NBER WORKING PAPER SERIES

MARIJUANA LEGALIZATION AND DISABILITY CLAIMING

Johanna Catherine Maclean
Keshar M. Ghimire
Lauren Hersch Nicholas

Working Paper 23862
http://www.nber.org/papers/w23862

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 2017

Previously circulated as "The Impact of State Medical Marijuana Laws on Social Security Disability Insurance and Workers' Compensation Benefit Claiming" and "Medical Marijuana Laws and Disability Applications, Receipts, and Terminations." This work was supported by the National Institute on Aging (K01AG041763). Findings do not represent the views of the sponsor. We thank Padmaja Ayyagari, Bo Feng, Micheal Pesko, Sarah See Stith, and Douglas Webber, and session participants at the iHEA World Congress for helpful comments and Micah Baum and Amanda Chen for excellent research assistance. All errors are our own. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

At least one co-author has disclosed a financial relationship of potential relevance for this research. Further information is available online at http://www.nber.org/papers/w23862.ack

Marijuana legalization and disability claiming
Johanna Catherine Maclean, Keshar M. Ghimire, and Lauren Hersch Nicholas
NBER Working Paper No. 23862
September 2017, Revised August 2020
JEL No. I1,I12,I18,J22

ABSTRACT

We study the effect of recent legalization of recreational marijuana use (RMLs) in the United States on Social Security Disability Insurance and Supplemental Security Income claiming, proxied by new applications and new benedficiaries, over the period 2001 to 2019. We combine administrative caseload data from the Social Security Administration with state policy changes using two-way fixed effects regression. We find that RML adoption increases new disability application rates. However, there is no change in new beneficiaries post-RML. We provide suggestive evidence that the observed changes in applications post-RML are potentially driven by increases in marijuana misuse and selective migration.

Johanna Catherine Maclean
Department of Economics
Temple University
Ritter Annex 869
Philadelphia, PA 19122
and NBER
catherine.maclean@temple.edu

Lauren Hersch Nicholas
Johns Hopkins School of Public Health
624 N Broadway, Room 450
Baltimore, MD 21205
USA
lauren.nicholas@jhu.edu

Keshar M. Ghimire
Business and Economics Department
University of Cincinnati - Blue Ash
9555 Plainfield Road
Blue Ash, OH 45236
USA
ghimirkr@ucmail.uc.edu

1 Introduction

Marijuana use has been prohibited under federal law in the United States since the Marijuana Tax Act of 1937. Beginning in 2012, 12 U.S. states have adopted laws that legalize recreational marijuana use among adults 21 years and older. These recent state laws reflect the most progressive stance since federal prohibition in terms of an individual's ability to legally consume marijuana. In particular, RMLs surpass, in terms of providing legal protection for marijuana use, earlier state-level policy changes related to marijuana decriminalization (Pacula, Chriqui, & King, 2003) and legalization of the product for specific medical purposes (Pacula, Powell, Heaton, & Sevigny, 2015). In addition, federal lawmakers are proposing to decriminalize marijuana (e.g., the Marijuana Opportunity Reinvestment and Expungement [MORE] Act of 2019), which would mark a profound shift in U.S. drug policy.[1]

Given that RML adoption by U.S. states is a relatively recent phenomena, few studies have evaluated the effects of these policy changes. However, the early literature provides suggestive evidence that these state laws increase marijuana use, both casual use and, perhaps more troubling, problematic use (Kim et al., 2016; Cerdá et al., 2017; Miller, Rosenman, & Cowan, 2017; Cerdá et al., 2019; Dragone, Prarolo, Vanin, & Zanella, 2019). A concern with expanded marijuana use is that such use will lead to addiction and associated social ills.

We explore the effects of recreational marijuana legalization on Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) program claiming. SSDI and SSI are social insurance programs that provide cash assistance to U.S. residents with work-limiting disabilities. SSDI provides benefits to disabled workers. In 2017 this program cost the U.S. $138B (Social Security Administration, 2018a). SSI is a means-tested welfare program for low-income disabled or blind individuals with limited work history. In 2017, the costs of SSI were $55B (Social Security Administration, 2018b). Beneficiaries are eligible for public health insurance; Medicare for SSDI beneficiaries and Medicaid for SSI beneficiaries. These two programs provide disability benefits to approximately 16M U.S. residents. While costly, both programs offer income support and health insurance to individuals and their families who become disabled and cannot work.

[1] Legalization of marijuana and/or reducing criminal penalties associated with possessing this product is not unique to the U.S. and indeed reflects a trend among many, but certainly not all, countries. For instance, Argentina legalized medical marijuana in 2017, recreational use of marijuana was legalized in Canada in 2018, public possession of marijuana is a non-criminal offense punished through fines in Israel, Mexico decriminalized possession of small quantities of marijuana in 2009 and a 2018 Supreme Court ruling states that prohibiting marijuana cultivation for personal use is unconstitutional, and in 2020 there will be a referendum on legalization of recreational marijuana use in New Zealand.

