were compared to ARIMA models of predicted post-ALS law data using a paired-sample t-test. For each state, the results are summarized in a table following the narrative analysis.

A. Virginia

Virginia's SVN/MVD predicted and actual lines are virtually the same indicating the ALS law had no effect in reducing drunken driving. The statistics further support this interpretation.[288] A paired-sample t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36 pairs) showed no statistically significant difference, t(35) = 1.114 and p =0.273.

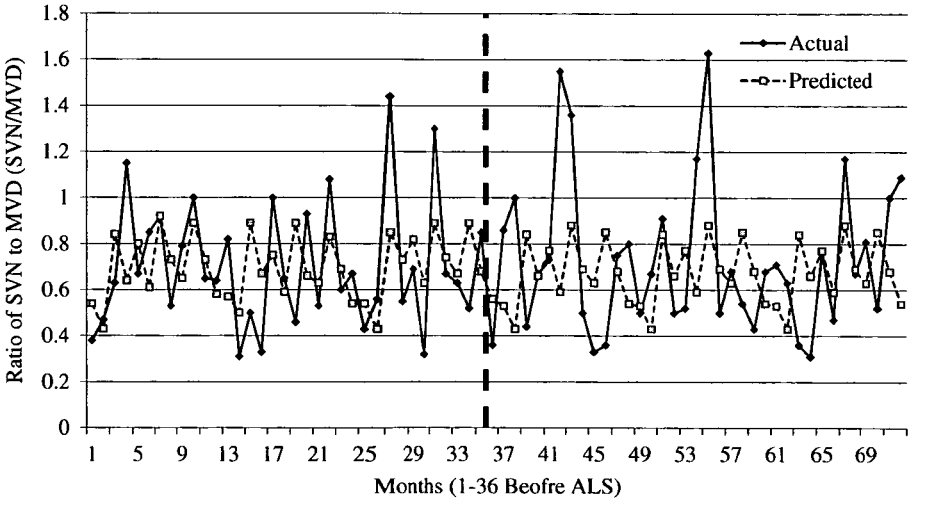

Figure 1. Virginia data before and after ALS

Virginia's .01↑/.00 BAC predicted line is a good fit to the pre-ALS law actual data, but a poor fit for the post-ALS law actual data. A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed a statistically significant difference between the two ratios, t(35) = 4.476 and p =0.000, at the 95% alpha level.[289]

288. The model of best fit is a simple seasonal model, with a stationary R-squared of 0.834. Mean absolute percentage error (MAPE) is 33.43, and the mean actual error (MAE) is 0.204. The mean ratio of the actual post ALS data was 0.74, with a standard deviation of 0.33. The mean ratio for the predicted post-ALS data was 0.67, with a standard deviation of 0.14.

289. The model of best fit is the Winters' Additive model, with a stationary R-squared of 0.902. MAPE is 20.421, and the MAE was 0.125. The mean ratio for the actual post-ALS data is

However, the ARIMA model predicted a continuous decline in driver fatalities while the actual data show an *increase* in driver fatalities after the initial decline. If this finding is valid, it suggests that the ALS law caused an *increase* in drunken driving of approximately 20%.[290] As discussed in Part II, the premise of deterrence theory is that increasing the severity, certainty, and swiftness of punishment can reduce crime. ALS laws increase the swiftness and certainty of punishment for drunken drivers. Logically, this should lead to a decrease in drunken driving after implementation of an ALS law. In contrast, Virginia's data demonstrated that drunken driving *increased* by 20% after implementation of its ALS law. This is an anomalous finding that indicates the ALS law was counterproductive.

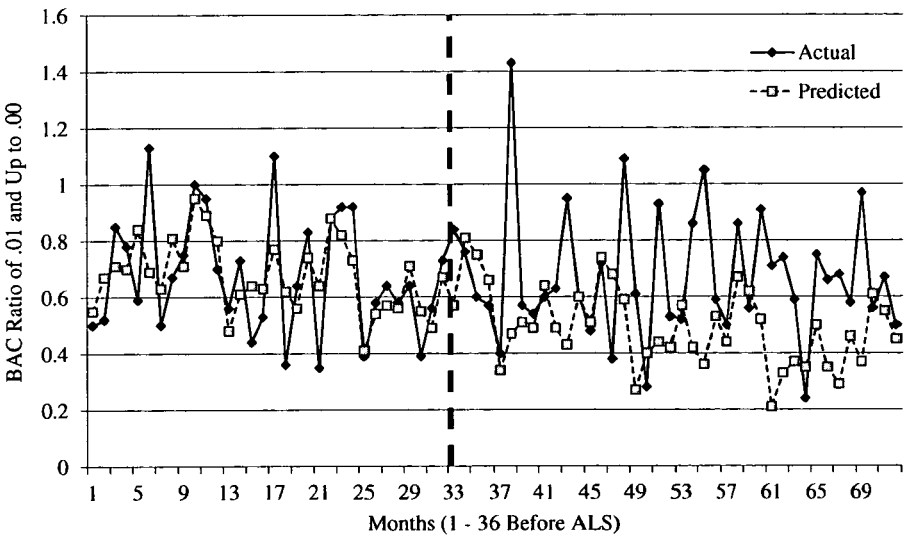

FIGURE 2. VIRGINIA FATAL CRASHES AND ALS IMPLEMENTATION

Virginia's three subsets of BAC data indicated no statistically significant differences in the .08-.14/.00BAC and .15↑/.00BAC ranges. The .01-.07/.00BAC category did have a significant finding, p = 0.011. This finding indicates the ALS law produced an *increase* in drunken driving of 3.41% in this category.[291] Again, if this finding is valid, it suggests the ALS law was counterproductive in reducing drunken driving.

0.673, with a standard deviation of 0.239. The mean ratio for the predicted post-ALS data is 0.472, with a standard deviation of 0.124.

290. The percentage change is calculated by subtracting the mean ratio for the predicted post-ALS data (0.472) from the mean ratio for the actual post-ALS data (0.673) or 0.673 - 0.472 = 0.201 or 20.1%. A positive difference indicates the ALS law increased drunken driving. A negative difference indicates the ALS law decreased drunken driving.

291. *See supra* note 290 for mathematical formula. 0.0903 - 0.0562 = .0341 or 3.41% increase.

TABLE 3

Virginia	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Simple Seasonal	Simple Seasonal	Simple Seasonal
Stationary R-squared	.796	.800	.888
MAPE[292]	54.681	29.881	29.562
MAE[293]	.029	.033	.112
Mean ratio of actual post-ALS data	.0903 (s.d. =.06135)	.1530 (s.d. = .07855)	.4103 (s.d. = .16145)
Mean ratio of predicted post ALS data	.0562 (s.d. = .03491)	.1260 (s.d. = .02868)	.4527 (s.d. = .08024)
t (35)	2.679	1.874	-1.420
p value	.011*	.069	.165

* Statistically significant at 95% alpha level.

B. SOUTH CAROLINA

South Carolina's SVN/MVD predicted line and actual line, with rather dramatic outliers in the actual data, suggest the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.[294] A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, t(35) = -1.503 and p = 0.142.

