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The Effect of State Marijuana Legalizations: 2021 Update

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EXECUTIVE SUMMARY

In November 2012, Colorado and Washington approved ballot initiatives that legalized marijuana for recreational use under state law. Since then, nine additional states (Alaska, Oregon, California, Nevada, Maine, Vermont, Massachusetts, Michigan, and Illinois) plus the District of Columbia have followed suit, either by ballot initiative or legislative action. Voters in four other states (New Jersey, South Dakota, Arizona, and Montana) approved state ballot measures legalizing marijuana for personal use in the November 2020 election.

Supporters and critics make numerous claims about state-level marijuana legalizations. Advocates suggest that legalization reduces crime, raises tax revenue, lowers criminal justice expenditures, improves public health, increases traffic safety, and stimulates the economy. Critics argue that legalization spurs marijuana and other drug or alcohol use, increases crime, diminishes traffic safety, harms public health, and lowers teen educational achievement.

In previous work, we found that the strong claims made by both advocates and critics are substantially overstated and in some cases entirely without support from existing legalizations; mainly, state legalizations have had minor effects. This paper updates previous work to account for additional years of data and the increase in the number of states with legalized marijuana. Our conclusions remain the same, but our assessments of legalization's effects remain tentative because of limitations in the data. The existing data nevertheless provide a useful perspective on what other states should expect from legalization or related policies.

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INTRODUCTION

In November 2012, Colorado and Washington approved ballot initiatives that legalized marijuana for recreational use under state law.[1] Since then, nine additional states (Alaska, Oregon, California, Nevada, Maine, Vermont, Massachusetts, Michigan, and Illinois) plus the District of Columbia have followed suit, either by ballot initiative or legislative action.[2] Four additional states approved marijuana legalization in the 2020 November elections (New Jersey, South Dakota, Arizona, and Montana).

Supporters and critics make numerous claims about state-level marijuana legalization. Advocates suggest that legalization reduces crime, raises tax revenue, lowers criminal justice expenditures, improves public health, increases traffic safety, and stimulates the economy. Founder and executive director of the Drug Policy Alliance Ethan Nadelmann, for example, asserted in 2010 that legalization would help end mass incarceration and undermine illicit criminal organizations.[3] Former New Mexico governor and Libertarian Party presidential candidate Gary Johnson has also advocated for marijuana legalization, predicting it would lead to less overall substance abuse because individuals addicted to alcohol or other substances would find marijuana a safer alternative.[4] Even some law enforcement officials agree legalization lowers crime; Denver police chief Robert White, for example, said in 2014 that violent crime dropped almost 9 percent.[5]

Critics argue that legalization spurs marijuana and other drug or alcohol use, increases crime, diminishes traffic safety, harms public health, and lowers teen educational achievement.[6] Colorado Gov. John Hickenlooper, a Democrat, opposed initial efforts to legalize marijuana because he thought the policy would, among other things, increase the number of children using drugs.[7] Former U.S. Attorney General Edwin Meese III, who is now the Heritage Foundation's Ronald Reagan Distinguished Fellow Emeritus, and Charles Stimson, also with the Heritage Foundation, have argued that violent crime surges when marijuana is legally abundant and that the economic burden of legalization far outstrips the gain.[8] Kevin Sabet, former senior White House drug policy adviser in the Obama administration, called Colorado's marijuana legalization a mistake, warning that potential consequences may include high addiction rates, spikes in traffic accidents, and reductions in IQ.[9] David Murray, a senior fellow with the Hudson Institute, and John Walters, a former director of the White House Office of National Drug Control Policy and president and CEO of the Hudson Institute, claimed in 2014 that "what we saw in Colorado has the markings . . . of a drug use epidemic" and argued that there was a thriving underground marijuana market in Colorado and that more research on marijuana's societal effects should be completed before legalization is considered.[10] John Walsh, the U.S. attorney for Colorado, defended the targeted prosecution of medical marijuana dispensaries located near schools by citing figures from the Colorado Department of Education showing dramatic increases in drug-related school suspensions, expulsions, and law enforcement referrals between 2008 and 2011.[11] Denver District Attorney Mitch Morrissey pointed to the 9 percent rise in felony cases submitted to his office from 2008 to 2011, after Colorado's marijuana laws had been partially liberalized, as evidence of marijuana's social effects.[12]

Reviews of the literature on the first wave of marijuana decriminalizations in the 1970s note that marijuana use did not change in response to relaxed restrictions.[13] Analysis of the recent U.S. state legalizations is more limited, but broader research suggests little to no effect of decriminalization on drug use.[14]

In previous work, we assessed these claims based on data from states that had legalized the recreational use of marijuana by mid-2018. In this paper, we update our earlier work to account for an additional two years of data, both from those initial states and from others that have since legalized marijuana.[15]

Our earlier conclusion was that the strong claims made by both advocates and critics are substantially overstated and in some cases entirely without real-world support. At the time,

our data showed that state-level legalization of marijuana had generally minor effects. One notable exception was the increase in state tax revenue from legalized marijuana sales; states with legal marijuana markets have collected millions of dollars in state tax revenues. As of July 2020, all but two jurisdictions with legalized marijuana had opened the door for retail sales. Although both Vermont and the District of Columbia officially allow marijuana consumption, neither permits the substance to be bought or sold on the market.

New data reinforce our earlier conclusions. Even with two additional years, however, the data available for before-and-after comparisons are limited, so our assessments of the effects of legalization remain tentative. Nevertheless, the existing data provide a useful perspective on what other states should expect from legalization or related policies.

HISTORY OF STATE-LEVEL MARIJUANA LEGALIZATIONS

Until 1913, marijuana was legal throughout the United States under both state and federal law.[16] Beginning with California in 1913 and Utah in 1914, however, states began outlawing marijuana, and by 1930, 30 states had adopted marijuana prohibition. Those state-level prohibitions stemmed largely from anti-immigrant sentiments and particularly from racial prejudice against Mexican migrant workers, who were often associated with the use of the drug. Prohibition advocates attributed terrible crimes to marijuana and the Mexicans who smoked it, stigmatizing marijuana use and the purported "vices" that resulted from it.[17] Meanwhile, film productions, such as the 1936 movie *Reefer Madness*, presented marijuana as "Public Enemy Number One" and suggested that its consumption could lead to insanity, death, and even homicidal tendencies.[18]

Starting in 1930, the Federal Bureau of Narcotics pushed states to adopt the Uniform State Narcotic Drug Act and to enact their own measures to control marijuana distribution.[19] In 1937, Congress passed the Marihuana Tax Act, which effectively outlawed marijuana under federal law by imposing a prohibitive tax; stricter federal laws followed.[20] The 1952 Boggs Act and the 1956 Narcotics Control Act established mandatory sentences for drug-related violations; a first-time offense for marijuana possession carried a minimum sentence of 2–10 years in prison and a fine of up to $20,000.[21] While those mandatory sentences were mostly repealed in the early 1970s, President Ronald Reagan reinstated them under the Anti-Drug Abuse Act of 1986. The current federal legislation controlling marijuana possession, use, and distribution is the Controlled Substances Act, which was published in 1971 and classifies marijuana as a Schedule I drug. This category is for drugs that, according to the Drug Enforcement Administration, have "no currently accepted medical use and a high potential for abuse" as well as a risk of creating "severe psychological and/or physical dependence."[22]

Despite this history of increasingly draconian federal action against marijuana (and other drugs), individual states have been backing away from marijuana prohibition since the 1970s. Eleven states decriminalized the possession or use of limited amounts of marijuana between 1973 and 1978, including, in chronological order, Oregon, Alaska, California, Colorado, Maine, Minnesota, Ohio, Mississippi, New York, North Carolina, and Nevada.[23] However, not all states followed such a straightforward path toward marijuana liberalization. Alaska, for example, decriminalized marijuana use and possession in one's home in 1975, but in 1990, a voter initiative recriminalized possession and use of marijuana. A second decriminalization wave began when Nevada defelonized marijuana possession in 2001; 19 more states and the District of Columbia have since adopted similar reforms.[24] By the mid-1990s, amid mounting scientific evidence pointing to marijuana's potential medicinal benefits—including treating chronic pain, glaucoma, Alzheimer's, Parkinson's, epilepsy, and other medical conditions—various states began to legalize medical marijuana but restricted access only to patients who satisfied strict criteria.[25] Over the

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past two decades, 33 states and the District of Columbia have legalized marijuana for medical purposes, significantly expanding the number of patients eligible for medical marijuana prescriptions. In some states, these medical regimes approximate de facto legalization.[26]

The most dramatic cases of states undoing earlier prohibitions and departing from federal policy have occurred in those states that have legalized marijuana for recreational as well as medical purposes (Colorado, Washington, Oregon, Alaska, California, Nevada, Maine, Massachusetts, Illinois, Michigan, and Vermont). Nearly every state that has legalized marijuana thus far has done so through citizen-driven ballot initiatives. After formally legalizing marijuana, states normally take one to two years to set up regulatory regimes, establish licensing guidelines, and impose marijuana taxes; only then can the first marijuana shops open.

In the 2020 elections, more states' ballots included measures to liberalize their marijuana laws. New Jersey, South Dakota, Arizona, and Montana passed ballot measures legalizing marijuana for recreational use. Mississippi and South Dakota voters likewise approved ballot measures legalizing medical marijuana. As of November 2020, the Marijuana Policy Project listed 23 states with bills to legalize marijuana, 14 with bills to decriminalize marijuana, and 12 with bills to create medical marijuana programs.[27]

Although states' paths differ in some ways, most follow a pattern of first decriminalizing, then medicalizing, and then legalizing. One exception is Michigan, which did not decriminalize marijuana statewide prior to legalizing medical marijuana—although many cities had adopted local decriminalization laws by that time.[28] Another is Vermont, which legalized medical marijuana in 2004, nine years before decriminalizing it in 2013.[29] For states following the usual decriminalize-medicalize-legalize pattern, their experiences with decriminalization and medical legalization inform the expected effects of total legalization, since these partial measures often serve as steps toward that end.

KEY DATES

To determine the effects of legalization and other policy changes on marijuana use, we examine the trends before and after the changes. We focus on recreational marijuana legalizations, because earlier work has covered other marijuana policy modifications, such as medicalization.[30]

The specific statewide legalizations we consider are Colorado (2012), Washington (2012), Oregon (2014), Alaska (2014), California (2016), Nevada (2016), Maine (2016), Massachusetts (2016), Vermont (2018), Michigan (2019), and Illinois (2020).

Our analysis examines whether the trends in marijuana use and related outcomes changed substantially after these dates. We consider trends in alcohol and drug use, suicides, crime, traffic fatalities, and economic conditions. Any observed changes may, however, be due to other factors and do not necessarily implicate marijuana policy. Similarly, an absence of changes does not prove that policy changes had no effect; a confounding variable operating in the opposite direction might have approximately offset the policy change.

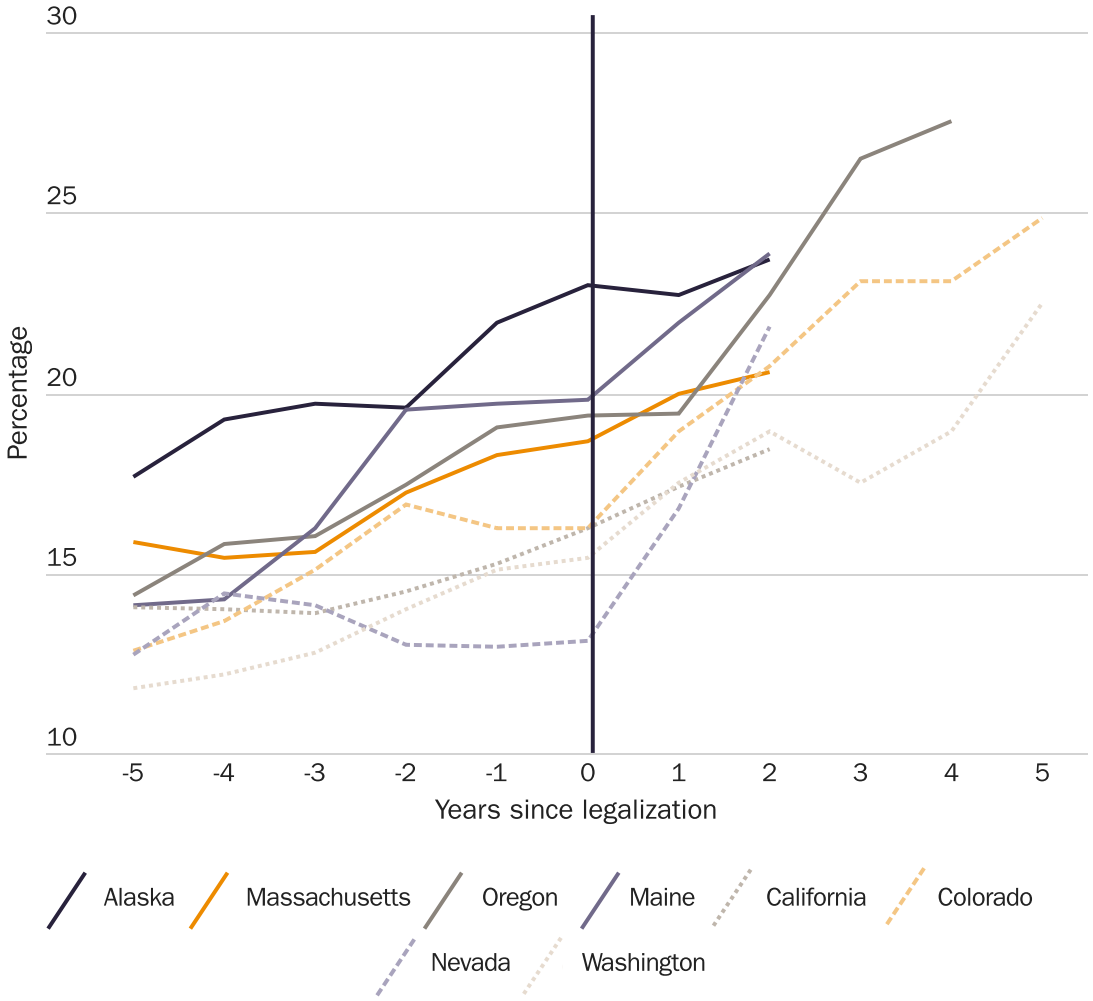
MARIJUANA AND OTHER SUBSTANCE USE

One of the most important potential effects of marijuana legalization is increased marijuana use. If increases are minimal, then the other effects of legalization are also likely to be minimal since ancillary effects depend on use.