Legalization of recreational marijuana may influence disability claiming through at least two channels. Disability has become a substitute for paid employment among some individuals who are marginally attached to the labor market (Autor & Duggan, 2006). For some workers, legalization of recreational marijuana may alter the costs and benefits of claiming disability, plausibly leading to a rise in such claims. For instance, recreational use of marijuana may reduce a worker's marginal product through intoxication and health impairments. Alternatively, recent work suggests that RMLs increase medical use of marijuana, displacing standard medications used to manage symptoms related to pain, mental illness, and other chronic and acute health conditions (Bradford & Bradford, 2016; Ozluk, 2017; Bradford & Bradford, 2017; Bradford, Bradford, Abraham, & Adams, 2018; Bradford & Bradford, 2018; Wen & Hockenberry, 2018). If marijuana allows for improved symptom management, claiming should decrease. In line with improved symptom management, recent studies suggest that work-capacity increases following a state medical marijuana law (MML) (Nicholas & Maclean, 2019; Ghimire & Maclean, 2020). Finally, policies can induce individuals to migrate to/from the adopting locality (Moffitt, 1992), which can change composition of treated and untreated individuals and is therefore part of the policy effect. The impact of selective migration on disability claiming is not obvious. Thus, the net effect of RMLs on disability claiming is *ex ante* unclear. We provide the first evidence on this question.

To study the effects of RML adoption on disability claiming, we combine administrative caseload data maintained by the Social Security Administration (SSA) on new applications and new beneficiaries (i.e., applications deemed legitimate by SSA examiners after a formal review) with two-way fixed effects models over the period 2001 to 2019. To shed light on mechanisms through which RML adoption may lead to changes in disability claiming, we leverage data on reported marijuana use and admissions to substance use disorder (SUD) treatment for which marijuana is listed as a contributing substance, and migration.

2 Data and methods

2.1 Claiming data

We draw administrative data on the number of processed claims from the SSA State Agency Monthly Workload Data (SAMWD) 2001 to 2019. We focus on two disability flow variables: new applications and new beneficiaries – applications that are determined to be meritorious by SSA examiners. We consider three types of claims: SSDI and/or SSI ('all'), SSDI, including SSDI-only and concurrent SSI/SSDI claims (some individuals with particularly

low earnings can qualify for both programs), which we refer to as ('SSDI'), and SSI-only ('SSI'). Disabled children are eligible for SSI, but we remove these entries.

We convert all and SSDI claiming variables to the rate per 10,000 non-elderly adults (21-64 years) using population data from the U.S. Census and age-share information from the Current Population Survey (CPS) (King et al., 2019) as SSDI is available to non-elderly adults. For SSI claiming, we use the adult population (21 years+) as there is no upper age limit on eligibility for this program. We choose 21 years as current RMLs do not allow legal access to marijuana among younger individuals. We use the term 'eligible adults' for these population variables. We aggregate the monthly-level data to the state-quarter-year level to smooth out seasonality.[2]

2.2 RMLs

We use data on state RML effective dates collected by Chan, Burkhardt, and Flyr (2019) and ProCon.org to capture states' law environment, see Figure 1. We construct a variable coded one in state/quarter-year pairs with an RML in place and coded zero in state/year pairs when there is no RML. We code an RML as in place in the first full quarter in which the law is effective.

2.3 Methods

We estimate the relationship between RMLs and disability claiming with the following two-way fixed effects regression model:

$$D_{s,p} = \beta_0 + \beta_1 RML_{s,p-4} + X_{s,p}\beta_2 + \lambda_s + \gamma_p + \mu_{s,p} \tag{1}$$

$D_{s,t}$ is a disability claiming rate variable in state s in period (quarter-year) p. $RML_{s,p-4}$ is an indicator for a state RML, we elect to lag the variable by one year (four quarters) to allow time for the legal status to change, marijuana use to adjust, and finally for disability outcomes to change. $X_{s,p}$ is a vector of state-level characteristics that plausibly predict disability claiming: indicators for an MML, a prescription drug monitoring program, a Medicaid Health Insurance Flexibility and Accountability [HIFA] Waiver, the 2006 Massachusetts healthcare reform, and Affordable Care Act (ACA) Medicaid expansion (Pacula et al., 2003; Atherly, Dowd, Coulam, & Guy, 2012; Courtemanche, Marton, Ukert, Yelowitz, & Zapata, 2017;

[2]We have also aggregated the data to the annual level to further remove seasonality and results (available on request) are not appreciably different.

Wen & Hockenberry, 2018; Sabia & Nguyen, 2018),[3] and demographics from the monthly Current Population Survey (King et al., 2019). λ_s is a vector of state fixed effects and γ_t is a vector of period fixed effects. We cluster standard errors around the state. We weight regressions by the state eligible adult population.

3 Results

3.1 Summary statistics

Table 1 reports summary statistics for the full sample, and for states that pass and do not pass an RML by the end of our study period. Summary statistics for the RML state sample are reported for the period *prior* to RML adoption. In the full sample, the number of all disability, SSDI, and SSI new applications per 10,000 eligible adults are 31.39, 22.71, and 7.07. The corresponding rates for new beneficiaries are 7.53, 1.71, and 2.12. Claiming rates are somewhat lower in RML states than in non-RML states. For instance, the overall disability new application rate per 10,000 eligible adults is 28.84 in RML states and 32.60 non-RML states. An RML is in place in 3.5% of the state-period pairs.

3.2 Validity

A necessary assumption for the two-way fixed effects model to recover causal estimates is that the treatment (i.e., states that passed an RML) and comparison (i.e., states that did not pass an RML) group would have trended similarly in terms of outcomes (i.e., disability claiming) had the treatment group not been treated; 'parallel trends.' While this assumption is untestable as counterfactual trends for the treatment group are not observed, we estimate an event-study to provide suggestive evidence.

Tables 2 and 3 report event study results for new applications and new beneficiaries, respectively. We note that a small number of lead variables rise to the level of statistical significance, but overall adopting and non-adopting states appear to move broadly in parallel pre-RML. We interpret these findings as providing suggestive evidence that our data can satisfy parallel trends.