292. Mean absolute percentage error (MAPE).

293. Mean absolute error (MAE).

294. The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.789. Mean absolute percentage error is 38.509, and the mean actual error was 0.222. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.629 with a standard deviation of 0.261. The mean ratio for the predicted post-ALS data is 0.724, with a standard deviation of 0.245.

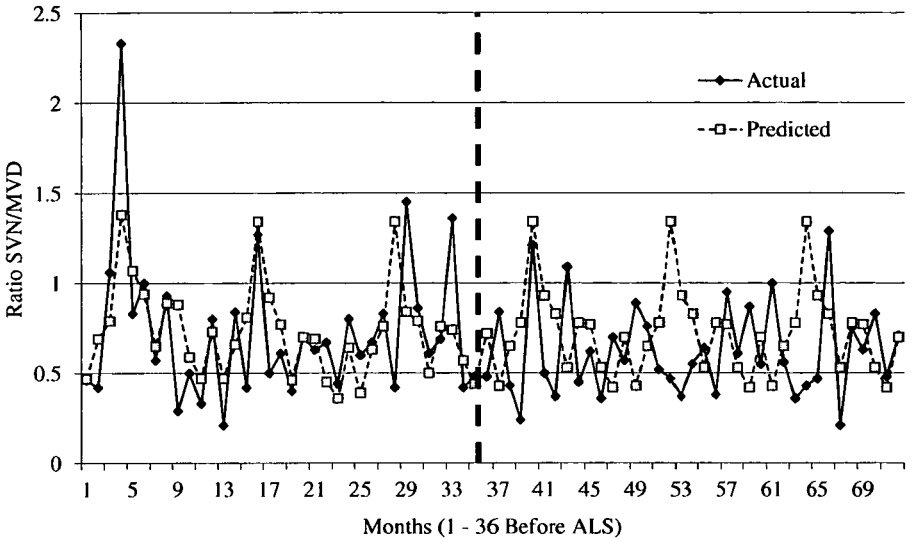

FIGURE 3. SOUTH CAROLINA BEFORE AND AFTER ALS

South Carolina's predicted line is a good fit for the actual data pre-ALS law, but a poor fit for the post-ALS law data. This indicates the predicted driver fatalities based on pre-ALS data are not a good fit for the post-ALS data. As can be seen, the model predicts a continuous decline in driver fatalities, while the actual data show an increase in driver fatalities after the initial decline. The statistics support this interpretation as well.[295] A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed a statistically significant difference between the two ratios, $t(35) = 7.614$ and $p = 0.000$. This finding shows the ALS law correlated with an *increase* in drunken driving of 43.4%.[296]

295. The model of best fit is the Winter's Multiplicative model, with a stationary R-squared of 0.763. MAPE is 21.496, and the MAE was 0.145. The mean ratio for the actual post-ALS data is 0.688, with a standard deviation of 0.259. The mean ratio for the predicted post-ALS data is 0.254, with a standard deviation of 0.149.

296. *See supra* note 290 for mathematical formula. 0.254 – 0.688 = 0.434 or 43.4% increase.

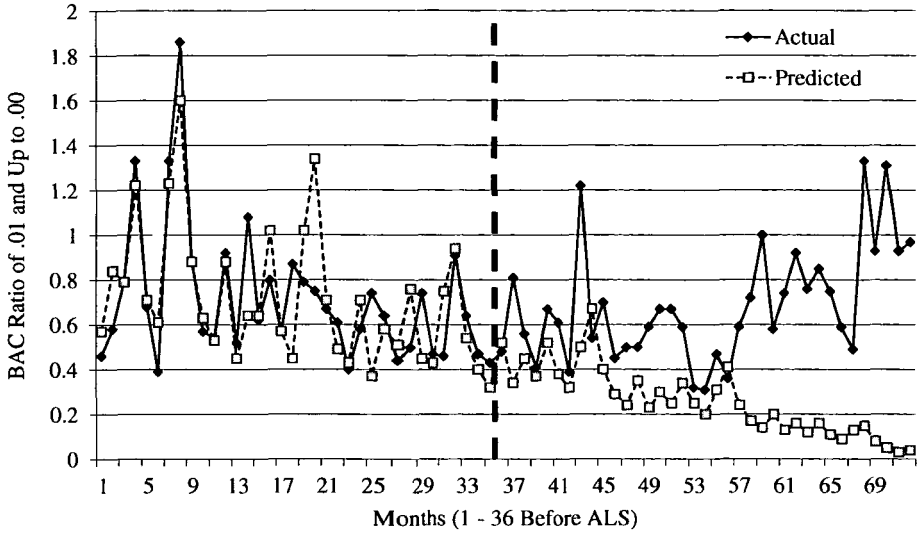

FIGURE 4. SOUTH CAROLINA FATAL CRASHES AND ALS IMPLEMENTATION

Each of South Carolina's subsets of BAC data indicate a statistically significant difference, p = 0.000. In the .01-.07/.00BAC category, p = 0.000, the finding shows the ALS law produced a 5.39% *increase* in driver fatalities with BAC's in this range.[297] In the .08-.14/.00 BAC category, p = 0.000, the finding indicates the ALS law caused a 13.62% *increase* in driver fatalities in this range.[298] In the .15↑/.00BAC category, p = 0.000, the finding shows the ALS law produced an *increase* of 27.54% in driver fatalities with a BAC in this range.[299]

TABLE 4

South Carolina	**.01-.07/.00 BAC**	**.08-.14/.00 BAC**	**.15↑/.00 BAC**
Model Used	Winters' Additive	Winters' Additive	Winters' Multiplicative
Stationary R-squared	.835	.865	.709
MAPE	46.077	33.059	31.469
MAE	.026	.062	.118
Mean ratio of actual post-ALS data	.0539 (s.d. = .03848)	.1645 (s.d. = .06817)	.4462 (s.d. = .18272)

297. 0.0539 – 0.0000 = 0.0539 or a 5.39% increase.
298. 0.1645 – 0.0283 = 0.1362 or a 13.62% increase.
299. 0.4462 – 0.1708 = 0.2754 or a 27.54% increase.

Mean ratio of predicted post-ALS data	.0000 (s.d. = .03720)	.0283 (s.d. = .07533)	.1708 (s.d. = .08867)
t(35)	5.508	7.401	7.225
p value	.000*	.000*	.000*

* Statistically significant at the 95% alpha level.

C. IDAHO

Idaho's SVN/MVD predicted line is a good fit for the actual data, except for those dramatic outliers at the end, suggesting that implementation of the ALS law had no effect in reducing the number of SVN fatalities. The statistics further support this interpretation.[300] A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, t(35) = -.783 and p = 0.439.

