DOES UNIVERSAL LICENSING RECOGNITION IMPROVE PATIENT ACCESS? EVIDENCE FROM HEALTHCARE UTILIZATION

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ABSTRACT

Optimizing physician labor supply has been an important policy issue in healthcare in the United States. One of the proposed solutions has been the Interstate Medical Licensure Compact which provides universal licensing recognition (ULR) and waives the re-licensure processes of out-of-state licensed workers. The policy. allows physicians to move across state lines without relicensing and the practice was adopted to raise the local labor supply of physicians relative to the demand for their services. While economic theory suggests that the relaxation of regulations further increases the local labor supply and subsequently improves consumer benefits, there has been no empirical evidence. In this study, we use the Behavioral Risk Factor Surveillance System to investigate the effect of universal reciprocity of physician licenses on healthcare utilization. Our results show that the universal reciprocity of physician licenses significantly raises the proportion of respondents accessing healthcare, particularly among older respondents, and reduces the proportion of respondents not getting healthcare services due to costs. We also show that the positive effect of the ULR on healthcare utilization is closely related to the inflow of doctors but not with interstate migration. We also validate that the estimated effects are from the 'universal reciprocity' of physician licenses, instead of unknown factors related to the ULR. The use of universal licensing recognition may allow for a more efficient regional distribution of physicians and result in greater access to health care.

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1 Introduction

Optimizing physician labor supply is an important policy agenda in healthcare (Kirch and Petelle, 2017). Due to changes in the demographic composition of the U.S. population there is expected to be a significant increase in the number of regions that will have a lower than anticipated number of physicians (Zhang et al., 2020). Although not raising the overall physician labor supply, one of the ways to increase the optimal geographic distribution of physicians is to allow 'interstate reciprocity' of physician licenses. A regulatory relaxation is allowing out-of-state practitioners to practice with their current licenses issued in another state. However, in a heavily regulated industry, 'interstate reciprocity' of the license was not considered until the early 2010s, restricting the labor supply that limited the growth of consumer benefits in many U.S. states (Holen, 1965; Kleiner, 2000; Johnson and Kleiner, 2020).

Universal licensing recognition (ULR) is a comprehensive regulatory relief policy that waives the re-licensure processes of out-of-state licensed workers (i.e. universal reciprocity of selected occupational licenses), and several recent studies show its positive impact on local labor supply (Bae and Timmons, 2023). However, its impact on consumer benefits, such as healthcare utilization, has not been analyzed. Recent policy changes to include the Interstate Medical Licensing Compact (IMLC), make measuring the impact of the ULR more complex. In this study, we evaluate the impact of the ULR on healthcare utilization separately from the IMLC by measuring the effect on healthcare utilization among the states that passed the IMLC before adopting the ULR. We use the Behavioral Risk Factor Surveillance System (BRFSS) to examine the changes in state-level healthcare utilization and medical cost issues.

Our paper provides two new contributions to the literature. First, this study is the first empirical study that provides empirical evidence on how the ULR potentially improves consumer

benefits. Previous studies suggest the outcomes, including improvements in consumer benefits, based on economic theory can occur when regulations are relaxed. This study provides empirical evidence that the relaxation of regulatory requirements increased consumer benefits for a specific service that is essential **and costly.** Second, the study adds to the literature by providing empirical evidence that regulatory relief can contribute to improving consumer benefits. Although labor market regulations are needed to protect consumers from incompetent or unscrupulous service providers, and to maintain the quality of services, some of the regulations may be too restrictive, leading to a reduction in the labor supply and reducing access to health care. Thus, these reduced regulations may raise consumer benefits by diminishing access without deteriorating the service quality or increasing malpractice costs. The empirical evidence shows that policy implications through regulatory reliefs can improve consumer benefits if the work-related requirements, such as the scope of practice and qualification exams, are substantially equivalent across the states.

To preview our findings, we show that accepting universal reciprocity of physician licenses raises the proportion of respondents who have personal doctors or healthcare providers, especially for older individuals, and reduces the proportion of respondents who do not see doctors due to costs. We also provide empirical evidence that the residency requirement of the ULR limits the effect of regulatory relief, suggesting that the positive effect of universal reciprocity for healthcare utilization is closely correlated with doctors who move across state lines, but not with general interstate migration. Using counterfactual analyses, we validate that the effects of the ULR on healthcare utilization that are from the 'universal reciprocity' of physician licenses. Overall, our study shows that the ULR is a regulatory relief that improves consumer benefits, which is consistent with the theoretical predictions and previous literature on the relaxation of occupational licensing regulations.

The remainder of this paper is organized as follows. In Section 2, we present a background of occupational licensure research over the last decade as well as the literature review on the impact of regulatory relief for occupational licensure. In Section 3, we provide a detailed explanation of the data, sample selection, variables, and estimation procedures. In Section 4, we outline the results from the analyses, and then provide the implications of the findings. In the final section, we summarize the findings and implications and discuss limitations and suggestions for future research directions.

2 Background on Relaxing Occupational Licensure Regulations

Licensing has its influence in the labor market through shifting out the labor market demand curve or restricting labor supply (Kleiner, 2016). The academic literature has examined both the demand and supply implications of the labor market effects of licensing. For example, Kleiner and Krueger (2013) find that licensing generates around a 15% wage premium while not significantly reducing wage dispersion for licensed workers; they further demonstrate even bigger wage associations of 23% when licensing is interacted with union membership. Gittleman et al. (2018) find a lower wage premium of around 5% using Survey of Income and Program Participation (SIPP) data, which use somewhat different questions than the ones asked in other surveys, and they also conclude that licensing is associated with higher probabilities of being employed and receiving health insurance from employers. By estimating market share ratios, Blair and Chung (2022) show that licensing reduces equilibrium labor supply by an average of 17% to 27%. Similarly, Kleiner and Soltas (2023) find that licensing raises wages and hours but reduces employment by a similar percentage.