[3]We incorporate MMLs adopted outside the range reported in Sabia and Nguyen (2018) using the ProCon database (https://marijuana.procon.org/legal-recreational-marijuana-states-and-dc/; last accessed May 24, 2020). We use the Kaiser Family Foundation Medicaid expansion database to incorporate expansions that occurred after those included in Courtemanche et al. (2017), see https://www.kff.org/health-reform/state-indicator/ (last accessed May 24, 2020)

3.3 Disability claiming

Table 4 reports our main findings. We observe that RML adoption leads to an increase in new disability applications, but not new beneficiaries. In particular, following RML adoption, all disability, SSDI, and SSI new applications per 10,000 eligible adults increase by 1.25, 0.75, and 0.44 per 10,000 eligible adults. The relative effect sizes (i.e., comparing coefficient estimates to the baseline mean pre-RML in adopting states) are 4.3%, 3.7%, and 6.1%. We observe no change in the number of new beneficiaries overall or for either program (SSDI or SSI) individually post-RML.

We also examine the importance of dispensaries, locations in which marijuana can be purchased (Table 5). Results suggest that dispensaries are important for SSI claiming – both new applications and new beneficiaries, but not overall or SSDI claiming.

3.4 Marijuana use

We expect that RMLs influence disability claiming through increased marijuana use. We next explore this 'first stage' effect using the public use two-year average National Survey on Drug Use and Health (NSDUH) (past 30-day and year use among adults) and the Treatment Episodes Dataset (TEDS) (admissions to SUD treatment with any reported marijuana use). NSDUH and TEDS data are available at the annual level. Results are listed in Tables 6 and 7 and show that marijuana use and admissions increase post-RML. For example, any past-year marijuana use increases by two percentage points (23%) and the number of admissions with marijuana listed as the primary substance per 10,000 adults increases by 1.85 (24%).[4]

3.5 Migration

We next examine the impact of RMLs on across-state migration using data from the CPS: any migration, and migration to/from an RML state (Table 8). Results suggest that there is no change in net migration post-RML, but migration to (from) an RML state increases (decreases). These results suggest that some of our claiming results may be driven by changes in RML state residents.[5]

[4]In unreported results we observe no evidence of differential pre-trends between adopting and non-adopting states across marijuana use and admissions variables. We estimate the effect of RMLs on admissions to SUD treatment with no marijuana listed and do not observe changes in this outcome. This finding suggests that we are not simply capturing a change in how admissions are recorded at treatment admissions. All results are available on request.

[5]We observe no evidence of differential pre-trends between adopting and non-adopting states. Results are available on request.

4 Robustness checking

We conduct sensitivity analysis to assess the stability of our findings. We include state-linear time trends, use the contemporaneous RML, lag the RML by two years, remove population weights, and and excludes states that have an MML but not an RML in place (Tables A1 and A2). We also conduct a 'leave-one-out' analysis in which we sequentially exclude each RML state (Figures 2 and 3). Results are robust, although we note that we lose precision in the application regressions when we remove the population weights.

5 Discussion

In this study we provide the first evidence on the effect of recent state RMLs on disability claiming. These programs are costly to federal and state governments, but are valuable to disabled individuals who are unable to work as they provide health insurance and income support. Overall, we find that RMLs increase applications but have no observable impact on beneficiaries (i.e., applications deemed suitable for benefits by SSA examiners). The effects sizes for new applications are modest: following RML adoption all disability, SSDI, and SSI applications increase by 4.3%, 3.7%, and 6.1%. One interpretation of our findings is that applications increase post-RML, but the additional claims promoted by law passage are not legitimate as determined by SSA case reviewers.

We provide evidence of a first stage using survey and administrative data, and show that marijuana use increases following RML adoption. Further, RMLs lead to changes in migration patterns. But marijuana use and migration may be mechanisms for observed changes in disability applications. Overall, our results suggest that any benefits from medical use of marijuana post-RML (e.g., improved symptom management) are offset by the impact of misuse and migration.

Our findings add to the growing literature that evaluates the overall effects of expanded access to marijuana through regulation. This literature documents that such expansions in access lead to both benefits and costs. Our findings can be interpreted to imply a cost: some workers, following RML adoption, attempt (but are not ultimately successful) to substitute labor market participation with disability. Policy makers should consider both when establishing marijuana regulation. The optimal law likely varies across states based on state demographics, underlying health status, labor market conditions, related policies and programs, and so forth.

Table 1: Summary statistics for the full sample and by RML adoption

Sample:	All states	RML states, pre-RML	Non-RML states
Applications per 10,000			
All claims	31.39	28.84	32.60
SSDI claims	22.71	20.19	23.78
SSI claims	7.070	7.197	7.144
New beneficiaries per 10,000			
All claims	7.526	7.124	7.772
SSDI claims	1.707	1.291	1.814
SSI claims	2.116	2.374	2.075
RMLs			
RML (lagged one year)	0.0346	–	–
Control variables			
MML	0.335	0.853	0.154
PDMP	0.780	0.865	0.744
HIFA waiver	0.197	0.254	0.176
ACA Medicaid expansion	0.197	0.173	0.156
Massachusetts healthcare reform	0.0161	0.0621	0
Age	37.16	36.35	37.30
Men	0.489	0.493	0.488
Women	0.511	0.507	0.512
White	0.789	0.799	0.787
African American	0.129	0.0746	0.147
Other race	0.0822	0.126	0.0655
Hispanic	0.161	0.230	0.137
Born outside the U.S.	0.140	0.195	0.122
College degree	0.267	0.277	0.260
Unemployment rate	0.0609	0.0731	0.0587
Poverty rate	0.132	0.130	0.133
Observations	3876	666	3040

Notes: Dataset is SAMWD 2001 to 2019. The unit of observation is a state-year-quarter. Outcome variables: data are weighted by the state eligible adult population. All other variables: data are weighted by the state non-elderly adult population.