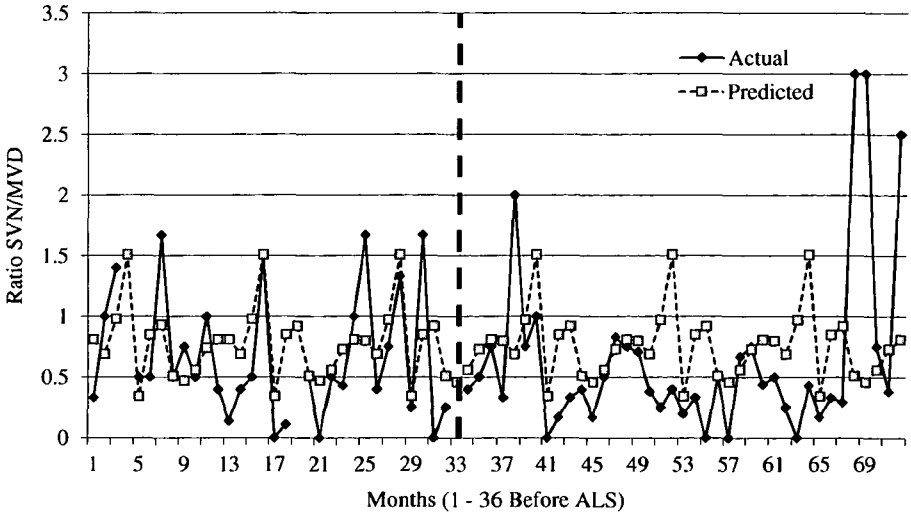

FIGURE 5. IDAHO BEFORE AND AFTER ALS

Idaho's .01→/.00BAC predicted line is a good fit for the actual data. The post-ALS predicted data are slightly higher than the actual data, suggesting the ALS law may have reduced the number of alcohol-involved fatalities. The statistics support this interpretation as well.[301] A paired

300. The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.664. MAPE is 79.327, and the MAE was 0.337. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.654, with a standard deviation of 0.499. The mean ratio for the predicted post-ALS data is 0.652, with a standard deviation of 0.763.

301. The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.855. MAPE is 65.30, and the MAE was 0.415. The mean ratio for the actual post-ALS data

samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed a statistically significant difference between the two ratios, t(35) = -2.027 and p = 0.05. This indicates that the number of alcohol related driver fatalities declined post-ALS, which suggests that the ALS law reduced drunken driving by 17.7%.[302]

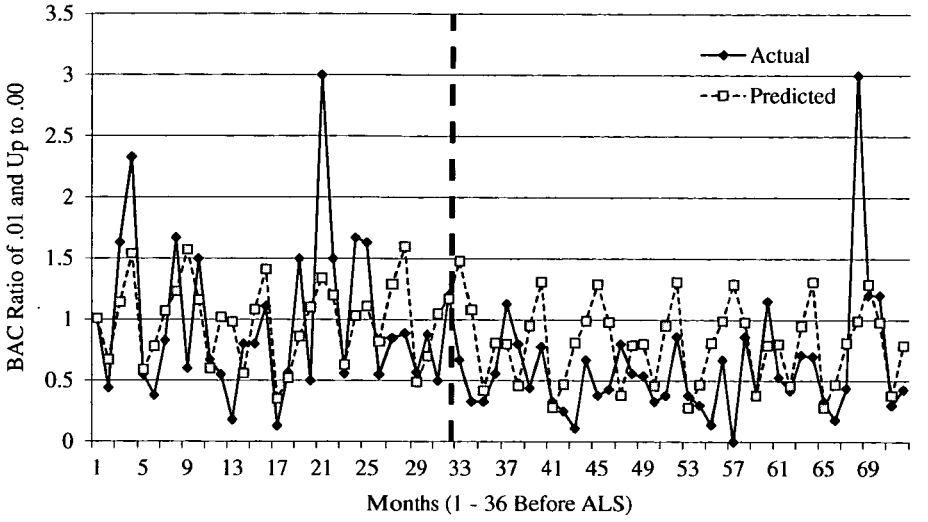

FIGURE 6. IDAHO FATAL CRASHES AND ALS IMPLEMENTATION

Idaho's three subsets of BAC data showed no statistically significant differences in the .01-.07/.00BAC and .15↑/.00BAC ranges. The finding in the category of .07-.14BAC approaches statistical significance at the 95% alpha level, p = 0.051. This finding indicates a reduction in drunken driving in this subcategory of 5.36%.[303] This is consistent with the finding in Figure 6 above, and suggests that Idaho's ALS law reduced drunken driving. If this is the case, the result is likely traceable to media and law enforcement efforts to apprise the public of the law. This finding may also be a false positive or type I error. A decline in drunken driving was only identified in two of the five datasets, and these results are inconsistent with the findings in Figure 5 above, which found Idaho's ALS law had no effect in reducing SVN fatalities. A summary of these results is provided in Table 5 below.

is 0.615, with a standard deviation of 0.511. The mean ratio for the predicted post-ALS data is 0.792, with a standard deviation of 0.328.

302. *See supra* note 290 for mathematical formula. 0.615 – 0.792 = -0.177 or a 17.7% decrease.

303. 0.1219 – 0.1755 = -0.536 or 5.36%.

TABLE 5

Idaho	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Simple Seasonal	Simple Seasonal	Simple Seasonal
Stationary R-squared	.693	.865	.845
MAPE	141.492	136.350	63.723
MAE	.064	.108	.269
Mean ratio of actual post-ALS data	.0608 (s.d. = .10449)	.1219 (s.d. = .12354)	.4340 (s.d. = .44894)
Mean ratio of predicted post-ALS data	.0665 (s.d. = .05527)	.1755 (s.d. = .09757)	.5173 (s.d. = .26043)
t(35)	-.276	-2.018	-1.149
p value	.784	.051*	.258

* Approaches statistical significance at the 95% alpha level.

D. NEBRASKA

Nebraska's SVN/MVD predicted line is a good fit for the actual data, except for those dramatic outliers at the end, suggesting that implementation of ALS had no effect on the number of SVN fatalities. The statistics support this interpretation as well.[304] A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, t(35) = -0.366 and p = 0.716.

Nebraska's .01↑/.00BAC predicted line is a good fit for the actual data indicating the ALS law had no effect in reducing drunken driving. The statistics further support this interpretation.[305] A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, t(35) = 0.992 and p = 0.328.

304. The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.839. MAPE is 59.168, and the MAE was 0.252. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.481, with a standard deviation of 0.382. The mean ratio for the predicted post-ALS data is 0.507, with a standard deviation of 0.275.

305. The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.843. MAPE is 40.498, and the MAE was 0.232. The mean ratio for the actual post-ALS data is 0.697, with a standard deviation of 0.435. The mean ratio for the predicted post-ALS data is 0.611, with a standard deviation of 0.301.