Figure 1 displays the trends in prevalence of marijuana use in eight states in the 12 months prior to the National Survey on Drug Use and Health from the Substance Abuse and Mental Health Services Administration (SAMHSA). The data are from people aged 12 and older. These prevalence data derive from self-reports in the SAMHSA surveys of drug and alcohol use. The vertical line in the graph marks the year of legalization in the states. Use in states where marijuana is legal tends to be higher than use in the United States overall, but this difference mainly pre-dates

Figure 1

Past year marijuana use rate



Source: "National Survey on Drug Use and Health (NSDUH)," Substance Abuse and Mental Health Services Administration, 2003–2018, https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health.

legalization. Among the 11 states that have legalized it, marijuana use rates in 2011—prior to any legalization—averaged 15 percent compared with the national rate of 11.6 percent. Only Illinois's was lower, at 11.4 percent.[31]

In many states, use increased modestly in the years leading up to legalization. For example, Maine's participation rate hovered around 12–13 percent between 2003 and 2009; it then increased to 14 percent in 2011, 16 percent in 2013, and 19 percent from 2014 through 2016. After legalization in 2016, the increase continued to 22 percent in 2017 and almost 24 percent in 2018. Similarly, marijuana use in Massachusetts began increasing in 2012, several years prior to its legalization in 2016. Maine and Massachusetts track the pattern previously seen with early legalizers (Colorado, Washington, Alaska, and Oregon) of increases in use prevalence in the few years leading up to legalization. California's pre-trend is less pronounced, and Nevada's is flat. Vermont, Michigan, and Illinois demonstrate a similar increase pre-legalization, but data for the years following legalization are not yet available. Legalizing states display higher and increasing rates of use prevalence, but these patterns existed prior to legalization.

Much of the concern surrounding marijuana legalization relates to its possible effect on youth. Many, for example, fear that expanded access—even if legally limited to adults age

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21 and over—might increase use among teenagers, with negative effects on cognitive development, educational outcomes, or other behaviors. For instance, Madeline Meier and others analyzed a large sample of individuals tracked from birth to age 38 and found that those who smoked marijuana most heavily prior to age 18 lost an average of eight IQ points, a highly significant drop.[32] However, other studies have found results that rebut such claims. Claire Mokrysz and others examined an even larger sample of adolescents and, after controlling for many potentially confounding variables, discover no significant correlation between teen marijuana use and IQ change.[33] Deborah Cobb-Clark and others show that much of the relationship between marijuana use and educational outcomes is likely due to selection, although there is possibly some causal effect in reducing university entrance scores.[34] Evidence from Daniel McCaffrey and others supports this selection explanation of the association between marijuana use and educational outcomes.[35] M. Christopher Roebuck, Michael T. French, and Michael L. Dennis suggest that chronic marijuana use, not more casual use, likely drives any relationship between marijuana use and school attendance.[36] Olivier Marie and Ulf Zölitz estimate grade improvements are likely due to improved cognitive functioning among students whose nationalities prohibited them from consuming marijuana.[37] Jan C. van Ours and Jenny Williams concluded that cannabis may reduce educational outcomes, particularly with early onset of use.[38] Other studies discuss additional evidence on likely negative effects of early onset of use.[39]

Figure 2 in the Appendix shows self-reported youth marijuana use in the 30 days prior to the survey date, using data from the Youth Risk Behavior Surveillance System, a survey of health behaviors conducted in middle schools and high schools. Surveys are conducted in odd-numbered years. Washington and Oregon do not participate in this survey. Nationally, the trend is toward fewer youth reporting marijuana use. Youth participation rates are reportedly higher in legalizing states than in the United States as a whole. Of the six states with post-legalization data, in four—Maine, Massachusetts, Alaska, and Colorado—adolescent use reportedly decreases in the years immediately prior to legalization and then returns roughly to prior use rates. The available data show no obvious effect of legalization on youth marijuana use.

The high and increasing rates of marijuana use prior to legalization (shown in Figure 1) might provide evidence for a cultural explanation behind the recent swell of legalizations: as marijuana becomes more commonplace and less stigmatized, residents and legislators become less opposed to legalization. In essence, rising marijuana use may not be a consequence of legalization but a cause of it.

Consistent with this possibility, Figure 3 in the Appendix plots data on perceptions of risk from monthly marijuana use, collected between 2002 and 2018.[40] All states that have legalized marijuana fall below the average U.S. risk perception. This is consistent with the view that attitudes toward marijuana fostered both policy changes and increasing use rates. In some states, risk perceptions rose around the time of legalization. This rise may have resulted from public safety and anti-legalization campaigns that cautioned residents about the dangers of marijuana use.

Data on marijuana prices may also shed light on marijuana use rates. Before legalization, advocates in some states hypothesized that marijuana use might soar post-legalization because prices would plunge. For example, Dale Gieringer, director of the California branch of the National Organization for Reform of Marijuana Laws, testified in 2009 that in a "totally unregulated market, the price of marijuana would presumably drop as low as that of other legal herbs such as tea or tobacco—on the order of a few dollars per ounce—100 times lower than the current prevailing price of $300 per ounce."[41] A separate study by the RAND Corporation estimated that marijuana prices in California would fall by 80 percent after legalization.[42] These analyses consider

legalization at both the state and federal levels, which would allow for additional avenues for lower prices such as economies of scale but also for additional avenues for higher prices because of federal taxation and advertising.

Using crowd-sourced, real-time information from thousands of marijuana buyers in each state, we derived monthly average prices of marijuana in Colorado, Washington, Oregon, and California (see Figure 4).[43] In Colorado and Washington, monthly average prices declined post-legalization and have remained fairly steady over the past several years. The price of high-quality marijuana hovers around $230 per ounce in Washington and about $10 higher in Colorado. The opening of cannabis shops seems to have had little effect on prices. Oregon prices rose after legalization, leveling off at around $210. California has experienced a continued, slight upward trend in prices post-legalization, with prices currently slightly higher than prices in Washington. Although we cannot draw a conclusive picture based on consumer-reported data, the price of marijuana has not plunged as some predicted.

The convergence in prices across states is consistent with the idea that legalization diverts marijuana commerce from underground markets to legal retail shops, allowing retailers to charge a premium as the preferred sources of supply. One further trend we observed in Colorado, Washington, and California is a widening price gap between high-quality and medium-quality marijuana. Among other things, this gap may be the result of fewer information asymmetries in the marijuana market. In underground markets, it can be hard to know the true quality of a product.

Marijuana trade is complex, with hundreds of different strains and varieties. Yet in underground markets, consumers often have a difficult time differentiating them and may end up paying similarly high prices for medium- and high-quality marijuana. In Colorado, Washington, and California, the gap between the prices rose after legalization, suggesting that consumers have had an easier time distinguishing different qualities and strains. Overall, these data suggest no major drop in marijuana prices after legalization and,

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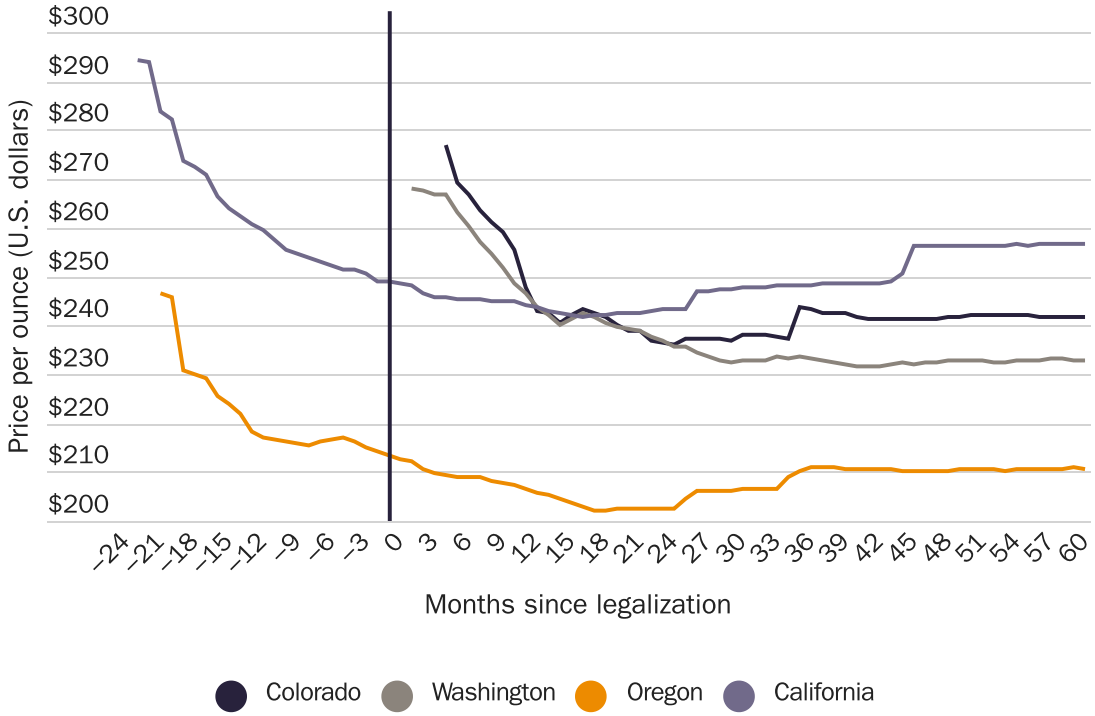
Figure 4

Monthly price of marijuana



Source: PriceOfWeed.com, accessed via Wayback Machine.

> "Medical marijuana, as a less risky pain reliever, may help lessen the rate of drug deaths and suicides."

consequently, less likelihood of soaring use rates because of cheaper marijuana.

We also consider whether legalization affected cocaine and alcohol use. Opponents of legalization claim that legalizing marijuana facilitates consumption of other drugs such as cocaine. Figure 5 in the Appendix presents state-level estimates of respondents' past-year cocaine use relative to the national trend and year of legalization.[44] These data suggest no clear relationship between marijuana legalization and cocaine use. Although Oregon saw an upward trend in cocaine use after legalization, Massachusetts saw a downward trend. In other states, including Washington and Maine, cocaine use rates are consistent with nationwide trends.

Supporters of legalization claim that legalizing marijuana led some consumers to switch from drinking alcohol to using marijuana, a safer substance.[45] Figure 6 in the Appendix presents state-level estimates of alcohol use in the 30 days prior to the administration of the survey relative to the national trend.[46] These data show no clear relationship between marijuana legalization and alcohol use. Alcohol use increased more than the national trend in Washington (1 percentage point more), Massachusetts (2.3 percentage points), California (1.9 percentage points), and Oregon (1.2 percentage points) but decreased in Colorado (–0.75 percentage points), Maine (–1.4 percentage points), Alaska (–1.1 percentage points), and Nevada (–1.8 percentage points).

HEALTH AND SUICIDES

Previous studies have suggested a link between medicalization of marijuana and a lower suicide rate, particularly among demographics most likely to use marijuana (males age 20–39).[47] Others claim marijuana can be an effective treatment for bipolar disorder, depression, and other mood disorders—not to mention a safer alternative to alcohol.[48] Moreover, the pain-relieving element of medical marijuana may help patients avoid more harmful prescription painkillers and tranquilizers.[49] Conversely, certain studies suggest excessive marijuana use may increase the risk of depression, schizophrenia, unhealthy drug abuse, and anxiety.[50] Some research also warns about long-lasting cognitive damage if marijuana is consumed regularly, especially at a young age.[51]

In 2017, the National Academy of Sciences conducted an extensive review of research on marijuana and mental health.[52] It concluded that marijuana use is associated with the development of psychotic disorders, although this relationship "may be multidirectional and complex." The relationship between marijuana use and other mental health outcomes, it concluded, is mixed and frequently confounded by alcohol use. It is also important to note that association is not causation and that mental health conditions might drive some people to use marijuana rather than marijuana use causing mental health conditions.

Figure 7 in the Appendix displays the yearly state suicide rate, relative to the national rate, before and after legalization (vertical line) for each state that legalized marijuana between 1999 and 2018.[53] It is difficult to see any association between marijuana legalization and changes in suicide trends. Previous research has suggested a link between medical marijuana use and lower suicide rates; that effect also is not obvious here, perhaps because many states had already legalized medical marijuana before fully legalizing it. The link between medical marijuana and lower suicide rates may stem partly from the fact that medical marijuana can substitute for other, more dangerous painkillers and opiates. Research by Anne Case and Angus Deaton found that suicides and drug poisonings led to a marked increase in mortality rates of middle-aged white non-Hispanic men and women in the United States between 1999 and 2013. Other studies have linked opioid and painkiller overdoses to a recent surge in self-inflicted drug-related deaths and suicides. Thus, medical marijuana, as a less risky pain reliever, may help lessen the rate of drug deaths and suicides.[54]

CRIME

In addition to health outcomes, marijuana legalization might affect crime rates. Opponents of marijuana legalization believe use can increase crime rates partly through the psychopharmacological effects on users.[55] In the lead-up to the 2012 referendums in the states surveyed, police chiefs, governors, policymakers, and concerned citizens spoke out against marijuana, citing its purported links to crime. For example, Sheriff David Weaver of Douglas County, Colorado, warned in 2012, "Expect more crime, more kids using marijuana, and pot for sale everywhere."[56] They also argued that expanding drug commerce could increase marijuana commerce in violent underground markets and that legalization would make it easy to smuggle the substance across borders to locations where it remained prohibited, thus causing negative spillover effects.[57]

Proponents of marijuana legalization argue that legalization reduces crime by diverting marijuana production and sale from underground markets to legal venues. This shift may be incomplete if high tax rates or significant regulation keep substantial amounts of marijuana commerce in semi-legal or underground markets, but this merely underscores the argument that more widespread legalization could reduce crime. At the same time, legalization may lower the burden on law enforcement to patrol for drug-related offenses, freeing up financial and personnel resources for law enforcement to address more severe crimes. Supporters of marijuana legalization also dispute the claim that marijuana increases neurological tendencies toward violence or aggression.[58]

Figure 8 in the Appendix presents monthly violent crime rates in the legalizing states relative to the U.S. average from 2000 to 2018.[59] Most state trends track the U.S. trend leading up to legalization, with the graphed difference essentially flat. Post-legalization, trends in many states tracked the national trend while violent crime in Maine and Nevada decreased by 90 and 178 crimes per 100,000 compared with the national trend post-legalization. The violent crime rate in Alaska and Massachusetts increased post-legalization by 152 and 57 more than the national trend. Overall, violent crime has neither soared nor plummeted in the wake of marijuana legalization.

> "Violent crime has neither soared nor plummeted in the wake of marijuana legalization."