Table 2: Effect of RML passage on new applications per 10,000 eligible adults: Event-study

Outcome:	All	SSDI	SSI
Mean in RML adopting states, pre-RML	28.84	20.19	7.197
-11	0.24	0.03	0.13
	(0.44)	(0.35)	(0.12)
-10	0.78	0.44	0.27
	(0.81)	(0.54)	(0.24)
-9	1.57	1.08	0.37
	(1.08)	(0.79)	(0.26)
-8	2.80**	1.98**	0.66
	(1.35)	(0.88)	(0.41)
-7	1.29	0.88	0.31
	(1.02)	(0.67)	(0.32)
-6	1.64	1.17	0.41
	(1.24)	(0.85)	(0.33)
-5	2.48*	1.85*	0.51
	(1.40)	(1.01)	(0.34)
-4	1.82	1.39	0.36
	(1.28)	(0.93)	(0.32)
-3	1.56	1.21	0.27
	(1.18)	(0.80)	(0.34)
-2	1.25	1.10	0.17
	(1.13)	(0.80)	(0.29)
0	1.75	1.54**	0.19
	(1.07)	(0.74)	(0.31)
+1	3.25*	2.58**	0.56
	(1.63)	(1.13)	(0.44)
+2	1.93*	1.59*	0.31
	(1.15)	(0.80)	(0.31)
+3	2.31**	1.91**	0.37
	(1.12)	(0.82)	(0.28)
+4	2.44**	2.05**	0.39
	(1.18)	(0.87)	(0.28)
+5	1.56	1.23	0.34
	(1.11)	(0.78)	(0.28)
+6	1.61	1.37	0.27
	(1.25)	(0.85)	(0.34)
+7	3.03**	2.24**	0.59*
	(1.32)	(1.03)	(0.31)
+8	2.98**	2.26**	0.63*
	(1.37)	(0.96)	(0.35)
+9	2.33*	1.62*	0.64*
	(1.36)	(0.95)	(0.35)
+10	1.40	0.93	0.49
	(1.49)	(0.98)	(0.43)
+11	2.89*	2.12*	0.79*
	(1.53)	(1.07)	(0.40)

Notes: Dataset is SAMWD 2001 to 2019. N=1186. The unit of observation is a state-year-quarter. The event-study window includes three years pre- and post-RML for adopting states. For non-adopting states, we assign the median adoption year among adopting states and form a 'pseudo' event-window of three years pre- and post-(false) effective date. The omitted category is 12 quarters pre-event. We omit the quarter prior to adoption in the adopting state sample, this quarter is partially treated as we code RMLs as in place the first full quarter the law is effective. Mean values are based on the full sample. All models estimated with LS and control for state characteristics, state fixed effects, and period fixed effects. Data are weighted by the state eligible adult population. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

Table 3: Effect of RML passage on new beneficiaries per 10,000 eligible adults: Event-study

Outcome:	All	SSDI	SSI
Mean in RML adopting states, pre-RML	7.124	1.291	2.374
-11	-0.34	-0.25	-0.09
	(0.31)	(0.22)	(0.08)
-10	-0.24	-0.20	-0.03
	(0.17)	(0.14)	(0.03)
-9	0.16	0.13	0.03
	(0.30)	(0.26)	(0.06)
-8	-0.31	-0.20	-0.09
	(0.26)	(0.19)	(0.06)
-7	-0.05	0.00	-0.04
	(0.20)	(0.16)	(0.05)
-6	0.28	0.16	0.11*
	(0.23)	(0.16)	(0.06)
-5	0.21	0.14	0.06
	(0.28)	(0.23)	(0.06)
-4	0.46	0.38	0.08
	(0.33)	(0.25)	(0.08)
-3	0.32	0.32	0.01
	(0.36)	(0.27)	(0.08)
-2	0.15	0.12	0.05
	(0.31)	(0.23)	(0.08)
0	0.27	0.28	-0.00
	(0.30)	(0.22)	(0.08)
+1	0.26	0.29	-0.02
	(0.38)	(0.29)	(0.08)
+2	0.50	0.43	0.07
	(0.44)	(0.31)	(0.12)
+3	0.51	0.47	0.06
	(0.39)	(0.32)	(0.08)
+4	0.53	0.51	0.04
	(0.47)	(0.39)	(0.07)
+5	0.11	0.19	-0.04
	(0.43)	(0.35)	(0.07)
+6	0.46	0.36	0.11
	(0.35)	(0.28)	(0.07)
+7	0.13	0.13	-0.00
	(0.55)	(0.43)	(0.12)
+8	0.03	0.09	-0.02
	(0.44)	(0.32)	(0.10)
+9	0.30	0.17	0.12
	(0.51)	(0.37)	(0.12)
+10	-0.14	-0.17	0.06
	(0.57)	(0.39)	(0.15)
+11	-0.59	-0.37	-0.12
	(0.62)	(0.47)	(0.14)

Notes: Dataset is SAMWD 2001 to 2019. N=1186. The unit of observation is a state-year-quarter. The event-study window includes three years pre- and post-RML for adopting states. For non-adopting states, we assign the median adoption year among adopting states and form a 'pseudo' event-window of three years pre- and post-(false) effective date. The omitted category is 12 quarters pre-event. We omit the quarter prior to adoption in the adopting state sample, this quarter is partially treated as we code RMLs as in place the first full quarter the law is effective. Mean values are based on the full sample. All models estimated with LS and control for state characteristics, state fixed effects, and period fixed effects. Data are weighted by the state eligible adult population. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