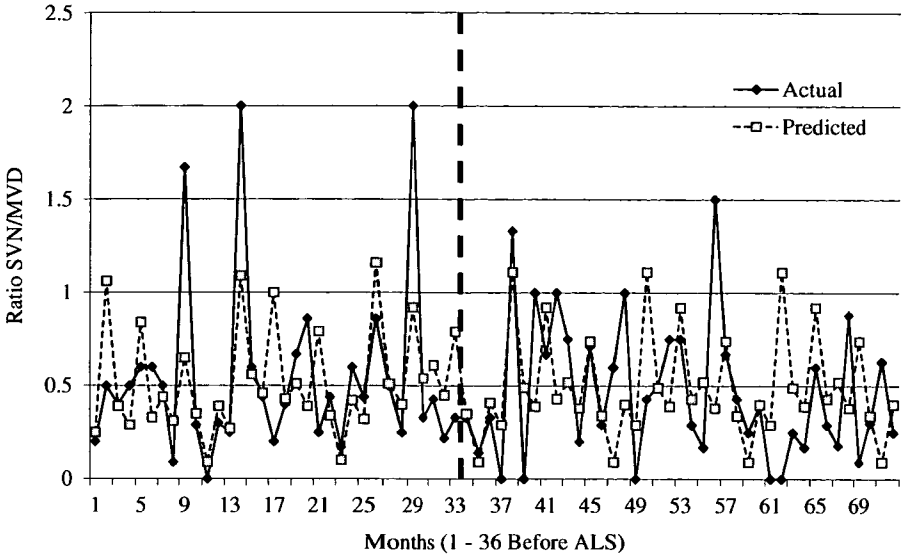

FIGURE 7. NEBRASKA BEFORE AND AFTER ALS

Nebraska's three subsets of BAC data showed no statistically significant differences in the .08-.14 or .15↑ ranges. There is a statistically significant finding in the .01-.07 category, p = 0.003. A summary of these findings is found in Table 6 below. This finding indicates a reduction in drunken driving in this category of 9.31%.[306]

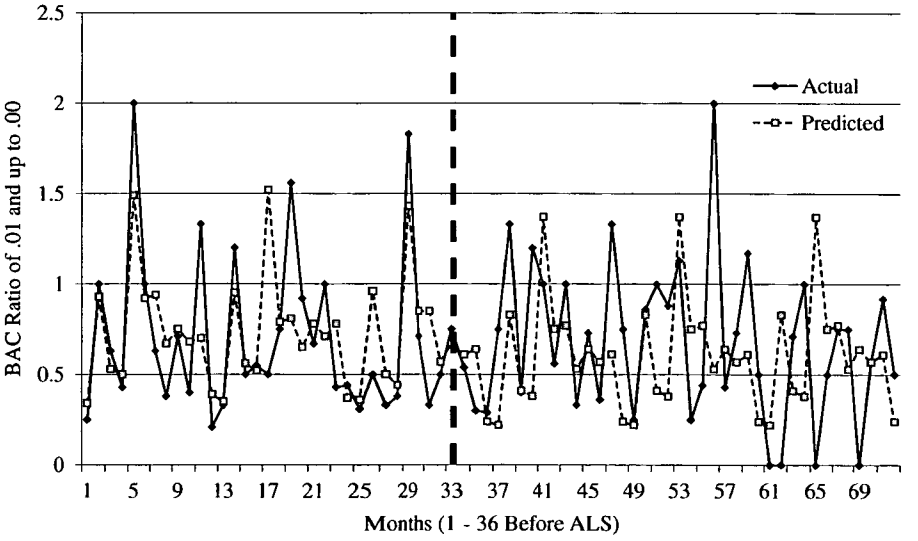

FIGURE 8. NEBRASKA FATAL CRASHES AND ALS IMPLEMENTATION

306. 0.0875 – 0.1806 = -0.0931 or a 9.31% decrease.

TABLE 6

Nebraska	**.01-.07/.00 BAC**	**.08-.14/.00 BAC**	**.15↑/.00 BAC**
Model Used	Simple Seasonal	Simple Seasonal	Simple Seasonal
Stationary R-squared	.834	.824	.845
MAPE	67.680	54.728	49.374
MAE	.097	.078	.140
Mean ratio of actual post-ALS data	.1806 (s.d. = .15586)	.1594 (s.d. = .18530)	.3676 (s.d. = .26171)
Mean ratio of predicted post-ALS data	.0875 (s.d. = .10208)	.1360 (s.d. = .11533)	.3797 (s.d. = .12718)
t(35)	3.210	.650	-.259
p value	.003*	.521	.797

* Statistically significant at 95% alpha level.

E. WYOMING

Wyoming's SVN/MVD predicted line is a good fit for the actual data, except for those dramatic outliers at the end, suggesting that implementation of ALS had no effect on the number of SVN fatalities. The statistics further support this interpretation.[307] A paired samples t-test comparing the post-ALS actual data to the post predicted data (N = 36) showed no statistically significant difference between the two ratios, t(30) = 0.405 and p = 0.689.

307. The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.872. MAPE is 87.65, and the MAE was 0.588. The mean ratio (SVN/MVD) for the actual post-ALS data is 1.02, with a standard deviation of 1.25. The mean ratio for the predicted post-ALS data is 0.927, with a standard deviation of 0.413.

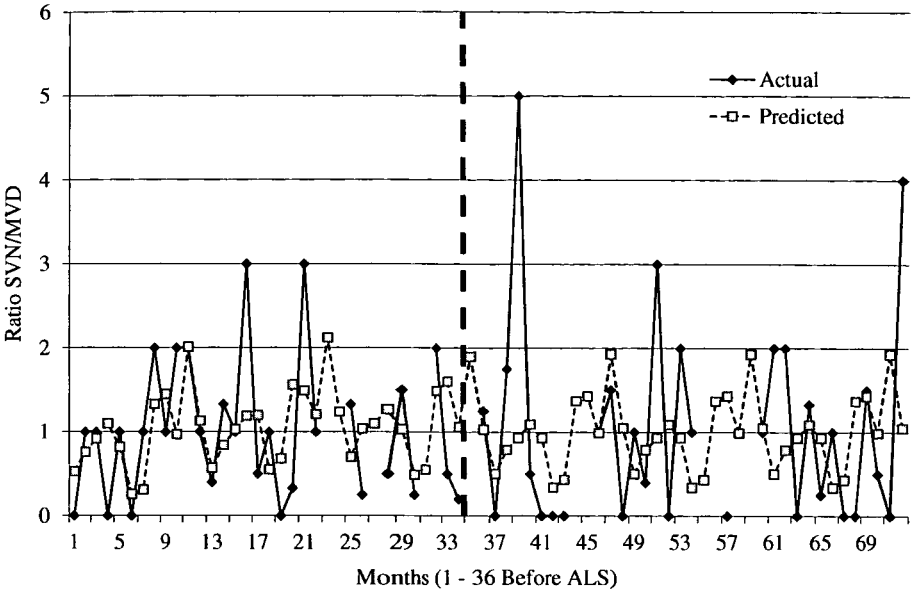

FIGURE 9. WYOMING BEFORE AND AFTER ALS

Wyoming's .01→/.00BAC predicted line is a fairly good fit for the actual data indicating the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.[308] A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, t(35) = -1.93 and p = 0.63.

308. The model of best fit is the simple seasonal model, with a stationary R-squared of 0.832. MAPE is 82.049, and the MAE was 0.668. The mean ratio for the actual post-ALS data is 1.133, with a standard deviation of 1.08. The mean ratio for the predicted post-ALS data is 1.533, with a standard deviation of 0.631.