ROAD SAFETY

Another possible consequence of marijuana legalization is changed road safety. On this score, debates about marijuana legalization offer two contrasting hypotheses. One holds that legalization increases traffic accidents by increasing drug use and, consequently, incidences of driving under the influence. This hypothesis presumes that marijuana impairs driving ability.[60] A contrasting view is that legalization may improve traffic safety if enough would-be drunken drivers substitute marijuana for alcohol, which some studies say impairs driving ability even more. Academic studies examining this issue have suggested a possible substitution effect. A 2015 report by the Governors Highway Safety Association cited one study revealing that marijuana-positive fatalities rose by 4 percent after legalization in Colorado. However, another study from the same report discovered no change in total traffic fatalities in California after its decriminalization of the drug in 2011.[61] Using synthetic control states, Benjamin Hansen, Keaton Miller, and Caroline Weber estimate no effect on traffic fatalities among legalizing states.[62]

Figure 9 in the Appendix presents the difference in driving fatalities between the 11 states included in this policy analysis and the U.S. average, relative to the year of legalization, measured in fatalities per 100 million vehicle miles traveled.[63] In most states, this trend remained relatively flat post-legalization; Oregon's fatality rate began increasing prior to legalization and has continued to increase. The National Highway Traffic Safety Administration also tracks traffic fatalities linked to marijuana and alcohol use. We focus on total traffic fatalities because there is likely some substitution between driving under the influence of alcohol and under the influence of marijuana. The relevant measure

> "One area where marijuana legalization has a significant impact is through increasing state tax revenue."

for public safety is the net effect; the concern is not whether marijuana-related fatalities increase but rather whether any increase is offset by fewer fatalities under the influence of alcohol. In addition, post-legalization police may check for marijuana use more vigorously than before, rendering the substance-specific data noncomparable over time.

ECONOMIC OUTCOMES

Economic and demographic outcomes are unlikely to be significantly affected by marijuana legalization, simply because marijuana commerce is a small part of the overall economy. Nevertheless, to give a holistic account of the possible outcomes of marijuana legalization, we consider its economic potential.

Before legalization, advocates in many states thought legalization could produce an influx of new state residents, particularly young individuals who might be enticed to move across state lines to take advantage of looser marijuana laws.[64] News articles reported housing prices in Colorado (particularly around Denver) soaring at growth rates far above the national average, perhaps as a consequence of legalization.[65] One analyst went so far as to say that marijuana had essentially "kick-started the recovery of the industrial market in Denver" and led to record-high rent levels.[66]

Figure 10 in the Appendix sheds doubt on these claims by presenting the difference between the Case-Shiller Home Price Indices for major cities in legalizing states (Denver; Seattle; Portland, Oregon; San Francisco and Los Angeles; Las Vegas; Detroit; Chicago; and Boston) and the national average.[67] Only Portland displays any upward trend post-legalization. Whereas some people may have moved across state lines for easier access to legal marijuana, any resulting growth in population has been small and is unlikely to cause noticeable increases in housing prices or total economic output.

Advocates also argue that legalization boosts economic activity by creating jobs in the marijuana sector, including "marijuana tourism" and other support industries, thereby boosting economic output. According to the data in Figure 11 (see the Appendix), which illustrates state employment to population ratios compared with the national average, states that legalized marijuana experienced no discernable change in employment after legalization. Some states saw increases in employment (Massachusetts, Nevada); others saw a decrease (Vermont, Alaska, Illinois, Maine); others tended to follow existing trends (Colorado, Washington, Michigan, California). Marijuana production and commerce do employ many thousands of people, but the employment gains seen in the wake of legalization are still modest compared with the overall size of each state's workforce.[68]

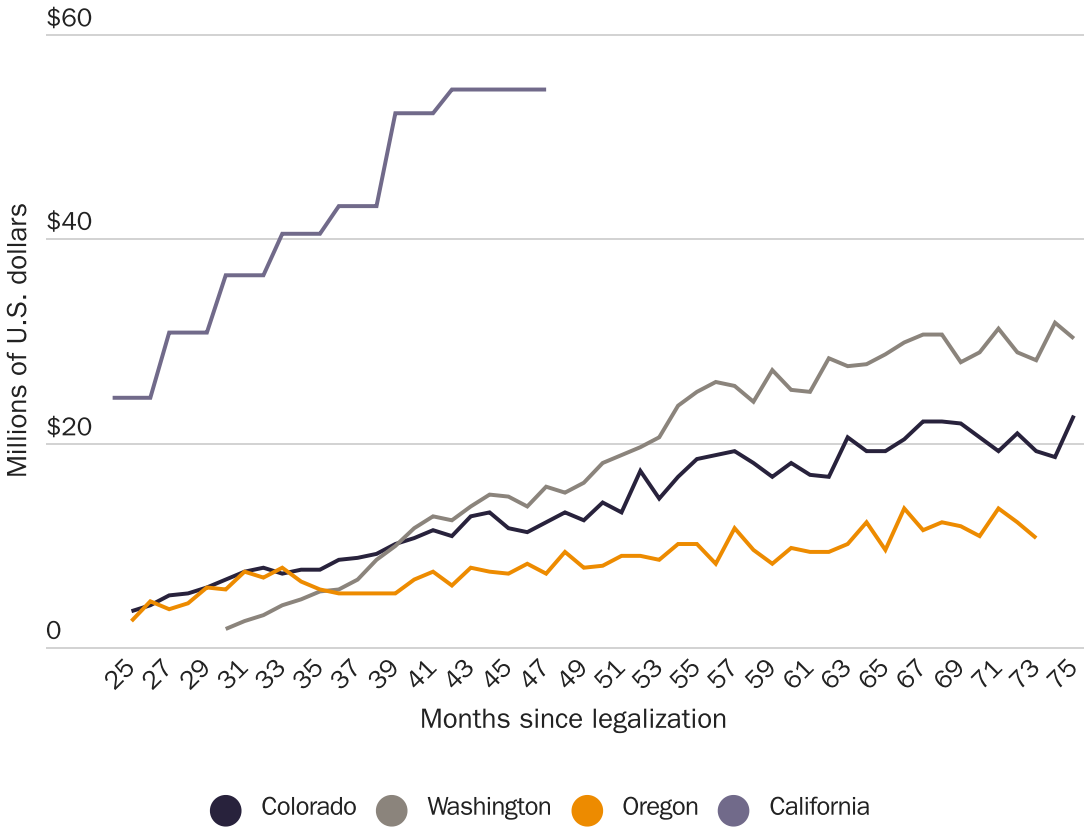
Figure 12 in the Appendix compares state and national gross domestic product growth rates in the years before and after legalization.[69] Some states experienced slight relative improvements following legalization (Colorado, Oregon, Washington, Nevada, Alaska), but generally the trends are flat post-legalization.

BUDGETARY IMPACTS

One area where marijuana legalization has a significant impact is through increasing state tax revenue. Colorado, Washington, Oregon, and California all impose significant excise taxes on recreational marijuana, along with standard state sales taxes, other local taxes, and licensing fees. As seen in Figure 13, Colorado now collects almost $20 million per month from recreational marijuana alone.[70] In 2015, the state generated a total of $135 million in recreational marijuana revenue. These figures exceed some pre-legalization forecasts, although revenue growth was sluggish during the first few months of sales.[71] A similar story unfolded in Washington, where recreational marijuana generated approximately $70 million in tax revenue in the first year of sales—double the original revenue forecast.[72] Oregon, which began taxing recreational marijuana only in January 2016, has reported

Figure 13

State marijuana tax revenue



Sources: State revenue departments.

revenues of $10 million per month, far above the initial estimate of $2 million to $3 million for the entire calendar year.[73] California collects more than $50 million in monthly tax revenues from recreational marijuana. The tax revenues in these states, however, may moderate as more states legalize marijuana. For example, Benjamin Hansen, Keaton Miller, and Caroline Weber estimate that Washington's dispensaries along the Oregon border experienced a significant decline in sales once Oregon's dispensaries opened.[74]

Figure 14 presents relative growth rates in criminal justice expenditures around the time of legalization.[75] Most states show no clear increase or decrease relative to the U.S. trend. Nevada's upward trend in the year leading up to legalization continued in the most recent year of data available. Alaska has experienced relative declines in criminal justice expenditures post-legalization.

CONCLUSION

Limited post-legalization data prevent us from ruling out that marijuana legalization causes small changes in marijuana use or other outcomes. As additional data become available, expanding this analysis will continue to inform debates surrounding marijuana reform. The data so far, however, provide little support for the strong claims about legalization made by either opponents or supporters; the notable exception is tax revenue, which has exceeded some expectations. The absence of significant adverse consequences is especially striking given the sometimes-dire predictions made by legalization opponents.

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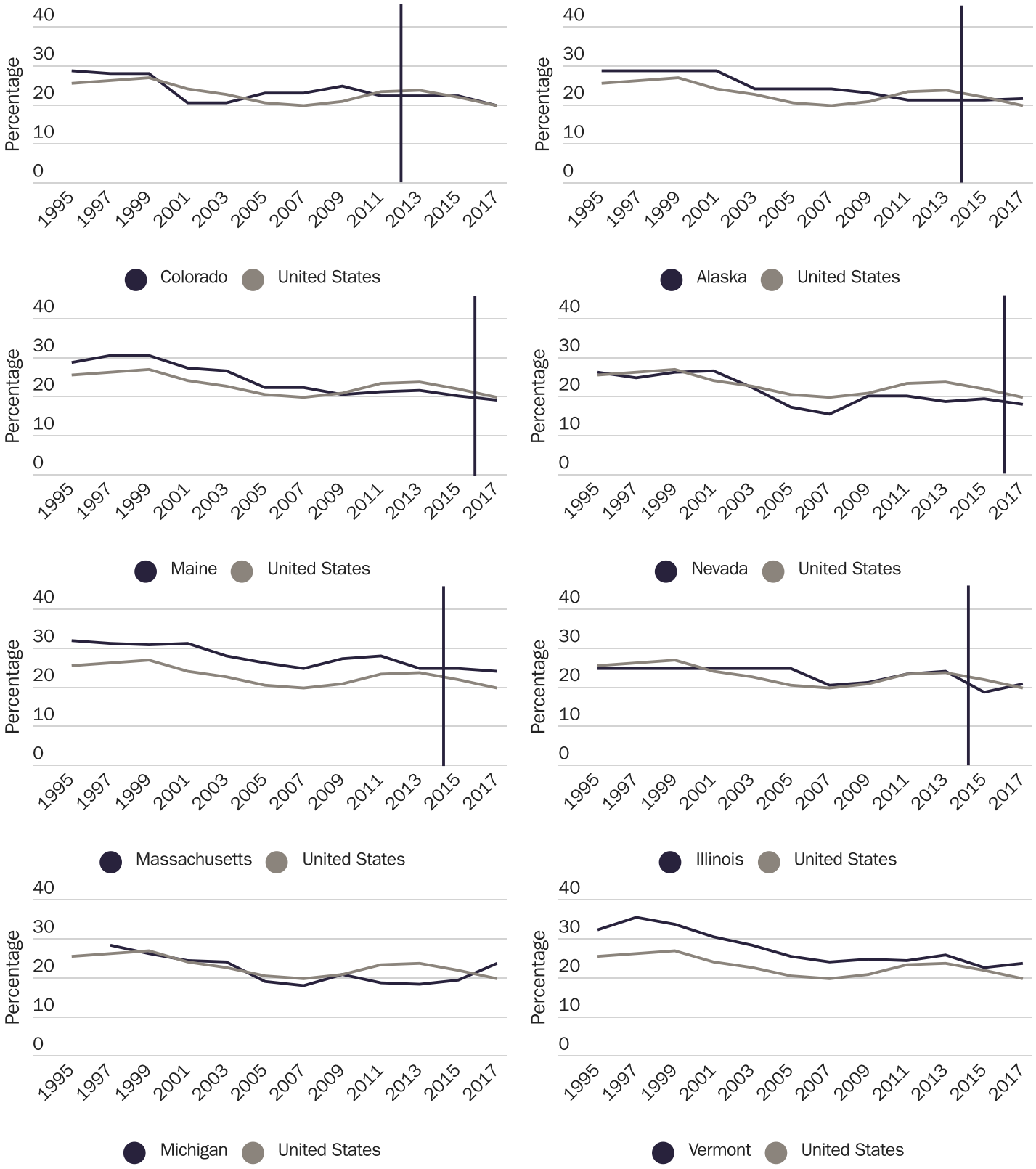
APPENDIX

Figure 2

Youth Risk Behavior Surveillance System respondents reporting marijuana use in 30 days prior to survey



Source: "Youth Risk Behavior Surveillance System (YRBSS)," Centers for Disease Control and Prevention, https://www.cdc.gov/healthyyouth/data/yrbs/index.htm.