Table 4: Effect of RML passage on disability claiming per 10,000 eligible adults

Outcome:	All claims	SSDI claims	SSI claims
New applications			
Mean in RML adopting states, pre-RML	28.84	20.19	7.197
RML	1.25**	0.75*	0.44**
	(0.55)	(0.41)	(0.18)
New beneficiaries			
Mean in RML adopting states, pre-RML	7.124	1.291	2.374
RML	0.10	0.03	0.06
	(0.35)	(0.25)	(0.09)

Notes: Dataset is SAMWD 2001 to 2019. N= 3876. The unit of observation is a state-year-quarter. The RML variable is lagged one year. All models estimated with LS and control for state characteristics, state fixed effects, and period fixed effects. Data are weighted by the state eligible adult population. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

Table 5: Effect of RML passage on disability claiming outcomes per 10,000 eligible adults: The role of dispensaries

Outcome:	All claims	SSDI claims	SSI claims
New applications			
Mean in RML adopting states, pre-RML	28.84	20.19	7.197
RML	1.04	0.78*	0.24
	(0.66)	(0.46)	(0.20)
RML dispensary	0.63	-0.09	0.61***
	(0.64)	(0.54)	(0.17)
RML + dispensary	1.67***	0.69	0.85***
	(0.59)	(0.51)	(0.21)
New beneficiaries			
Mean in RML adopting states, pre-RML	7.124	1.291	2.374
RML	0.04	0.06	-0.02
	(0.43)	(0.30)	(0.12)
RML dispensary	0.17	-0.09	0.21**
	(0.38)	(0.28)	(0.09)
RML + dispensary	0.21	-0.02	0.20**
	(0.31)	(0.25)	(0.08)

Notes: Dataset is SAMWD 2001 to 2019. N=3876. The unit of observation is a state-year-quarter. The RML and RML dispensary variables are lagged one year. All models estimated with LS and control for any MML (lagged one year), state characteristics, state fixed effects, and period fixed effects. Data are weighted by the state eligible adult population. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

Table 6: Effect of RML passage on reported marijuana use in the past 30 days and past year among individuals 12 years and older

Outcome:	30-day use	Year use
Mean in RML adopting states, pre-RML	0.0829	0.0871
RML	0.03***	0.02***
	(0.01)	(0.01)

Notes: Dataset is the public use two-year state average NSDUH 2003 to 2018. N=816. The unit of observation is a state-year. The RML variable is lagged one year. All models estimated with LS and control for state characteristics, state fixed effects, and year fixed effects. Data are weighted by the state population age 12 years and older. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

Table 7: Effect of RML passage on admissions to specialty SUD treatment in which any marijuana is reported and marijuana is the primary substance per 10,000 adults

Outcome:	Any	Primary
Mean in RML adopting states, pre-RML	26.36	7.604
RML	13.89***	1.85***
	(1.41)	(0.65)

Notes: Dataset is TEDS 2001 to 2017. N=848. TEDS records up to three substances at admission to treatment. The unit of observation is a state-year. The RML variable is lagged one year. All models estimated with LS and control for state characteristics, state fixed effects, and year fixed effects. Data are weighted by the state adult population. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

Table 8: Effect of RML passage on migration

Outcome	Move	Move in	Move out
Mean in RML adopting states, pre-RML	0.0187	0.000	0.000
RML	-0.001	0.011***	-0.003***
	(0.001)	(0.004)	(0.000)

Notes: Dataset is the Annual Social and Economic Supplement to the Current Population Survey 2001-2019. N=969. The unit of observation is a state-year. The RML variable is lagged one year. All models estimated with LS and control for state characteristics, state fixed effects, and year fixed effects. Data are weighted by the state adult population. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