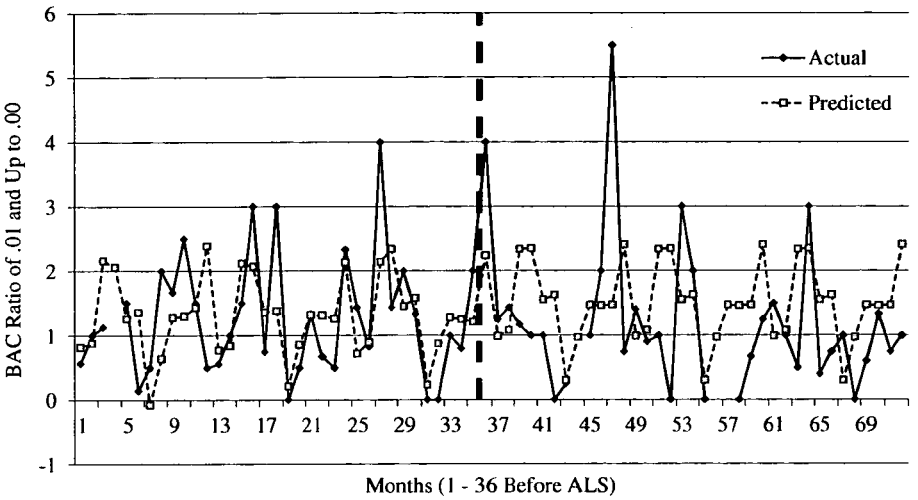

FIGURE 10. WYOMING FATAL CRASHES AND ALS IMPLEMENTATION

Wyoming's three subsets of BAC data showed no statistically significant differences in the .08-.14/.00BAC or .15↑/.00BAC ranges. There was a statistically significant finding in the .01-.07/.00BAC category, p = 0.000. This finding indicates the ALS law produced a 46.92% *increase* in drunken driving in this category.[309] A summary of these findings is provided in Table 7 below.

TABLE 7

Wyoming	**.01-.07/.00 BAC**	**.08-.14/.00 BAC**	**.15↑/.00 BAC**
Model Used	Winters' Additive	Simple Seasonal	Simple Seasonal
Stationary R-squared	.772	.870	.811
MAPE	110.370	116.837	115.165
MAE	.162	.250	.533
Mean ratio of actual post-ALS data	.1394 (s.d. = .32243)	.2521 (s.d. = .30941)	.8068 (s.d. = .69249)
Mean ratio of predicted post-ALS data	.6086 (s.d. = .20529)	.3222 (s.d. = .15964)	1.0200 (s.d. = .48661)
t(32)	-6.991	-1.167	-1.379
p value	.000*	.252	.177

* Statistically significant at 95% alpha level.

309. *See supra* note 290 for mathematical formula. 0.1394 – 0.6086 =.4692 or 46.92%.

F. New Hampshire

New Hampshire's SVN/MVD predicted line is a good fit for the actual data, except for those dramatic outliers at the end, suggesting the ALS law had no effect on reducing drunken driving. The statistics further support this interpretation.[310] A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, t(33) = 0.449 and p = 0.656.

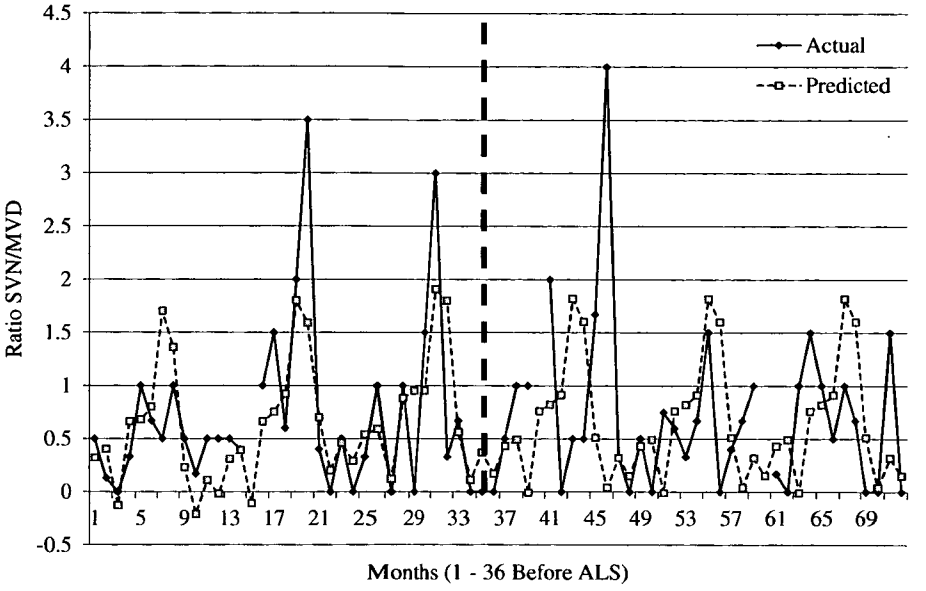

Figure 11. New Hampshire Before and After ALS

New Hampshire's .01↑/.00BAC predicted line is a good fit to the actual data, suggesting the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.[311] A paired samples t-test comparing the post actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, t(35) = 0.569 and p = 0.573.

310. The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.808. MAPE is 0.420, and the MAE was 0.420. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.743, with a standard deviation of 0.792. The mean ratio for the predicted post-ALS data is 0.665, with a standard deviation of 0.567.

311. The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.846. MAPE is 78.176, and the MAE was 0.47. The mean ratio for the actual post-ALS data is 0.881, with a standard deviation of 0.726. The mean ratio for the predicted post-ALS data is 0.807, with a standard deviation of 0.417.

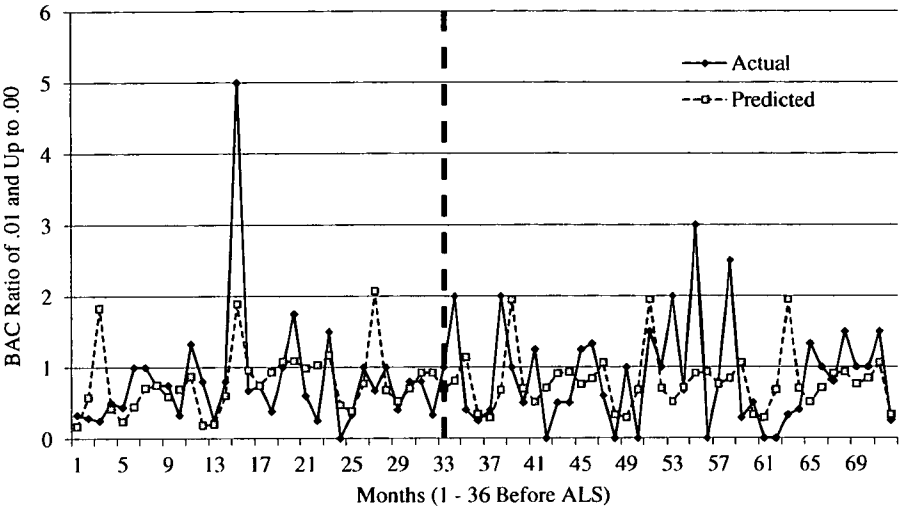

FIGURE 12. NEW HAMPSHIRE FATAL CRASHES AND ALS IMPLEMENTATION

New Hampshire's three subsets of BAC data revealed no statistically significant difference in the .15↑/.00 BAC range. Statistically significant changes were observed in the .01-.07/.00BAC and .08-.14/.00BAC categories. The finding in the .01-.07/.00 BAC category, p = 0.041, indicates that drunken driving *increased* by 12.48% as a result of the ALS law.[312] A statistically significant change was also detected in the .08-.14/.00BAC category, p = 0.034. This finding indicates a decrease in drunken driving of 7.81% due to the ALS law.[313] A summary of these findings is provided in Table 8 below.