Figure 3

Perceptions of "great risk" from smoking marijuana

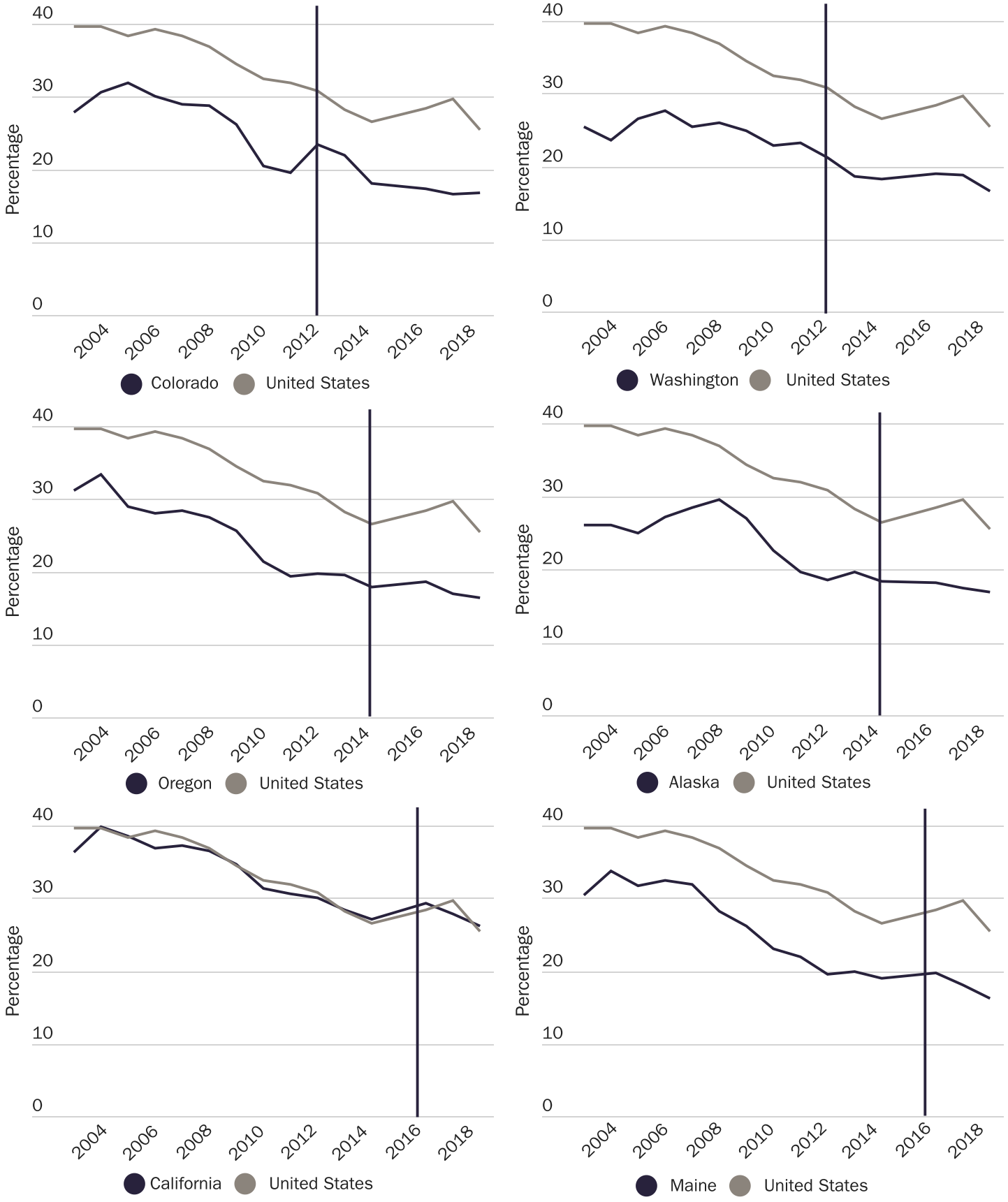
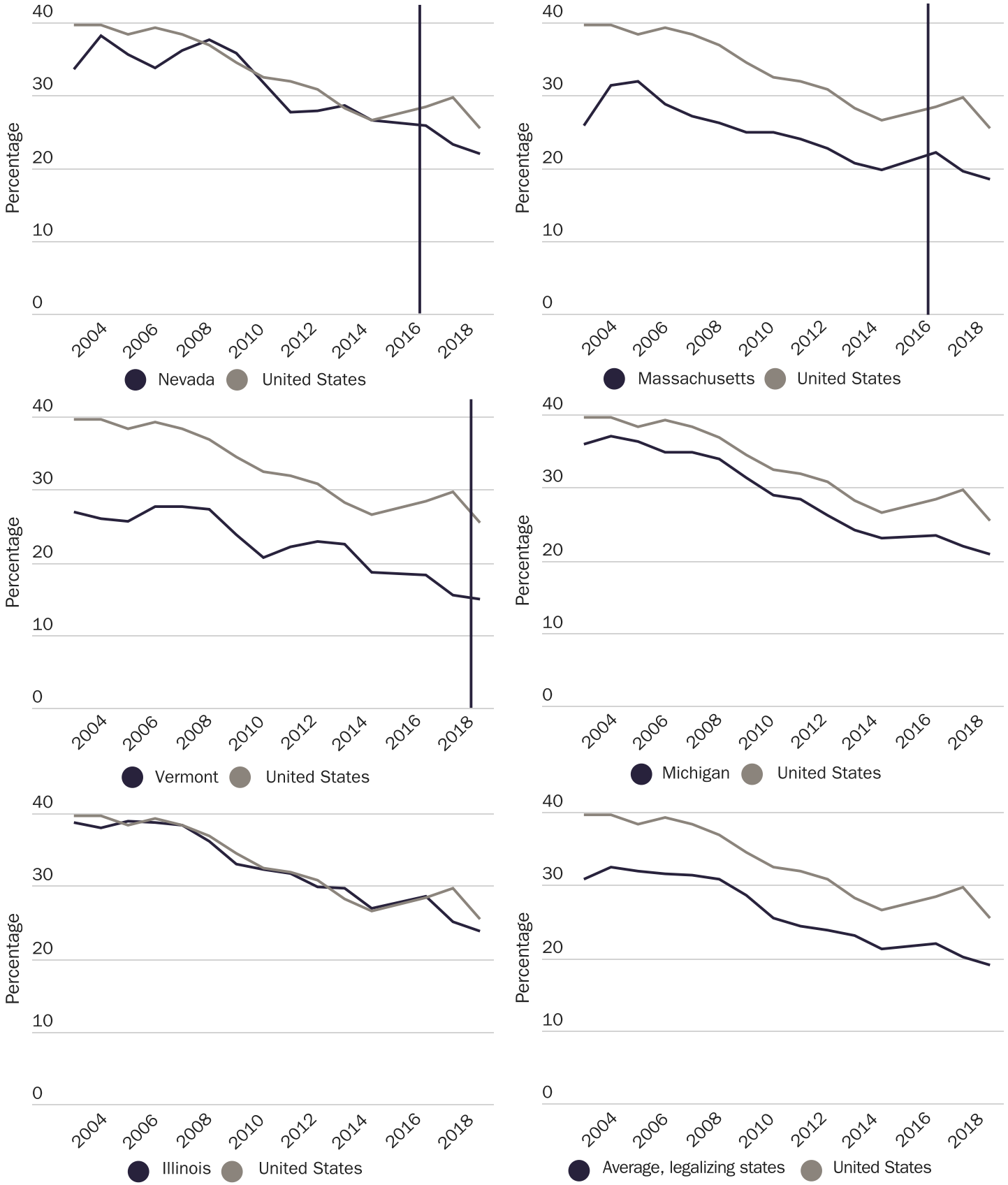


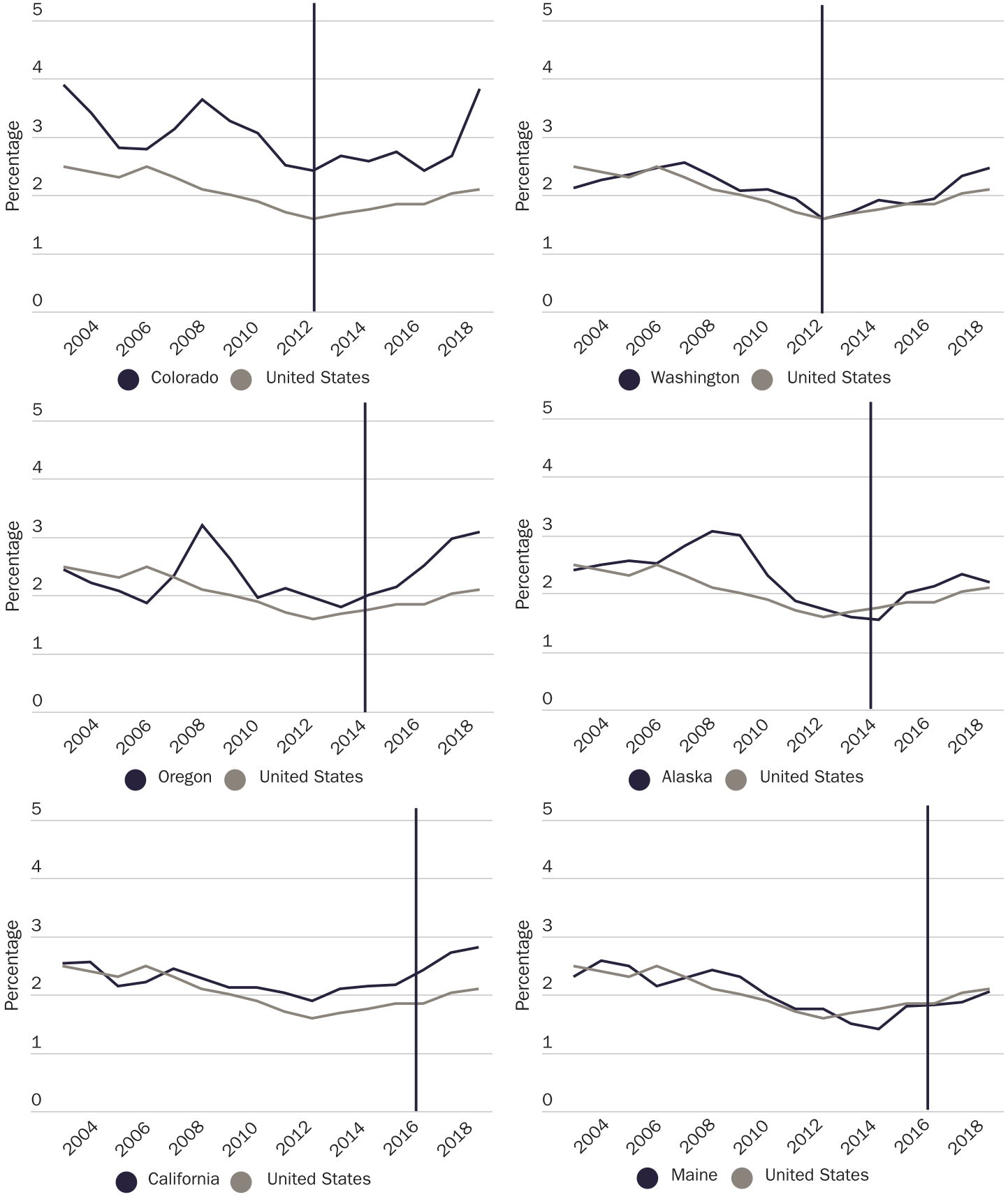
Figure 3 (continued)



Source: "National Survey on Drug Use and Health (NSDUH)," Substance Abuse and Mental Health Services Administration, 2003–2018, https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health.

Figure 5

Past year cocaine use rate



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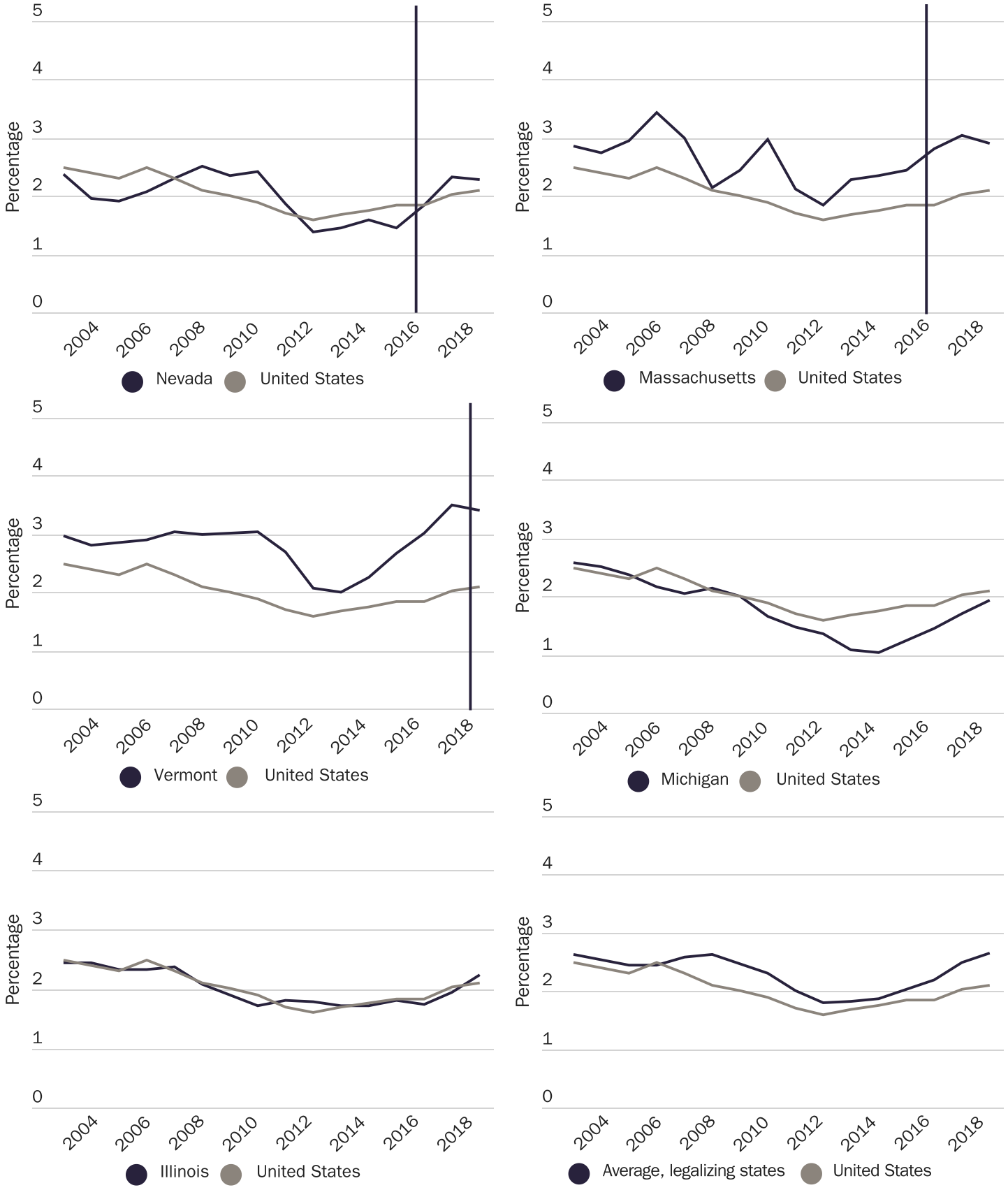
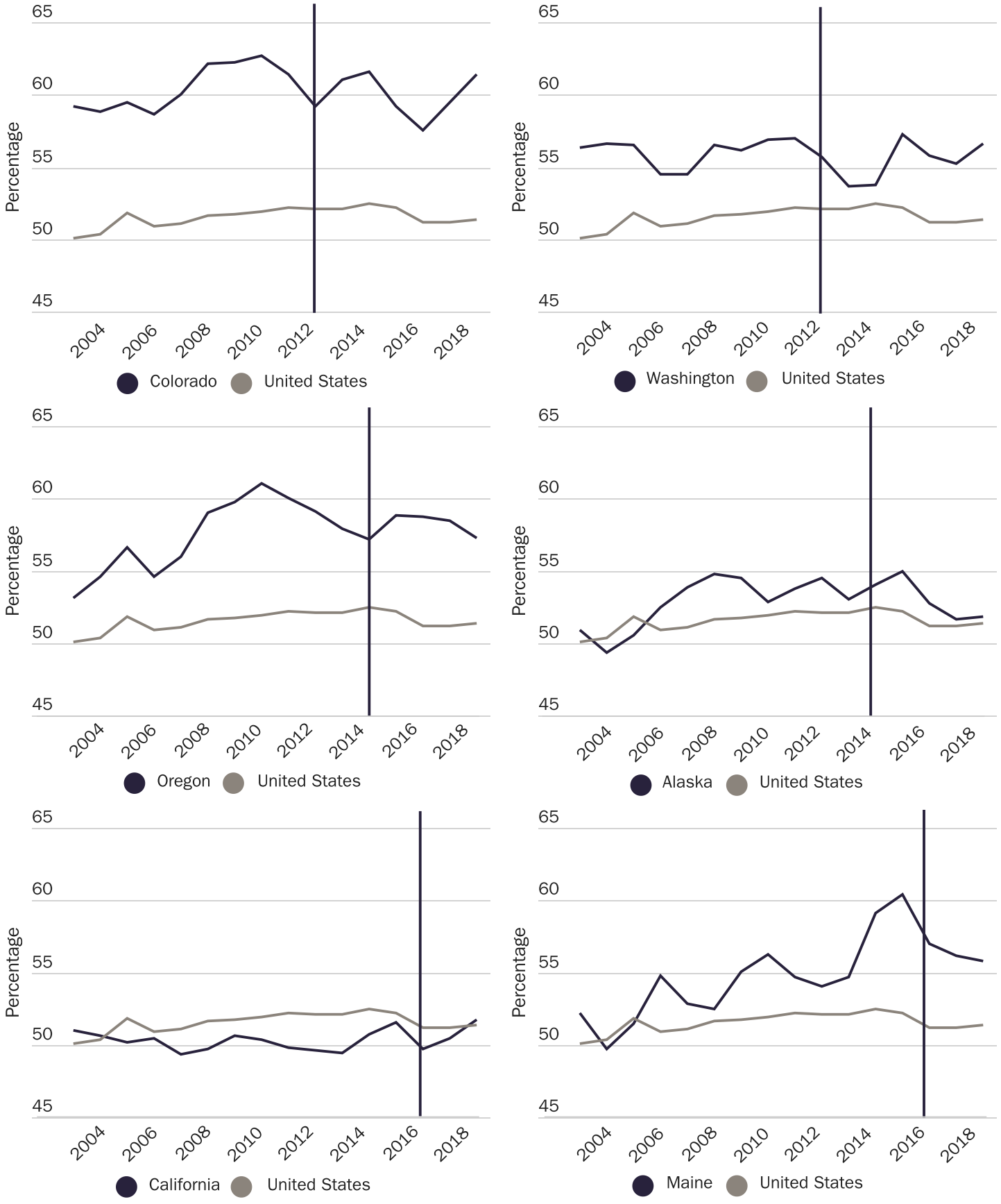


Source: "National Survey on Drug Use and Health (NSDUH)," Substance Abuse and Mental Health Services Administration, 2003–2018, https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health.