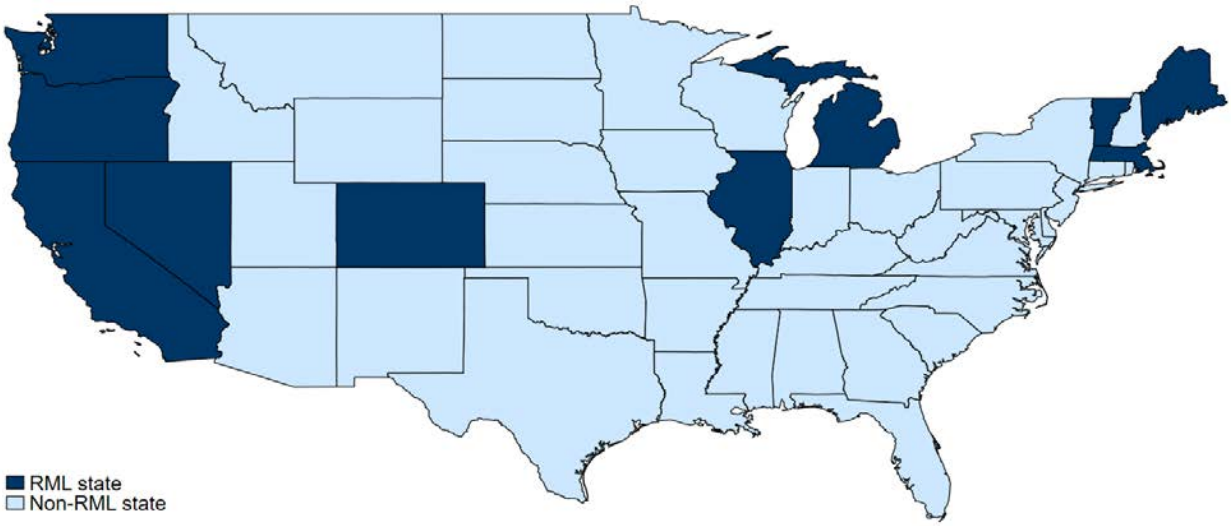

Figure 1: States that have adopted and not adopted an RML by 2020

Notes: Dataset is based on legal statue information collected by Chan et al (2019) and ProCon.org. RML effective dates are as follows: Alaska: February 2015, California: November 2016, Colorado: December 2012, District of Columbia: February 2015, Illinois: January 2020, Maine: January 2017, Massachusetts: December 2016, Michigan December 2018, Nevada: January 2017, Oregon: July 2015, Vermont: July 2018, and Washington: November 2012.

Table A1: Effect of RML passage on new applications per 10,000 eligible adults using different specifications and samples

Outcome:	All claims	SSDI claims	SSI claims
Mean value	28.84	20.19	7.197
Include state-specific linear time trends	1.39*	0.56	0.64***
	(0.74)	(0.47)	(0.23)
Observations	3672	3672	3672
Current RML	1.10**	0.77*	0.31*
	(0.53)	(0.43)	(0.16)
Observations	3672	3672	3672
Lag RML two years	1.41**	0.73*	0.59***
	(0.53)	(0.41)	(0.18)
Observations	3672	3672	3672
Unweighted	0.20	0.12	0.06
	(1.01)	(0.63)	(0.39)
Observations	3672	3672	3672
Drop states with an MML & no RML	2.00***	1.31**	0.61***
	(0.63)	(0.50)	(0.19)
Observations	2280	2280	2280

Notes: Dataset is SAMWD 2001 to 2019. The unit of observation is a state-year-quarter. RML variable is lagged one year unless otherwise noted. All models estimated with LS and control for state characteristics, state fixed effects, and period fixed effects. Data are weighted by the state eligible adult population unless otherwise noted. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

Table A2: Effect of RML passage on new beneficiaries per 10,000 eligible adults using different specifications and samples

Outcome:	All claims	SSDI claims	SSI claims
Mean value	7.124	1.291	2.374
Include state-specific linear time trends	0.79	0.42	0.29
	(0.59)	(0.38)	(0.18)
Observations	3672	3672	3672
Current RML	0.16	0.12	0.04
	(0.38)	(0.28)	(0.09)
Observations	3672	3672	3672
Lag RML two years	0.09	-0.03	0.10
	(0.32)	(0.23)	(0.09)
Observations	3672	3672	3672
Unweighted	-0.34	-0.22	-0.11
	(0.55)	(0.36)	(0.18)
Observations	3672	3672	3672
Drop state with an MML & no RML	0.21	0.12	0.08
	(0.30)	(0.22)	(0.08)
Observations	2280	2280	2280

Notes: Dataset is SAMWD 2001 to 2019. The unit of observation is a state-year-quarter. RML variable is lagged one year unless otherwise noted. All models estimated with LS and control for state characteristics, state fixed effects, and period fixed effects. Data are weighted by the state eligible adult population unless otherwise noted. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