312. 0.1477 – 0.0229 = 0.1248 or a 12.48% increase.
313. 0.1486 – 0.2267 = -0.0781 or 7.81% decrease.

TABLE 8

New Hampshire	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Simple Seasonal	Simple Seasonal	Simple Seasonal
Stationary R-squared	.898	.745	.852
MAPE	130.713	230.854	96.541
MAE	.046	.142	.419
Mean ratio of actual post-ALS data	.1477 (s.d. = .35859)	.1486 (s.d. = .18700)	.5824 (s.d. = .44669)
Mean ratio of predicted post-ALS data	.0229 (s.d. = .05738)	.2267 (s.d. = .11286)	.5852 (s.d. = .47834)
t(35)	2.125	-2.210	-.025
p value	.041*	.034*	.980

* Statistically significant at 95% alpha level.

G. WISCONSIN

Wisconsin's SVN/MVD predicted line and actual line, with the exception of the rather dramatic outliers, are a good fit indicating the ALS law had no effect on reducing drunken driving. The statistics further support this interpretation.[314] A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, t(35) = -1.509 and p = 0.140.

314. The model of best fit is an ARIMA simple seasonal, with a stationary R-squared of 0.877. MAPE is 28.74, and the MAE is 0.15. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.623, with a standard deviation of 0.274. The mean ratio for the predicted post-ALS data is 0.699, with a standard deviation of 0.272.

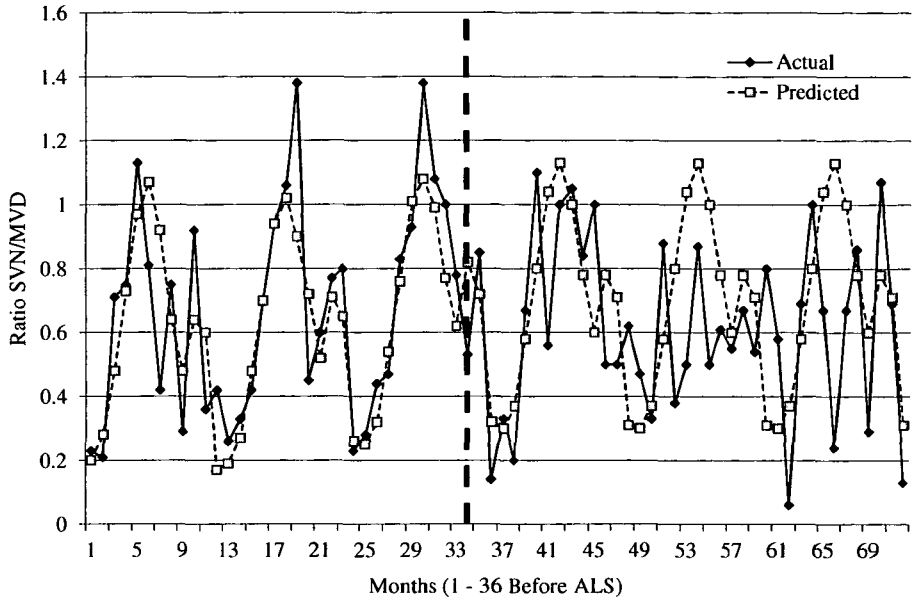

FIGURE 13. WISCONSIN BEFORE AND AFTER ALS

Wisconsin's .01↑/.00BAC predicted line is a fairly good fit to the actual data, indicating the ALS law had no effect in reducing drunken driving. The statistics support this interpretation as well.[315] A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, t(35) = -1.93 and p = 0.63.

315. The model of best fit is the simple seasonal model, with a stationary R-squared of 0.832. MAPE is 82.049, and the MAE was 0.668. The mean ratio for the actual post-ALS data is 1.133, with a standard deviation of 1.08. The mean ratio for the predicted post-ALS data is 1.533, with a standard deviation of 0.631.

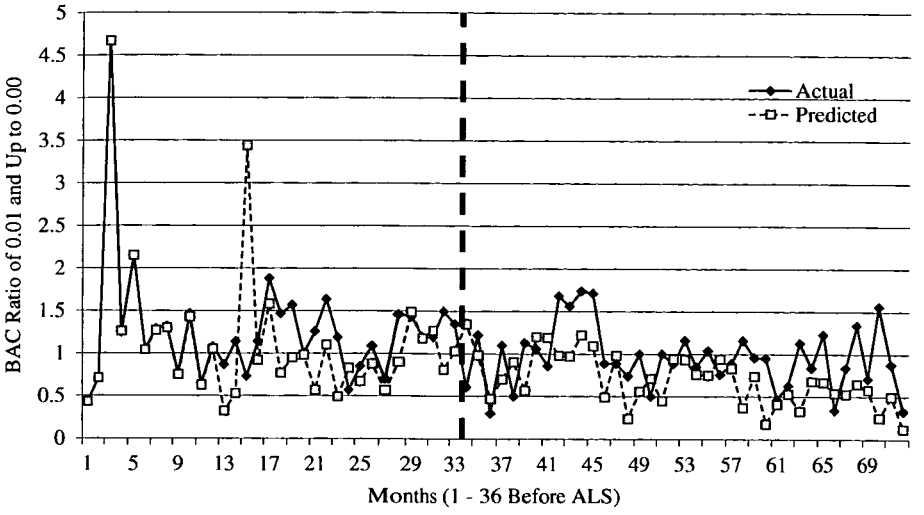

FIGURE 14. WISCONSIN FATAL CRASHES AND ALS IMPLEMENTATION

Wisconsin's three subsets of BAC data indicated no statistically significant difference in the .01-.07/.00BAC range. Statistically significant differences were detected in the .08-.14/.00BAC, p = 0.017, and .15↑/.00BAC, p = 0.000, categories. The finding in the .08-.14/.00BAC category indicates the ALS law caused a 5.27% reduction in driver fatalities within this BAC range.[316] The results in the .15↑/.00 BAC category indicate the ALS law caused a 60.44% *increase* in drunken driving.[317] A summary of these findings is provided in Table 9 below.

316. *See supra* note 290 for mathematical formula. 0.1765 – 0.2292 = -0.0527 or 5.27% decrease.

317. 0.6691 – 0.0647 = 0.6044 or 60.44% increase.

TABLE 9

Wisconsin	**.01-.07/.00 BAC**	**.08-.14/.00 BAC**	**.15↑/.00 BAC**
Model Used	Simple Seasonal	Simple Seasonal	Winters' Multiplicative
Stationary R-squared	.801	.893	.800
MAPE	83.030	60.828	44.026
MAE	.068	.087	.311
Mean ratio of actual post-ALS data	.1228 (s.d. = .09390)	.1765 (s.d. = .10464)	.6691 (s.d. = .27974)
Mean ratio of predicted post-ALS data	.1197 (s.d. = .06865)	.2292 (s.d. = .06397)	.0647 (s.d. = .23618)
t(35)	.171	-2.509	11.797
p value	.865	.017*	.000*

* Statistically significant at the 95% alpha level.