Figure 6

Past month alcohol use rate



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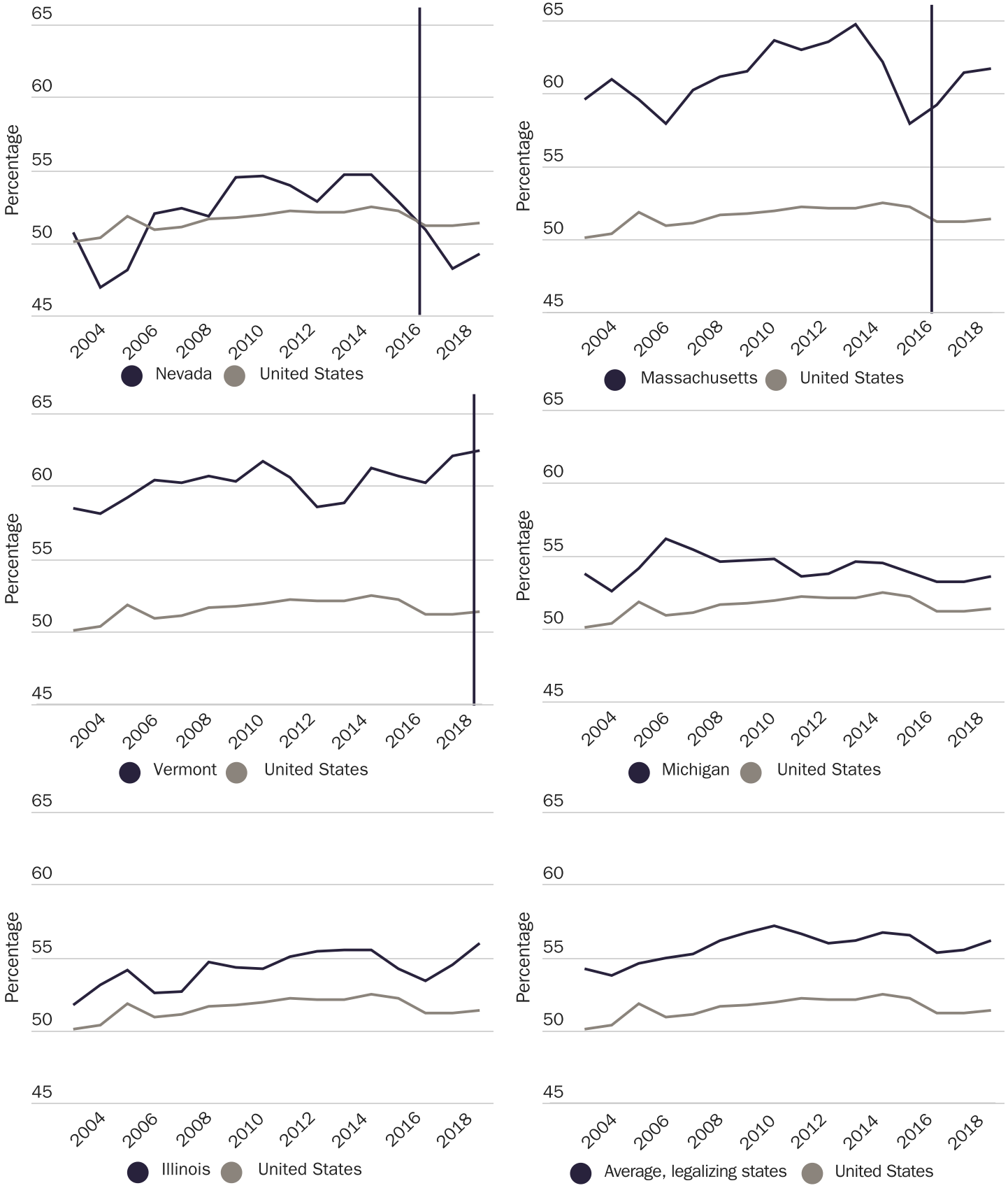
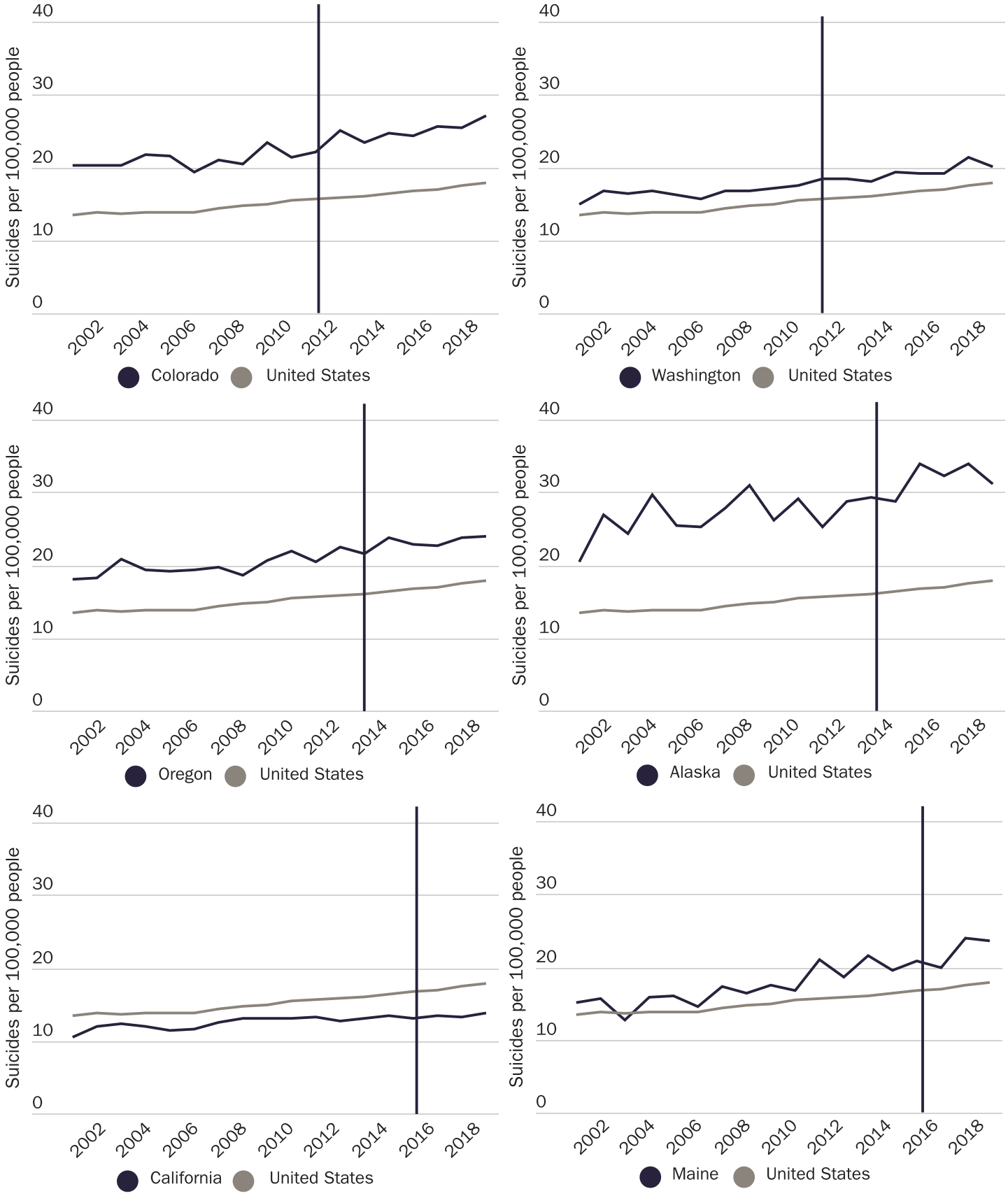


Source: "National Survey on Drug Use and Health (NSDUH)," Substance Abuse and Mental Health Services Administration, 2003–2018, https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health.

Figure 7

Suicide death rates among people aged 15 and older



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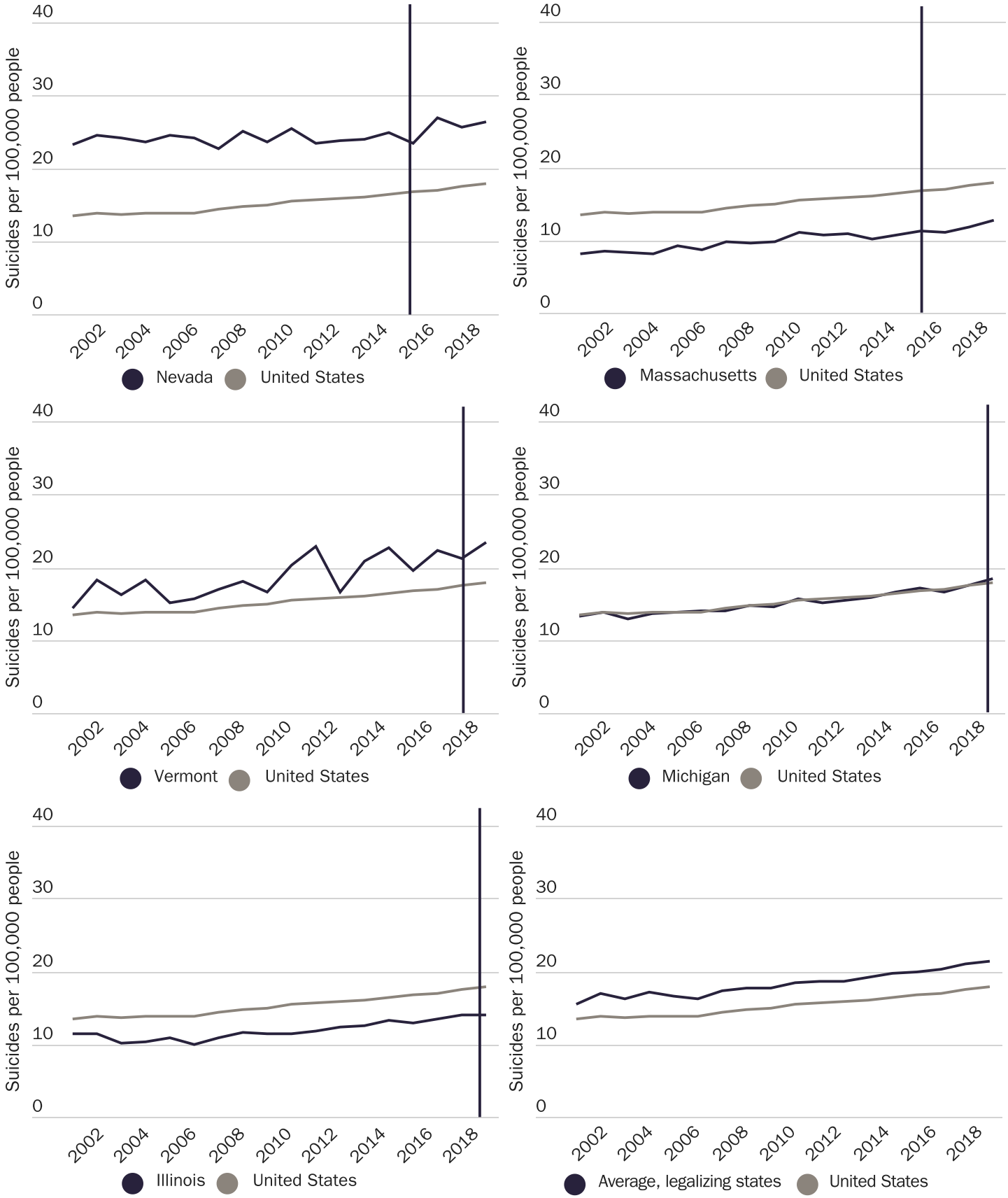
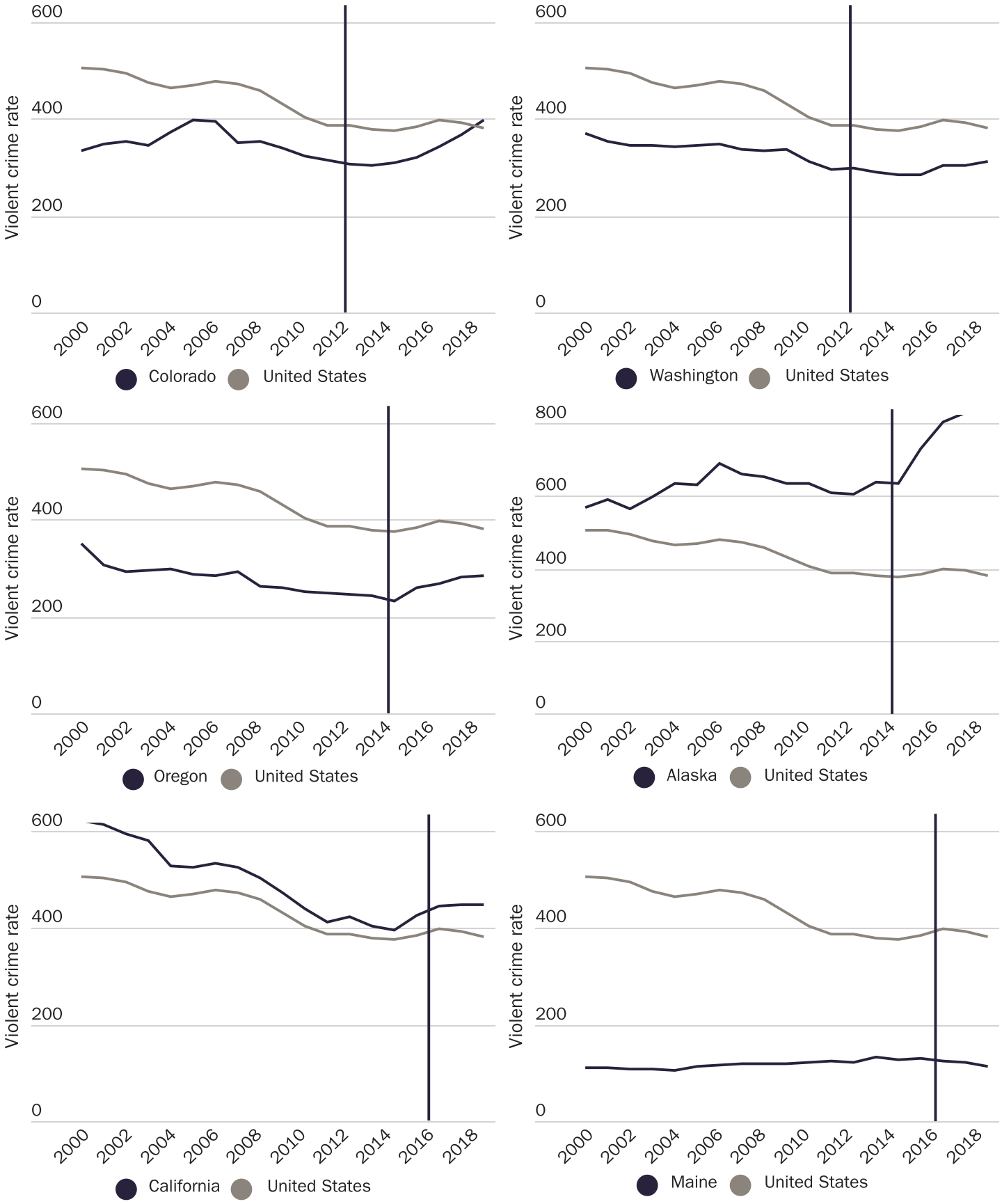


Source: Wide-ranging Online Data for Epidemiologic Research, Centers for Disease Control and Prevention, https://wonder.cdc.gov/.