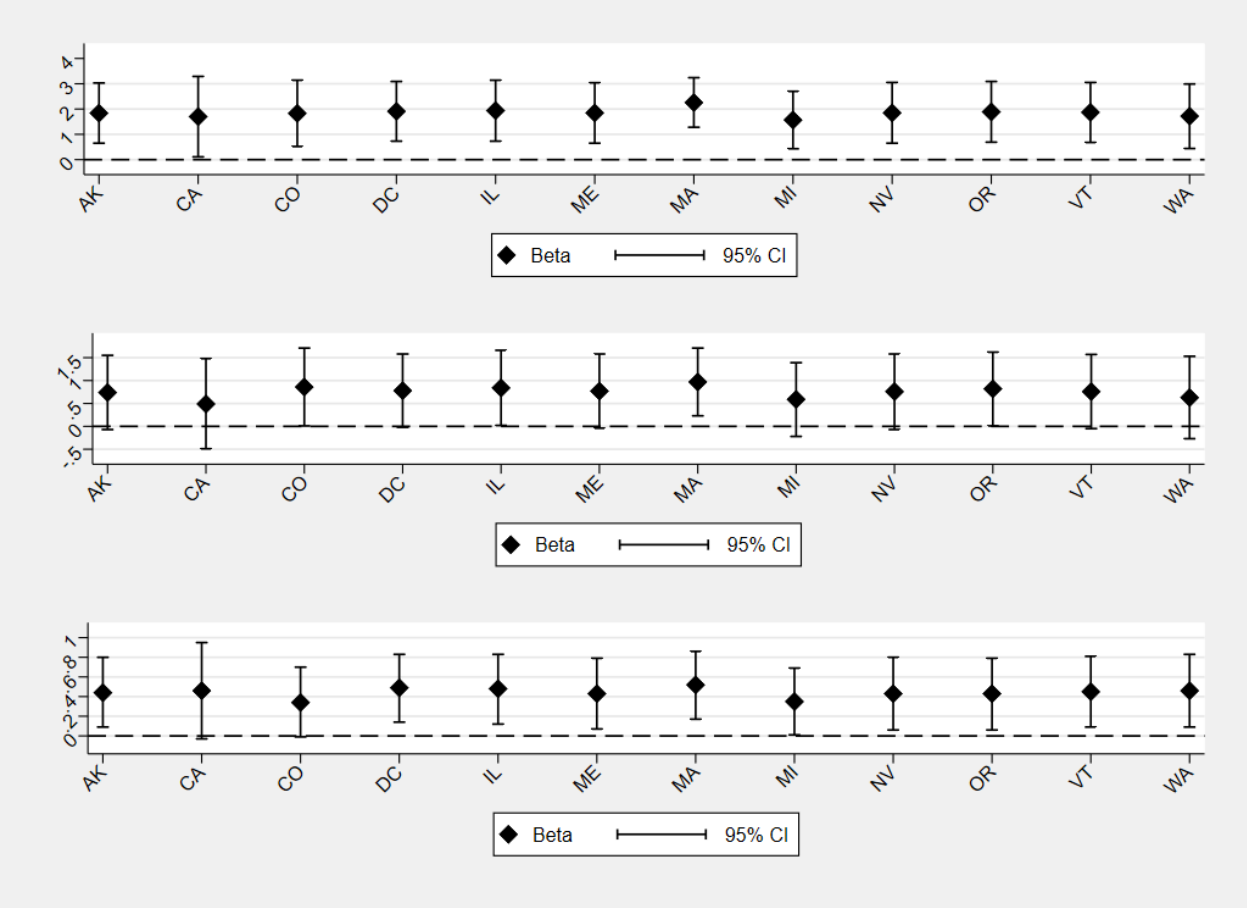

Figure 2: New applications leave one out analysis

Notes: Dataset is SAMWD 2001 to 2019. The unit of observation is a state-year-quarter. Coefficient estimates are generated in regression models that exclude the state listed on the x-axis. 95% confidence intervals are reported with vertical solid lines and account for within-state clustering. All models estimated with LS and control for state characteristics, state fixed effects, and period fixed effects. Data are weighted by the state eligible adult population. See Section 4 for full details.

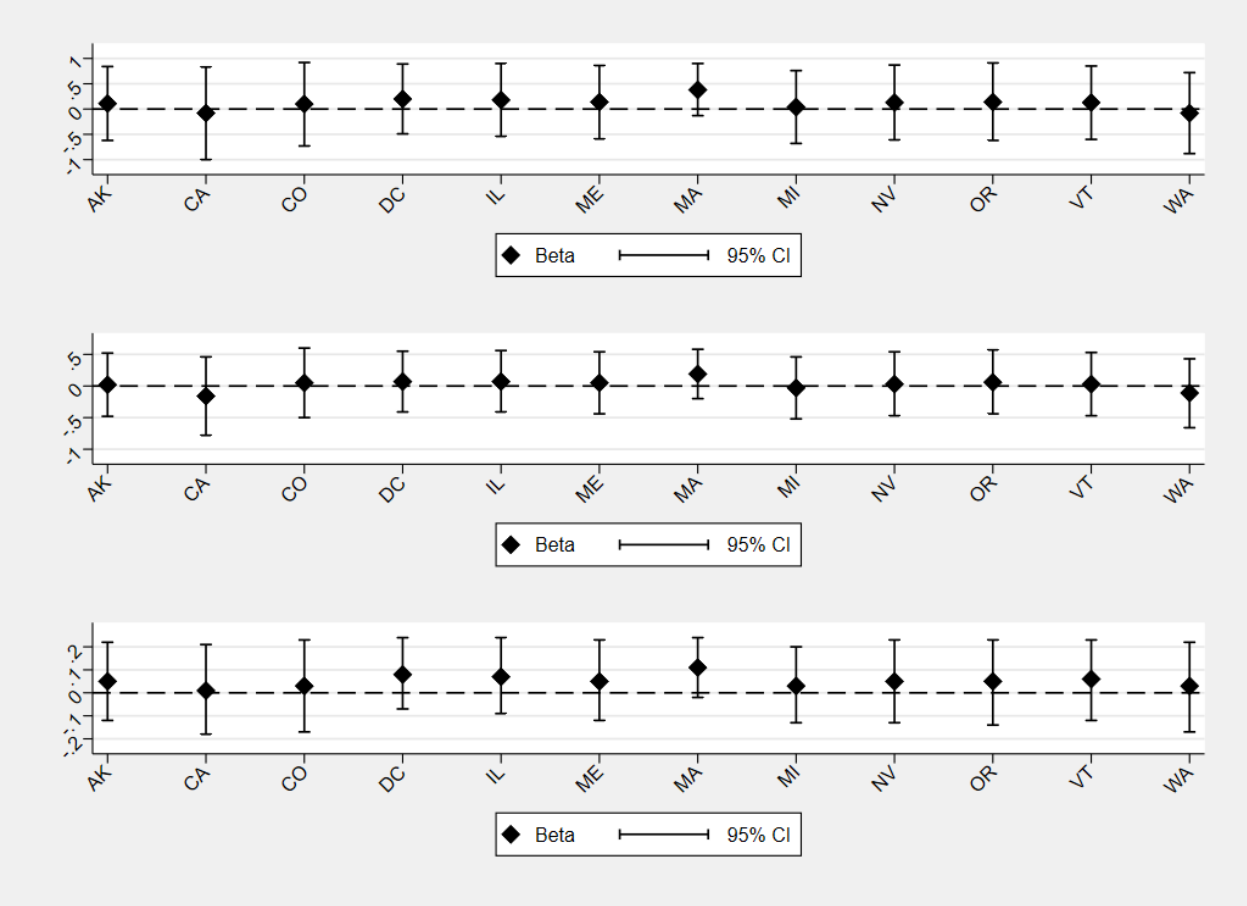

Figure 3: New applications leave one out analysis

Notes: Dataset is SAMWD 2001 to 2019. The unit of observation is a state-year-quarter. Coefficient estimates are generated in regression models that exclude the state listed on the x-axis. 95% confidence intervals are reported with vertical solid lines and account for within-state clustering. All models estimated with LS and control for state characteristics, state fixed effects, and period fixed effects. Data are weighted by the state eligible adult population. See Section 4 for full details.