H. GEORGIA

Georgia's SVN/MVD predicted line is a good fit to the actual data, suggesting the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.[318] A paired samples t-test comparing the post-ALS known data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, t(35) = -0.76 and p = 0.940.

318. The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.826. MAPE is 27.798, and the MAE was 0.099. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.402, with a standard deviation of 0.017. The mean ratio for the predicted post-ALS data is 0.404, with a standard deviation of 0.099.

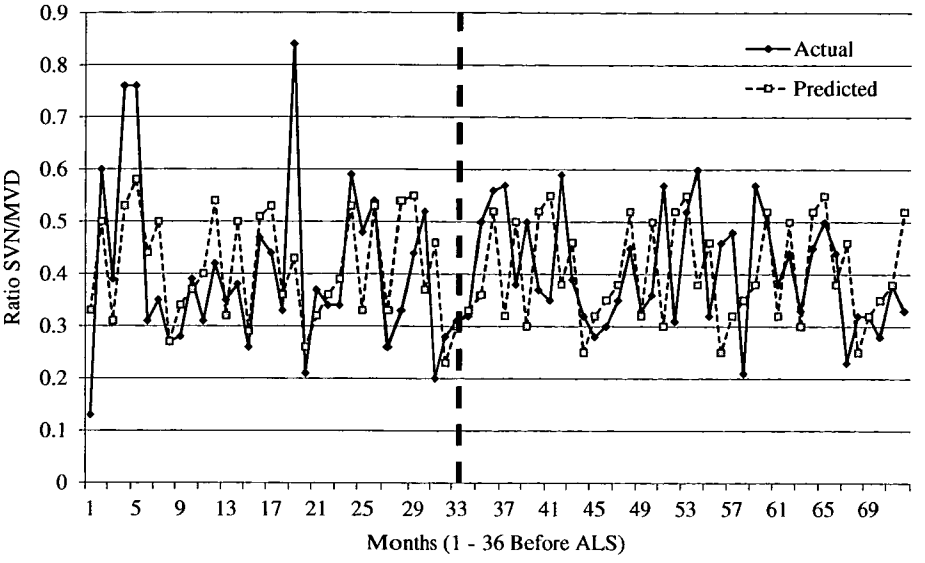

FIGURE 15. GEORGIA BEFORE AND AFTER ALS

Georgia's .01↑/.00BAC predicted line is a good fit to the actual data, suggesting the ALS law had no effect on reducing drunken driving. The statistics further support this interpretation.[319] A paired samples t-test comparing the post-ALS law known data to the post-ALS law predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = -0.815$ and $p = 0.421$.

319. The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.901. MAPE is 20.59, and the MAE was 0.104. The mean ratio for the actual post-ALS data is 0.509, with a standard deviation of 0.11. The mean ratio for the predicted post-ALS data is 0.529, with a standard deviation of 0.074.

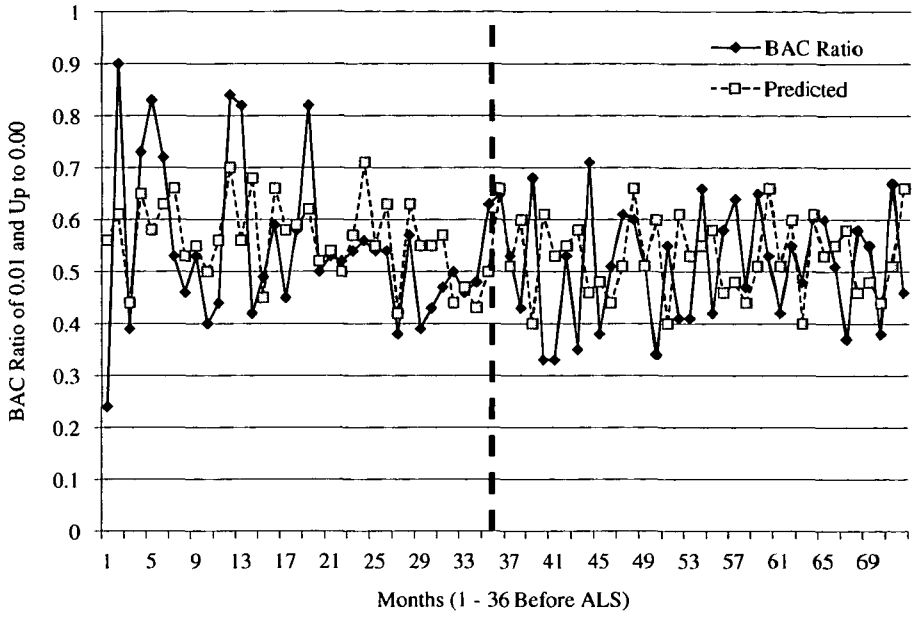

FIGURE 16. GEORGIA FATAL CRASHES AND ALS IMPLEMENTATION

Georgia's three subsets of BAC data showed no statistically significant differences in the .08-.14/.00 BAC or the .15↑/.00BAC categories. A statistically significant difference was detected in the .01-.07/.00 BAC category, p = 0.011. This finding indicates the ALS law produced a 3.41% *increase* in driver fatalities with a BAC in this range.[320]

320. 0.0903 – 0.0562 = 0.0341 or a 3.41% increase.

TABLE 10

Georgia	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Simple Seasonal	Simple Seasonal	Simple Seasonal
Stationary R-squared	.796	.800	.888
MAPE	54.681	29.881	29.562
MAE	.029	.033	.112
Mean ratio of actual post-ALS data	.0903 (s.d. = .06135)	.1530 (s.d. = .07855)	.4103 (s.d. = .16145)
Mean ratio of predicted post-ALS data	.0562 (s.d. = .03491)	.1260 (s.d. = .02868)	.4527 (s.d. = .08024)
t(35)	2.679	1.874	-1.420
p value	.011*	.069	.165

* Statistically significant at 95% alpha level.

VII. DISCUSSION

This research considered a diverse selection of states, the best data available, and utilized sophisticated statistical analyses to gauge the effectiveness of ALS laws, and found little or no support that ALS laws are effective in reducing drunken driving. If prior research was credible, and ALS laws were responsible for an approximate 5% reduction in drunken driving, then such declines should be readily apparent in the data. However, the empirical evidence from this study suggests that ALS laws do not deter drunken driving. These results are consistent with a large, but often ignored, body of literature.

For the eight states considered, two major categories of drunken driving data were considered (SVN/MVD and .01↑/.00BAC), along with three subcategories of drunken driving data (.01-.07/.00 BAC, .08-.14/.00 BAC, and .15↑/.00 BAC). Only Idaho revealed a statistically significant, $p = 0.05$, reduction in a major category of data. Idaho's data in the .01↑/.00 BAC category, $p = 0.05$, indicates the ALS statute reduced drunken driving by 17.7%. This positive finding in one of Idaho's major categories was supported by a marginally positive finding in the minor subcategory of .08-.14/.00BAC, $p = 0.051$. Of all the states, Idaho presented the best statistical proof that its ALS law reduced drunken driving. However, these two findings are offset by the lack of similar findings in Idaho's other major category, SVN/MVD, or in either of its .01-.07/.00BAC and .15↑/.00BAC subcategories. If Idaho's data were pooled, these marginally positive findings would evaporate leading to the conclusion that these positive finding are likely false positive or type I errors.