Figure 8

Violent crime rate per 100,000



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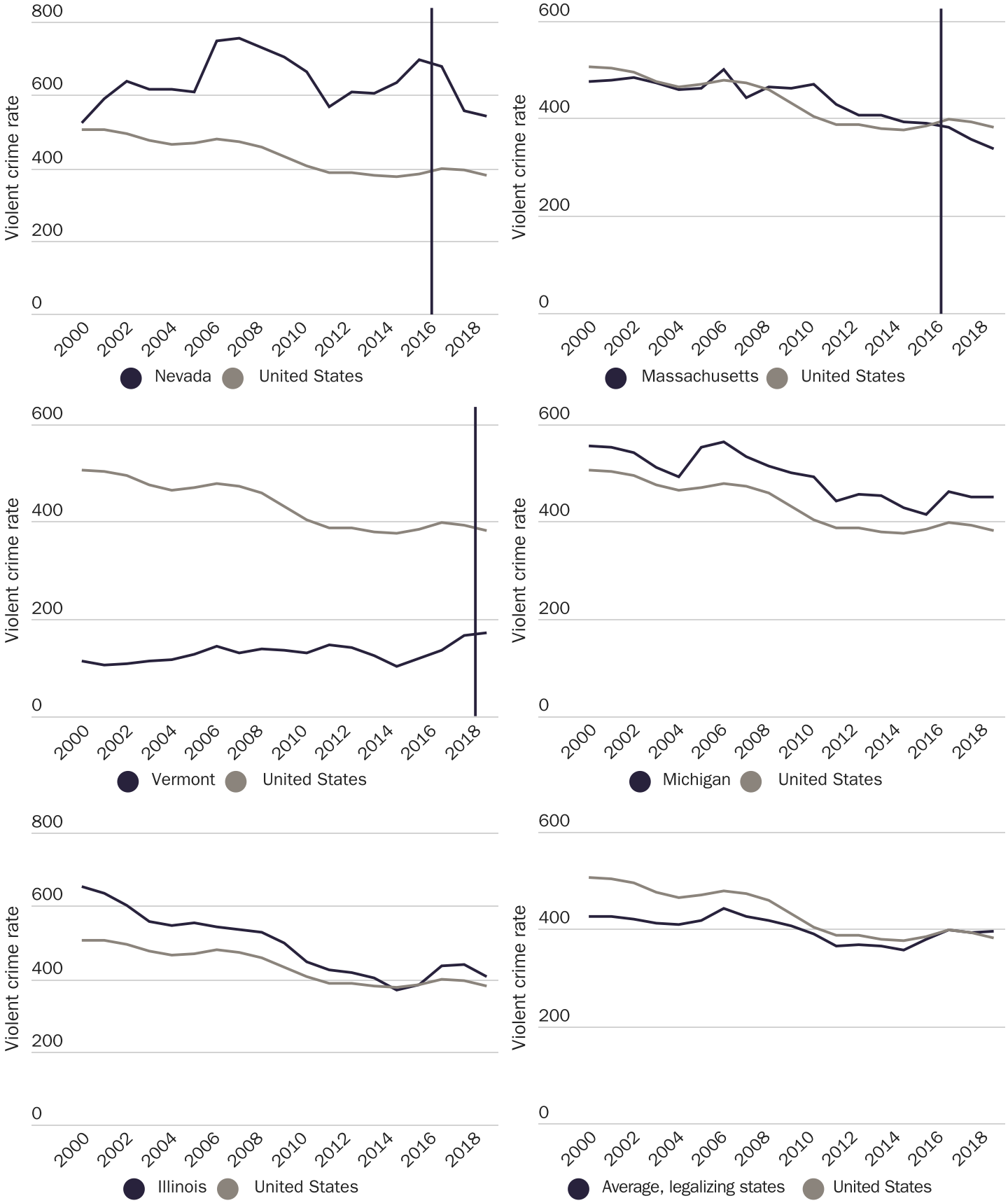
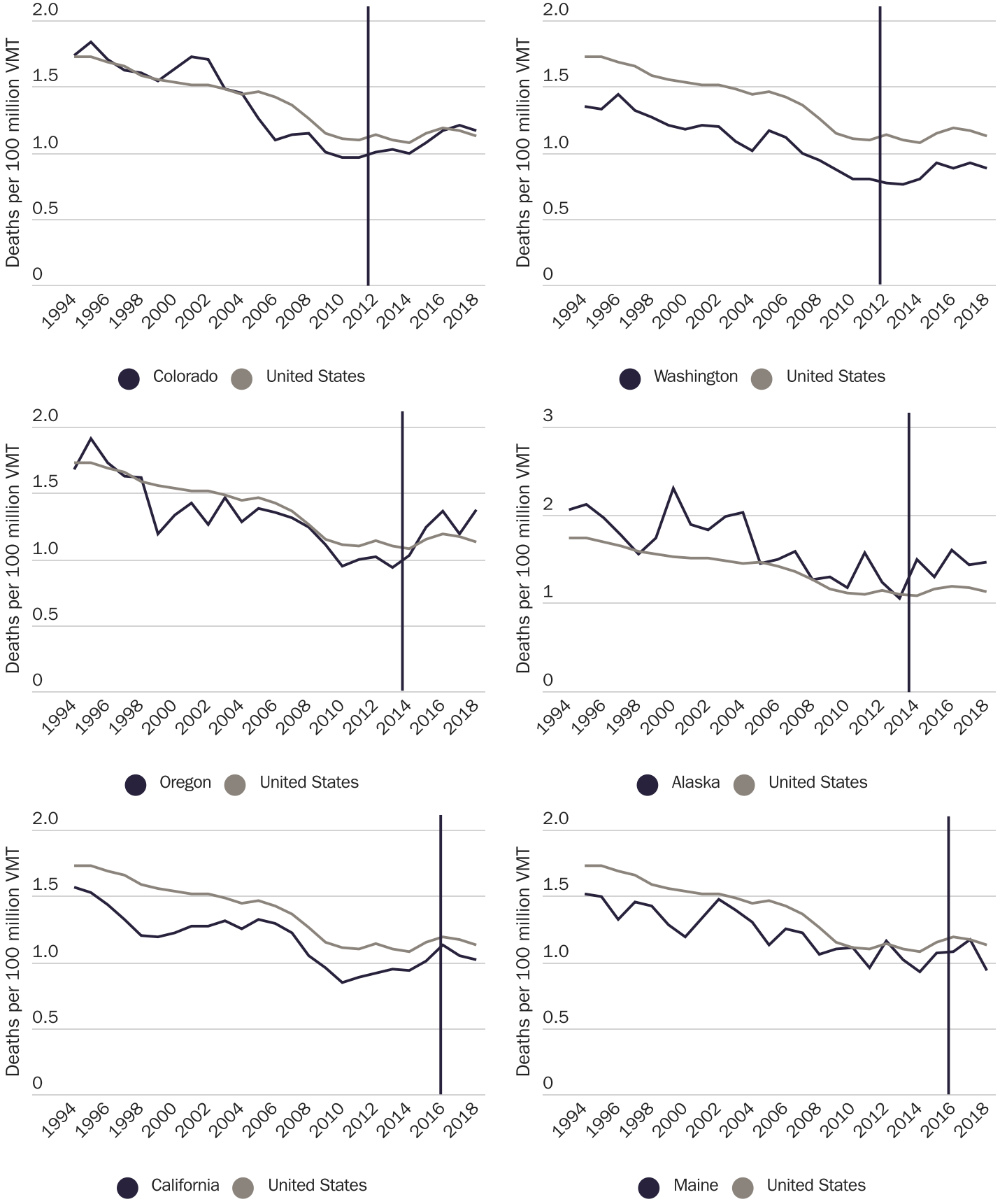


Source: Wide-ranging Online Data for Epidemiologic Research, Centers for Disease Control and Prevention, https://wonder.cdc.gov/.

Figure 9

Crash fatality rate



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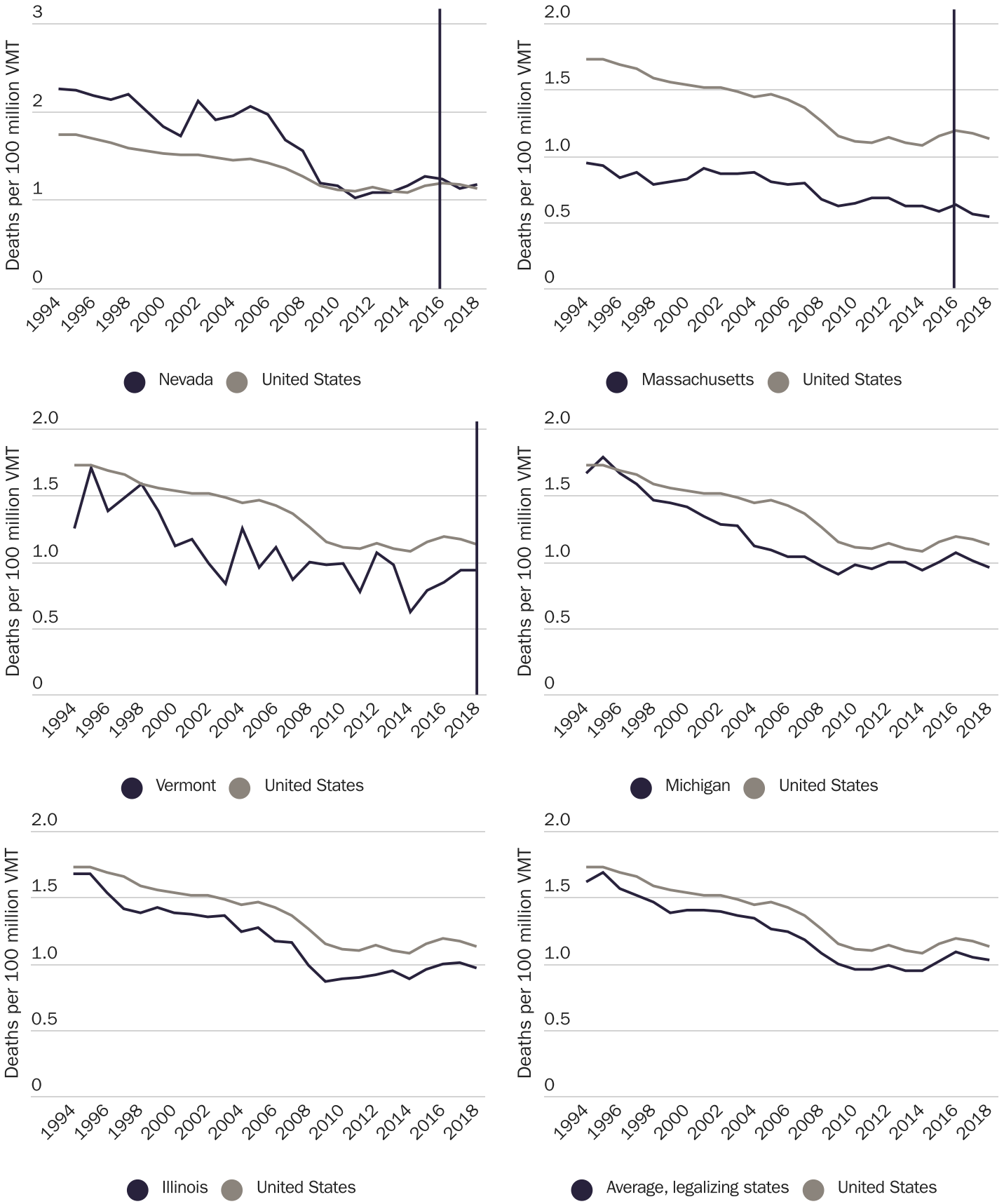
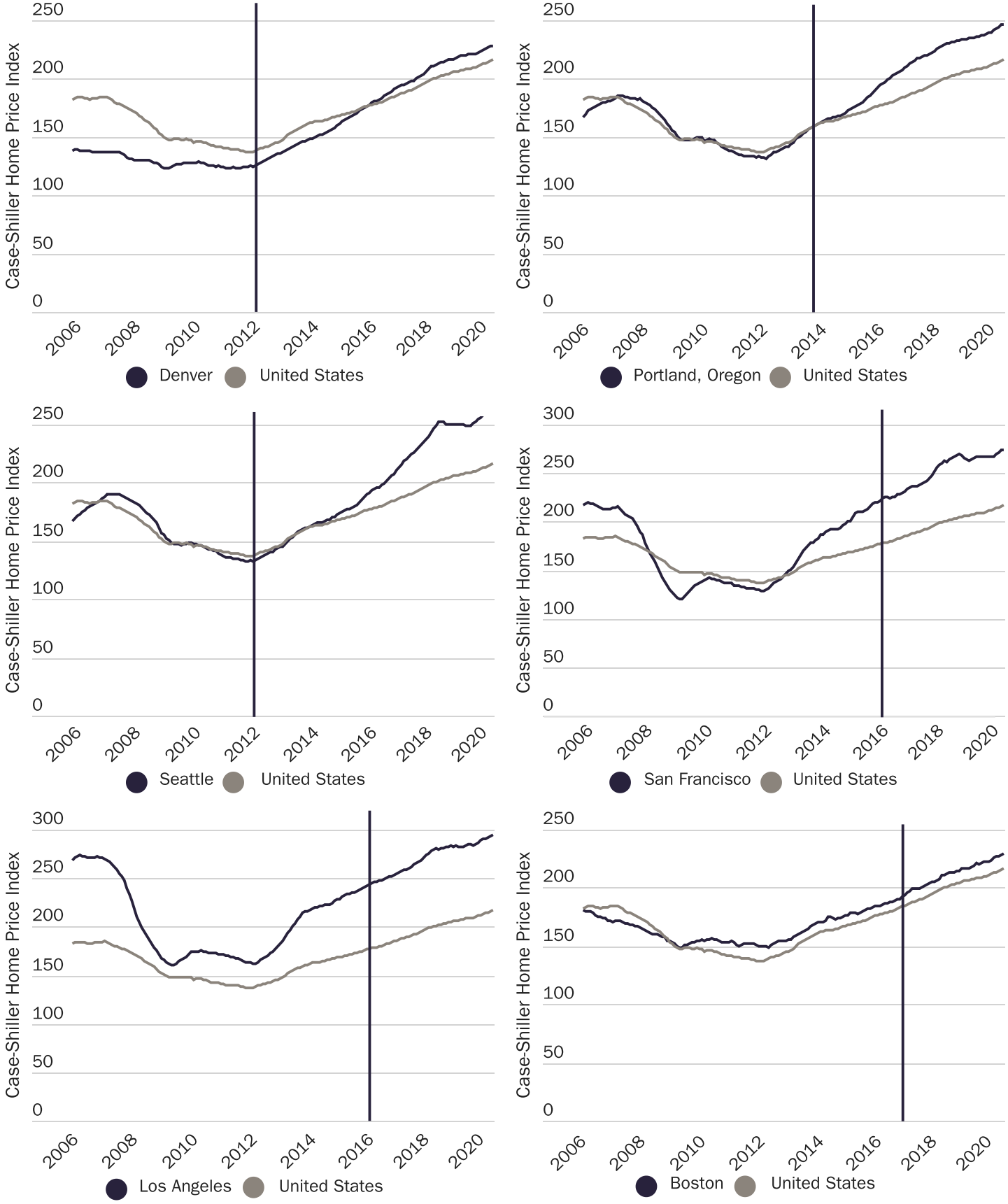