References

Atherly, A., Dowd, B. E., Coulam, R. F., & Guy, G. (2012). The effect of HIFA waiver expansions on uninsurance rates in adult populations. *Health Services Research*, *47*(3pt1), 939–962.

Autor, D. H., & Duggan, M. G. (2006). The growth in the Social Security Disability rolls: A fiscal crisis unfolding. *The Journal of Economic Perspectives*, *20*(3), 71–96.

Bradford, A. C., & Bradford, W. D. (2016). Medical marijuana laws reduce prescription medication use In Medicare Part D. *Health Affairs*, *35*(7), 1230-1236.

Bradford, A. C., & Bradford, W. D. (2017). Medical marijuana laws may be associated with a decline In the number of prescriptions for Medicaid enrollees. *Health Affairs*, *36*(5), 945–951.

Bradford, A. C., & Bradford, W. D. (2018). The Impact of Medical Cannabis Legalization on Prescription Medication Use and Costs under Medicare Part D. *The Journal of Law and Economics*, *61*(3), 461–487.

Bradford, A. C., Bradford, W. D., Abraham, A., & Adams, G. B. (2018). Association between US state medical cannabis laws and opioid prescribing in the Medicare Part D population. *JAMA Internal Medicine*, *178*(5), 667–672.

Cerdá, M., Mauro, C., Hamilton, A., Levy, N. S., Santaella-Tenorio, J., Hasin, D., ... Martins, S. S. (2019). Association between recreational marijuana legalization in the united states and changes in marijuana use and cannabis use disorder from 2008 to 2016. *JAMA psychiatry*.

Cerdá, M., Wall, M., Feng, T., Keyes, K. M., Sarvet, A., Schulenberg, J., ... Hasin, D. S. (2017). Association of state recreational marijuana laws with adolescent marijuana use. *JAMA Pediatrics*, *171*(2), 142–149.

Chan, N. W., Burkhardt, J., & Flyr, M. (2019). The effects of recreational marijuana legalization and dispensing on opioid mortality. *Economic Inquiry*.

Courtemanche, C., Marton, J., Ukert, B., Yelowitz, A., & Zapata, D. (2017). Early impacts of the affordable care act on health insurance coverage in medicaid expansion and non-expansion states. *Journal of Policy Analysis and Management*, *36*(1), 178–210.

Dragone, D., Prarolo, G., Vanin, P., & Zanella, G. (2019). Crime and the legalization of recreational marijuana. *Journal of Economic Behavior & Organization*, *159*, 488–501.

Ghimire, K., & Maclean, J. C. (2020). Medical marijuana and workers' compensation claiming. *Health Economics*, *29*(4), 419-434.

Kim, H. S., Hall, K. E., Genco, E. K., Van Dyke, M., Barker, E., & Monte, A. A. (2016).

Marijuana tourism and emergency department visits in colorado. *New England Journal of Medicine*, *374*(8), 797–798.

King, M., Ruggles, S., Alexander, J. T., Flood, S., Genadek, K., Schroeder, M. B., ... Vick, R. (2019). *Integrated Public Use Microdata Series, Current Population Survey: Version 6.0. [Machine-readable database]* (Tech. Rep.). Minnesota Population Center.

Miller, A. M., Rosenman, R., & Cowan, B. W. (2017). Recreational marijuana legalization and college student use: early evidence. *SSM-Population Health*, *3*, 649–657.

Moffitt, R. (1992). Incentive effects of the US welfare system: A review. *Journal of Economic Literature*, *30*(1), 1–61.

Nicholas, L. H., & Maclean, J. C. (2019). The Impact of Medical Marijuana Laws on the Labor Supply and Health of Older Adults: Evidence from the Health and Retirement Study. *Journal of Policy Analysis and Management*(22688).

Ozluk, P. (2017). *The effects of medical marijuana laws on utilization of prescribed opioids and other prescription drugs.*

Pacula, R. L., Chriqui, J. F., & King, J. (2003). *Marijuana Decriminalization: What does it mean in the United States?* (NBER Working Paper Series). National Bureau of Economic Research.

Pacula, R. L., Powell, D., Heaton, P., & Sevigny, E. L. (2015). Assessing the effects of medical marijuana laws on marijuana use: The devil is in the details. *Journal of Policy Analysis and Management*, *34*(1), 7–31.

Sabia, J. J., & Nguyen, T. T. (2018). The effect of medical marijuana laws on labor market outcomes. *The Journal of Law and Economics*, *61*(3), 361396.

Social Security Administration. (2018a). *Annual Statistical Report on the Social Security Disability Insurance Program, 2017* (Tech. Rep. No. 13-11826). Social Security Administration.

Social Security Administration. (2018b). *SSI Annual Statistical Report, 2017* (Tech. Rep.). Author. Retrieved from `https://www.ssa.gov/policy/docs/statcomps/ssi_asr/index.html`

Wen, H., & Hockenberry, J. M. (2018). Association of medical and adult-use marijuana laws with opioid prescribing for Medicaid enrollees. *JAMA Internal Medicine*, *178*(5), 673–679.