Nebraska, New Hampshire, and Wisconsin all had positive finding in

at least one subcategory of data, but these positive findings did not present in any of their major categories of data. Nebraska's subcategory, .01-.07/.00BAC, p = 0.003, indicated a 9.31% reduction in drunken driving in this range, but in no other category or subcategory. New Hampshire also had a positive finding in the .08-.14/.00BAC subcategory, p = 0.034, indicating a 7.81% reduction in drunken driving in this range. No reduction in drunken driving was identified in any other major category or subcategory for New Hampshire. New Hampshire's positive finding is negated by the positive finding in its .01-.07/.00BAC subcategory, p = 0.041, indicating an *increase* in drunken driving of 12.48% traceable to the ALS statute. Wisconsin produced similar results with a positive finding in the .08-.14/.00BAC, p = 0.017, or a decrease in drunken driving of 5.27%, but also exposed a positive finding in the .15↑/.00BAC category, p = 0.000, translating to an *increase* in drunken driving of 60.44% in this range. These inconsistent findings in the subcategories of the data lead to the conclusion that these results are likely false positives or type I errors. This interpretation is further supported by the data from several of the states demonstrating an *increase* in drunken driving after implementation of the ALS law.

More importantly, when the findings are considered *in toto*, there is absolutely no evidence that ALS laws reduced drunken driving in these states. If these data were pooled across states and variables, the marginally positive findings would be erased. This result is significant since the eight states tested represent approximately 20% of the forty-two states with ALS laws. This is wholly inconsistent with the literature urged by special interest groups such as MADD, IIHS, NTSB, and NHTSA indicating ALS laws reduce drunken driving by 5% to 12%.[321] This study confirms that the single-jurisdictional studies relied upon by these groups demonstrate short-lived results spurred on by factors other than the ALS laws, such as media attention and increased police enforcement. These findings are also consistent with findings by Ruhm,[322] Whetten-Goldstein et al.,[323] and Noland and Karlaftis[324] that all multi-jurisdictional, cross-sectional data studies are flawed due to omitted variable bias.

VIII. Conclusion

This research shows that ALS laws are not effective in reducing drunken driving. While ALS laws may not directly reduce drunken driving, that is not to say these laws lack benefit. ALS laws are more certain

321. *See supra* notes 25-28 and accompanying text.
322. Ruhm, *supra* note 114, at 446.
323. Whetten-Goldstein et. al., *supra* note 234, at 732.
324. Noland & Karlaftis, *supra* note 114, at 440.

to suspend an offender's license than a judicial post-conviction process.[325] By suspending the offender's license quickly, the offender is swiftly incapacitated and removed from the roadways.[326] Additionally, suspending the offender's license administratively appears to remove the offender's need to delay the companion criminal case and may increase the number of DUI guilty pleas.[327] The added costs of ALS law are typically self-supported by offenders' reinstatement fees.[328] Additionally, there are federal monies available to the states to offset the costs of initial implementation.[329]

All of these indirect benefits of ALS laws improve the legal system and may aid in reducing drunken driving. Further research is necessary to: 1) gauge the influence of ALS laws on the disposition of the underlying criminal case; 2) determine whether longer administrative license suspension periods, such as one year, produce better results; and 3) whether the expense of publicizing ALS laws is a cost effective means of reducing drunken driving.

Additionally, these remaining eight states cannot ignore the federal government's pressure on the states to adopt ALS laws. In addition to the DDPA grant funding discussed earlier, the federal government has implemented Federal Motor Carrier Safety Administration ("FMCSA") regulations that may require states to pass ALS laws, at least for commercial driver's licenses ("CDL").[330] In order to establish a national database of CDL suspensions for DUI convictions and implied consent violations while operating a commercial vehicle, the FMCSA established standards that every state must adopt.[331] These FMCSA regulations impose on all states an extremely broad definition of "conviction" for these offenses, which is inconsistent with traditional criminal law.[332] This cre-

325. ROBERT B. VOAS, A. SCOTT TIPPETS & EILEEN P. TAYLOR, EFFECTIVENESS OF THE OHIO VEHICLE ACTION AND ADMINISTRATIVE LICENSE SUSPENSION LAWS ii, 1 (2000), *available at* http://www.nhtsa.gov/people/injury/research/ohio/toc.html.

326. ROSS, *supra* note 100, at 7.

327. HOWARD RESEARCH, *supra* note 152, at 78-79.

328. LACEY, *supra* note 72, at 5.

329. JOHN H. LACEY, RALPH K. JONES & J. RICHARD STEWART, NAT'L HIGHWAY TRANSP. SAFETY ADMIN., DOT HS 807 689, COST-BENEFIT ANALYSIS OF ADMINISTRATIVE LICENSE SUSPENSION viii (1991).

330. 49 U.S.C. § 521 (2012).

331. 49 C.F.R. § 383.51(b) tbl.1 (2015).

332. 49 C.F.R. § 383.5 (2015). A conviction is defined as "an unvacated adjudication of guilt, or a determination that a person has violated or failed to comply with the law in a court of original jurisdiction or by an authorized administrative tribunal, an unvacated forfeiture of bail or collateral deposited to secure the person's appearance in court, a plea of guilty or nolo contendere accepted by the court, the payment of a fine or court cost, or violation of a condition of release without bail, regardless of whether or not the penalty is rebated, suspended, or probated."

ates a potential conflict when an offender's case is adjudicated in criminal court, but that adjudication is not a conviction under state criminal law. This would include diversion programs, probation, or dismissal upon payment of cost. However, the same adjudication may result in a conviction under FMCSA regulations, which would require the state to report it as such and suspend the offender's license. States must establish a system to identify and report convictions under FMCSA's regulations that may not be convictions under state law. Additionally, the state must establish an administrative process to suspend the CDL offender as required by FMCSA. A state that fails to establish such a process may be guilty of "masking" and subject to a loss of federal funds.[333] Given the complexities this process creates, states may be best served by adopting ALS laws, at least for CDL offenders.

Finally, post-conviction implied consent laws are considered ineffective because they lack uniformity with other states' laws in application, enforcement, and procedure.[334] If ALS laws are in place nationwide, it should produce results similar to mandatory jail time for first time DUI offenders, also encouraged by the federal government. While the minimum jail sentence varies from state to state, drivers are still generally aware that drunken driving will lead to incarceration regardless of which state they are arrested in. ALS laws in compliance with the DDPA will create a national system of immediate license suspension that will continue for at least ninety days. Ultimately, immediate administrative license suspension will become as familiar to drivers as minimum jail sentences are now. Since forty-two states and the District of Columbia have implemented ALS laws, it is likely just a matter of time before the remaining states are compelled to do the same.

333. 49 C.F.R. § 384.226 (2015).

334. Cafaro, *supra* note 60, at 101.