Source: Wide-ranging Online Data for Epidemiologic Research, Centers for Disease Control and Prevention, https://wonder.cdc.gov/.

VMT = vehicle miles traveled

Figure 10

Changes in value of real estate



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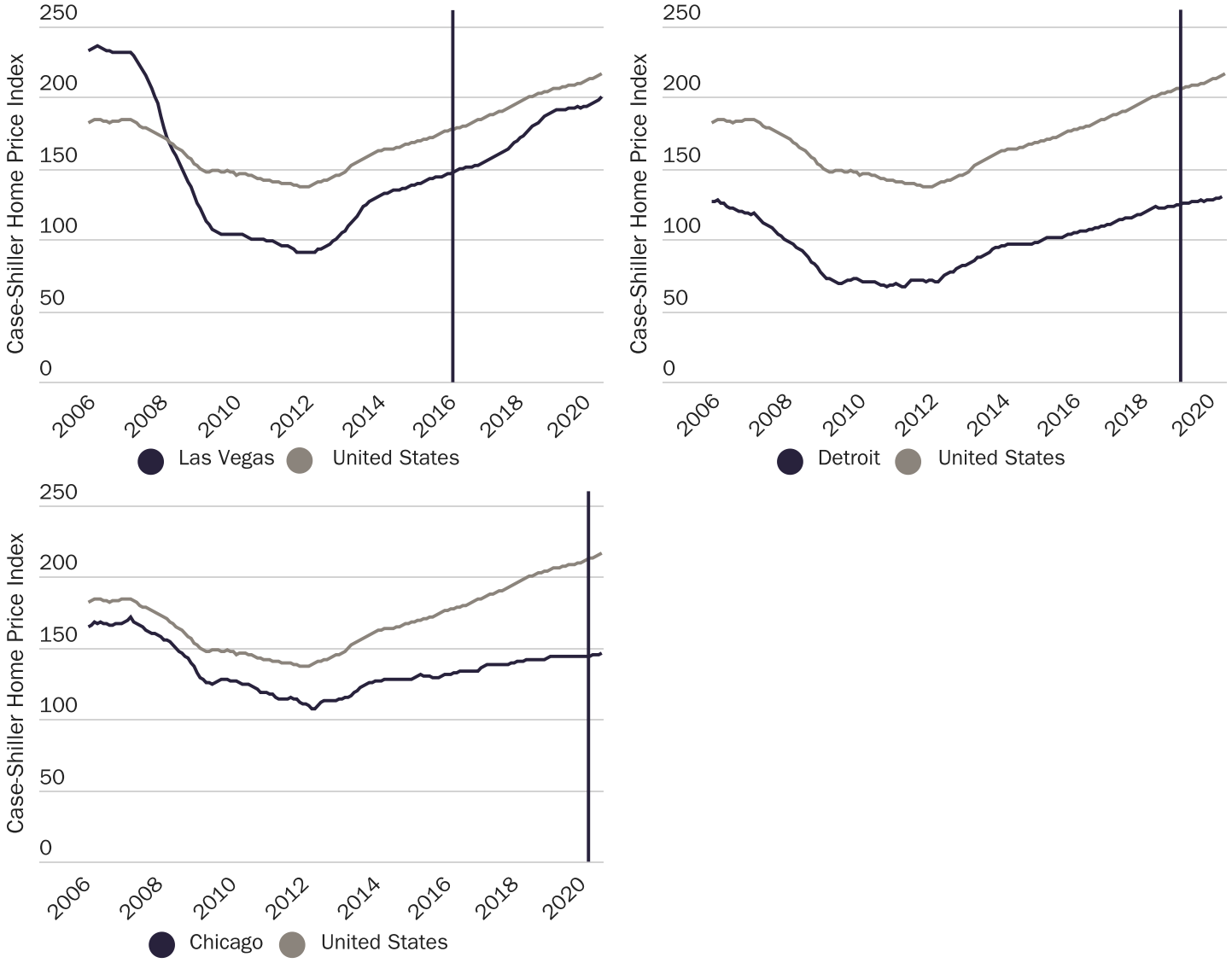


Source: "S&P CoreLogic Case-Shiller Home Price Indices," S&P Dow Jones Indices, https://www.spglobal.com/spdji/en/index-family/indicators/sp-corelogic-case-shiller/sp-corelogic-case-shiller-composite/#overview.

Figure 11

Employment as a percentage of population

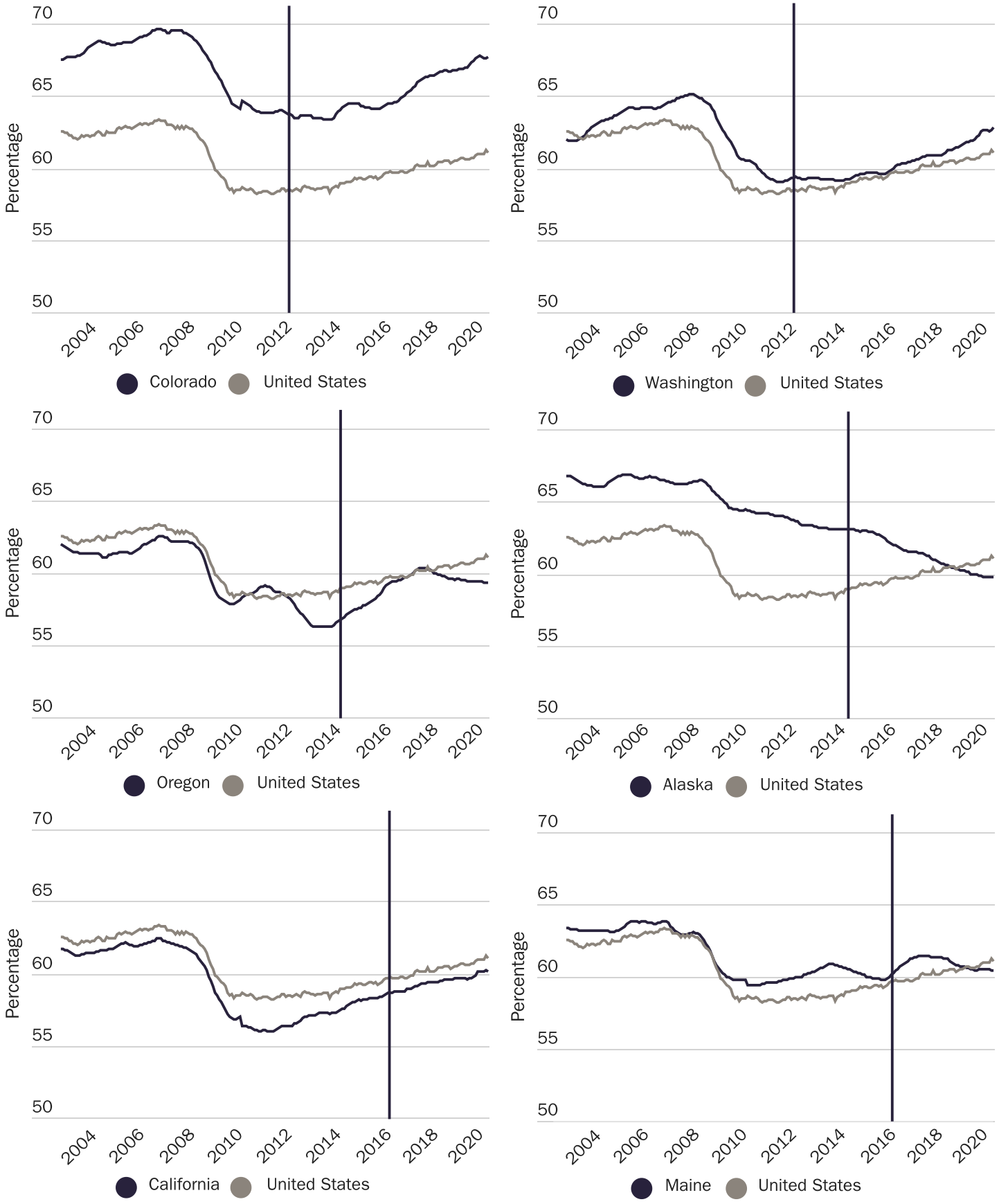
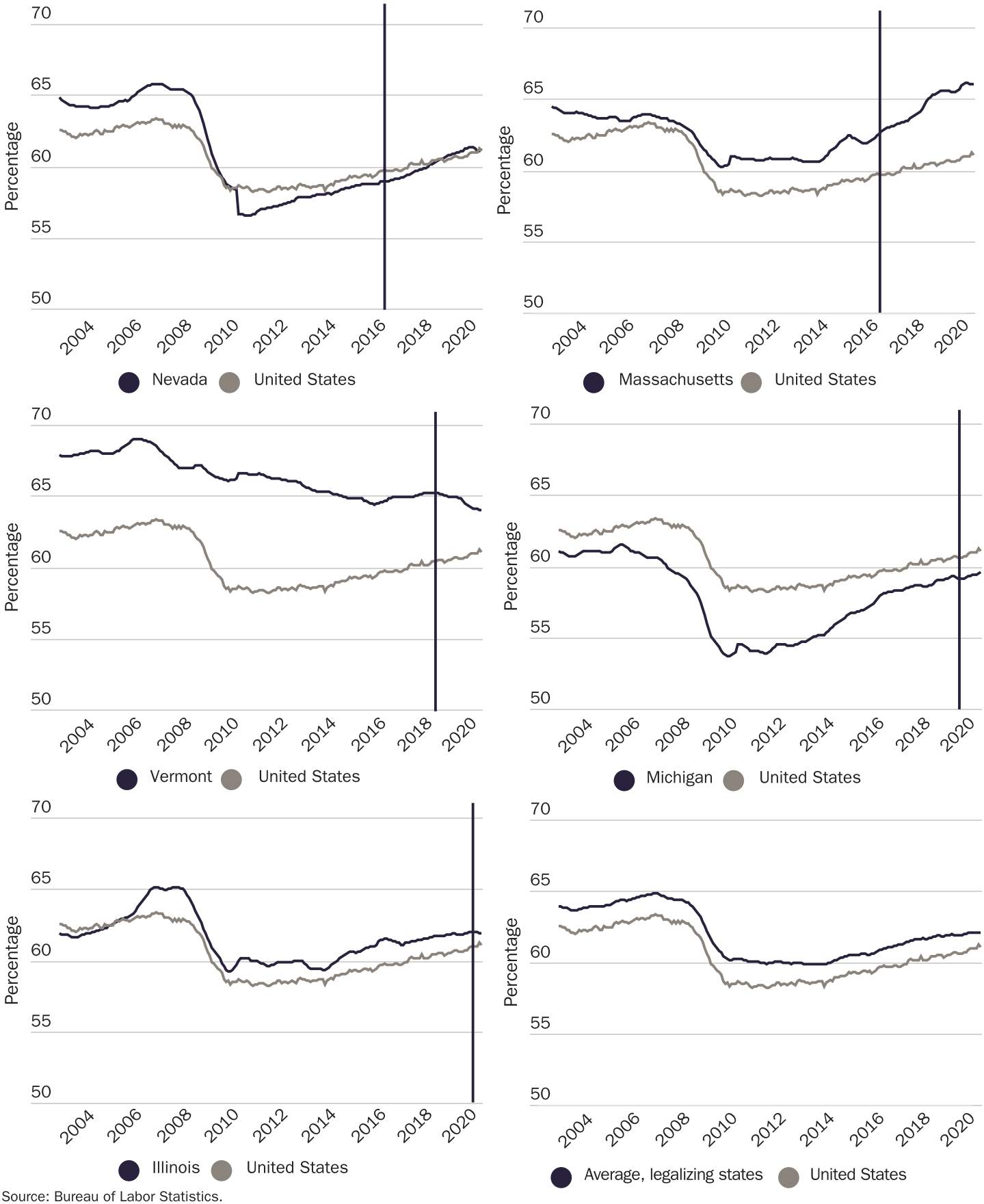


Figure 11 (continued)



Source: Bureau of Labor Statistics.

Figure 12

Gross domestic product growth rate

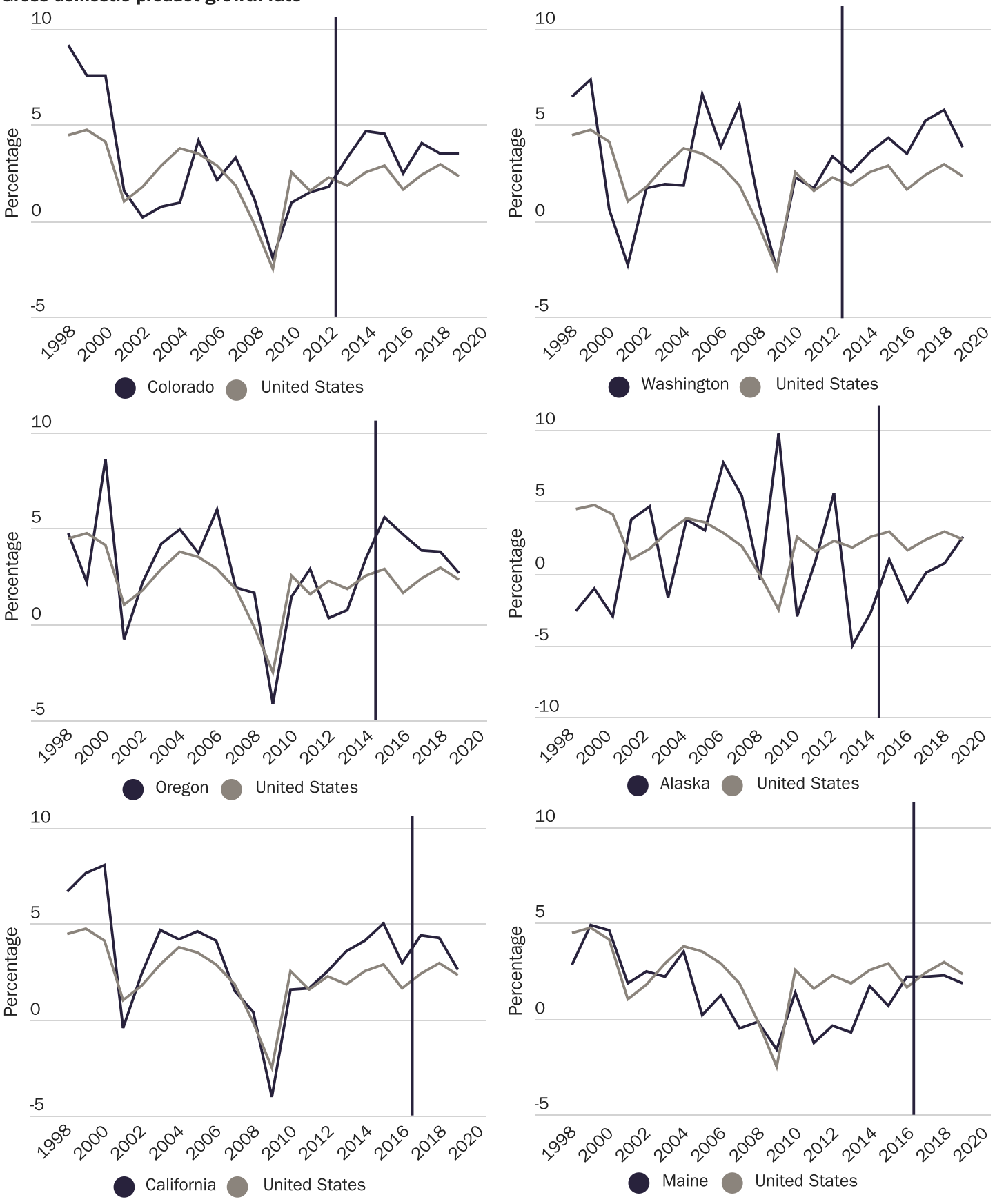
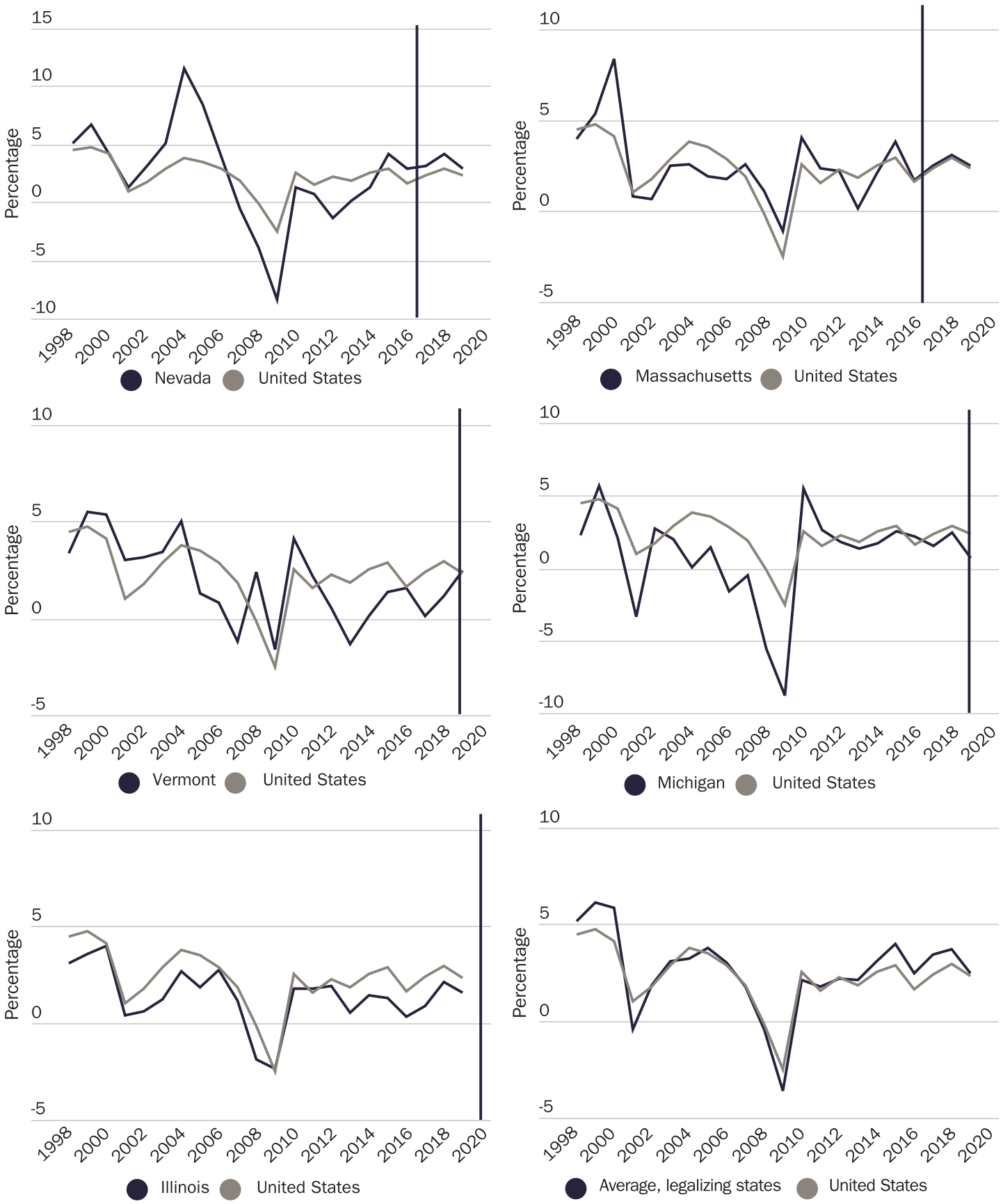


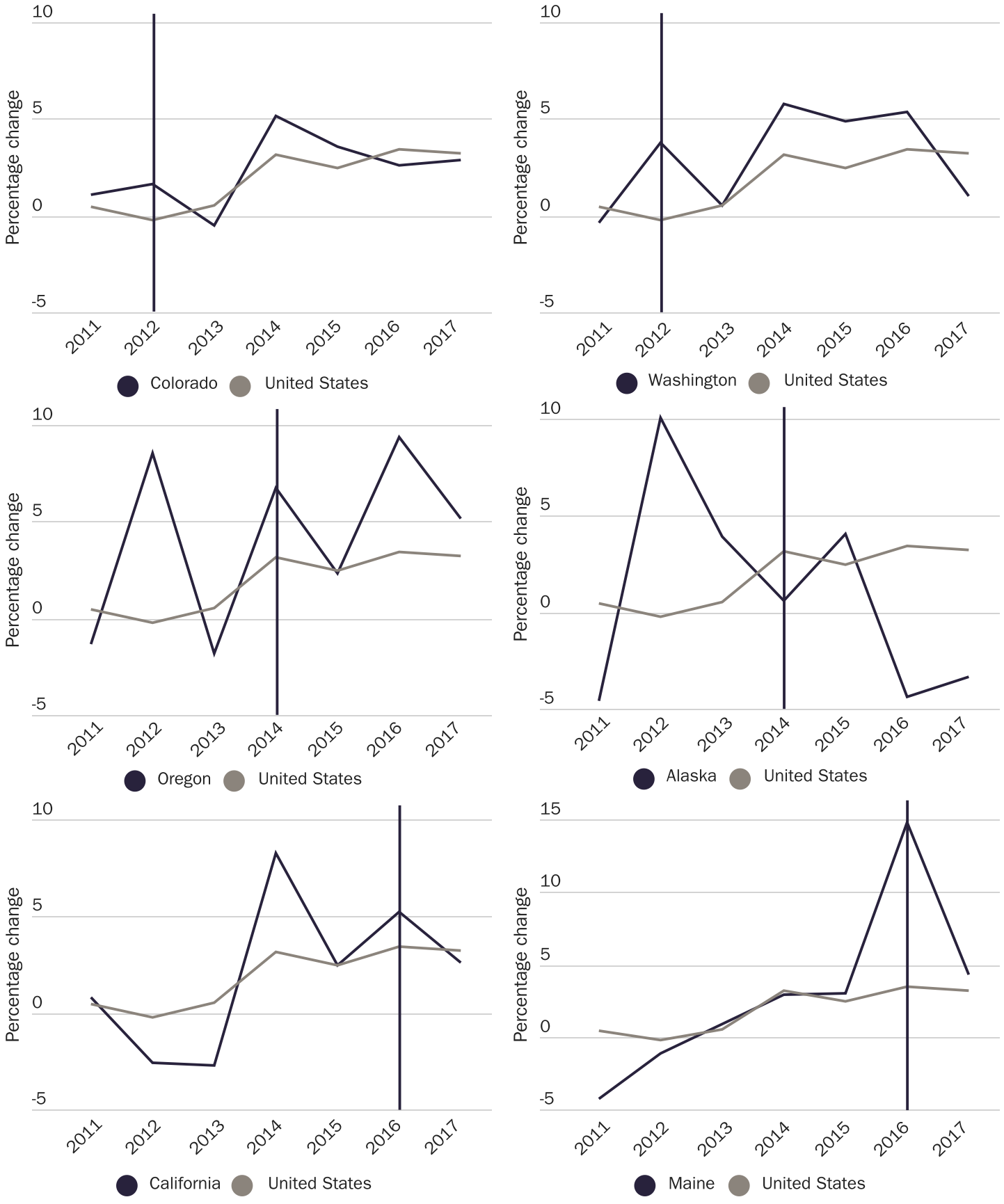
Figure 12 (continued)



Source: Author's calculations from Federal Reserve Economic Data and real state gross domestic product in millions of chained 2012 U.S. dollars.

Figure 14

Criminal justice expenditure growth rate



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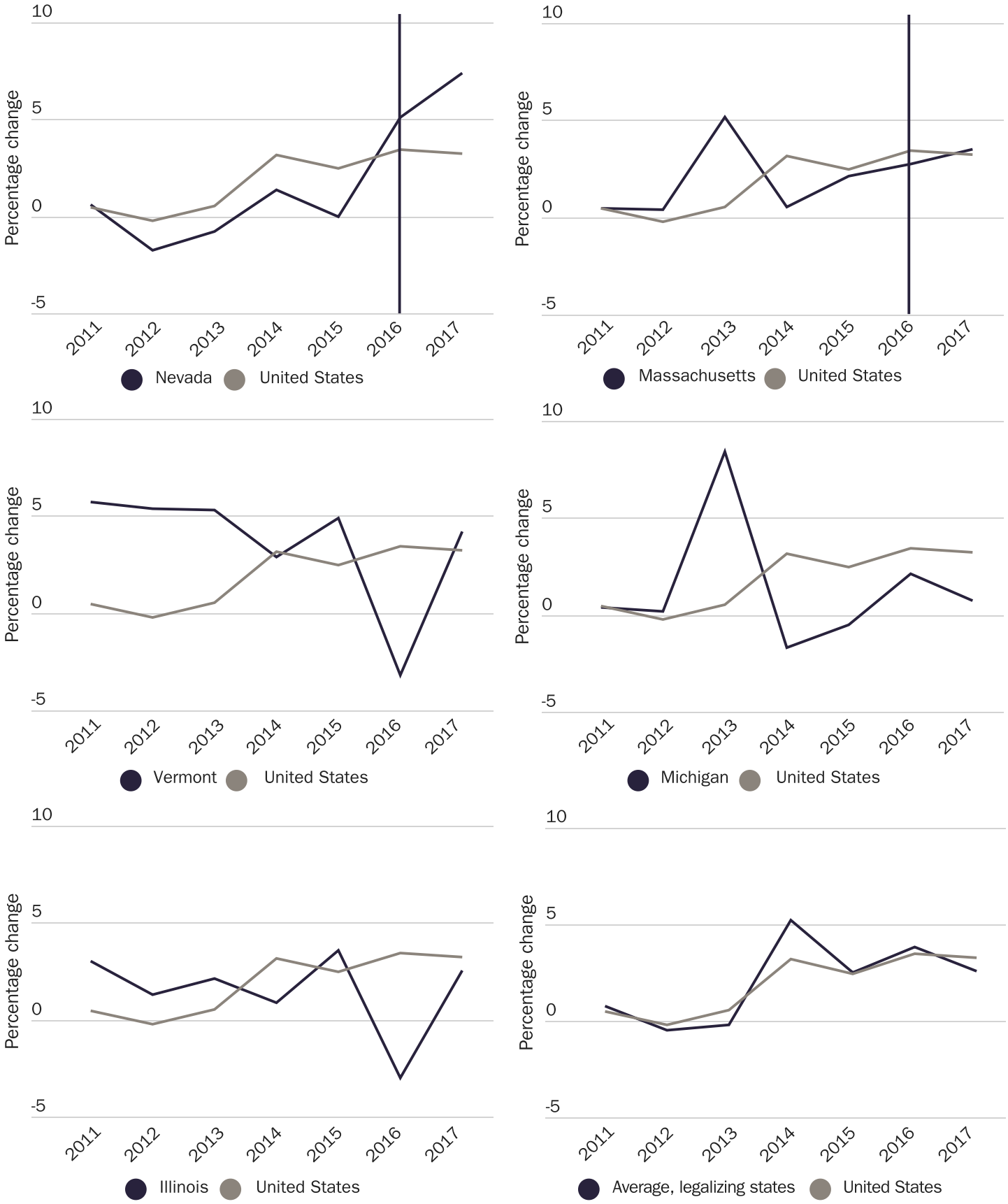

Source: Wide-ranging Online Data for Epidemiologic Research, Centers for Disease Control and Prevention, https://wonder.cdc.gov/.

NOTES

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top 5 percent of outliers when calculating its average prices. We were not able to calculate meaningful marijuana price averages from Alaska because of a relatively low number of entries from that state.

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