The potential monopoly effects of occupational licensing requirements on employment and earnings are well documented, both at the national level and within specific occupations (Kleiner 2016). From theory, occupational licensing restrictions limit labor supply, produce a wage premium for licensed workers, and increase prices for consumers. The influence of relaxing occupational licensing policies in health care for physicians has resulted in a reduction in prices with no effect on the quality of services (Kleiner et al., 2016).

Over the last decade, multiple relaxation of occupational licensing requirements has been introduced to the occupational regulations that accept the reciprocity of out-of-state occupational licenses. The Interstate Licensure Compact (ILC) is the regulatory relief that allows out-of-state licensed workers from the ILC member states to practice without a time-consuming re-licensure process. Since state-specific occupational licensure discourages the interstate mobility of licensed workers (Johnson and Kleiner, 2020), the 'interstate reciprocity' of out-of-state licenses, in theory, increases the interstate mobility of licensed workers, leading to an increasing local labor supply. Previous studies provide multiple empirical evidence that the ILC increased the local labor supply, reduced labor costs, improved the quality of services, and ultimately, increased consumer benefits (Apgar, 2022; Kim et al., 2023).

Specifically for physicians, the Interstate Medical Licensure Compact (IMLC) was introduced and adopted to raise the local labor supply of physicians by waiving state-specific re-licensure processes for those who attained their physician licenses from the IMLC member states (Steinbrook, 2014). Healthcare practitioners, economists, and policymakers expected that this compact would increase the labor supply of healthcare practitioners and access to healthcare by increasing the interstate mobility of physicians, including interstate relocations and travel doctors (Chaudhry et al., 2015). Multiple studies provide empirical evidence that this compact raised the

interstate mobility of these workers, increased the local labor supply of healthcare practitioners, and improved the quality of healthcare services (e.g. Deyo and Hughes, 2019; Livanos, 2020; Shakya et al., 2022). However, the IMLC only accepts interstate reciprocity among the IMLC member states. In other words, physician licenses from non-member states are not eligible for interstate reciprocity, although the Interstate Medical Licensing Compact board recognizes that approximately 80% of US physicians meet the ILC's reciprocity requirements (Adashi et al., 2021).

Starting in the late 2010s, an increasing number of states passed the Universal Licensing Recognition (ULR), another recent regulatory relief that allows out-of-state licensed workers to practice without state-specific re-licensure processes. Compared to the ILC, the ULR is a more comprehensive regulatory relief since the ULR does not distinguish where the licensees attained their licenses; instead, this relief accepts the 'universal reciprocity' for the selected licensed occupations regardless of the states of licensure, as long as licensees' qualifications meet the reciprocity requirements such as the similar scope of practice, substantially equivalent education and experience, and residency (Timmons and Norris, 2023; Norris, 2024; Shakya et al., 2024). Previous studies provide theoretical and empirical evidence that the ULR increased the interstate mobility and local labor supplies of licensed occupations and reduced service costs among the states that passed this relief, suggesting that the ULR has a clear effect on increasing the local labor supply (Deyo and Plemmons, 2022; Bae and Timmons, 2023).

As noted above, economic theory suggests that an increase in the labor supply reduces labor costs and improves the quality of services, leading to improved consumer benefits. This implies that the increase in the local labor supply of physicians due to the universal reciprocity will lead to the reduction of healthcare costs, improvement in the quality of services, and ultimately the increase in healthcare utilization among the states that passed the ULR including physician

occupations. However, it is not clear whether the ULR is an effective regulatory relief to improve healthcare utilization because the IMLC was already passed and accepted as interstate reciprocity; as it has been studied, the IMLC already contributed to raising healthcare utilization. Of course, in theory, ULR is more comprehensive than IMLC and therefore we can expect that this additional regulatory relief may further raise the local labor supply of physicians, leading to improving healthcare utilization. This study focuses on answering this question using new data and analysis.

3 Data and Methods

We mainly use the Behavioral Risk Factor Surveillance System (BRFSS) 2018-2023. The BRFSS, publicly available in the Center for Disease Control and Prevention (CDC), is a cross-sectional telephone survey that provides abundant health-related information, such as healthcare utilization, chronic diseases, and health-related behaviors, on the nationally representative sample of Americans aged 18 and older. The benefit of using the BRFSS is that the survey provides both the state of residency and month of survey of each respondent; this is particularly important to distinguish the time before and after the implementation of the ULR in each state.

We first select the sample of respondents aged between 25 and 64. We specifically select this working age group because Medicare eligibility and receipt at age 65 or older significantly increases healthcare utilization, possibly distorting the effect of the ULR (Card et al., 2008). Then, the respondent-level healthcare utilization measures are shrunk into state-half-year cells; each cell provides the proportion of respondents in each state who utilized corresponding healthcare services during the given 6-month period. For the analysis by age group, we follow the same procedure, but using a subset of respondents based on their ages: ages between 25 and 44 (younger population) and ages between 45 and 64 (older population). By examining the changes in this proportion before

and after the implementation of the ULR, we can validate the effect of the ULR on healthcare utilization.

3.1 Treatment and Control Groups

In this study, we use the event study framework to estimate the effect of the ULR. To do so, we carefully select the treatment and control groups that allow us to make a 'parallel trend' assumption. To do so, we group the states that adopted the IMLC in the same year. 11 states adopted the IMLC in 2015 (see Table 1). Out of these 11 states, 6 states adopted the ULR: Idaho, Iowa, Montana, South Dakota, Utah, and Wyoming. However, three states – Iowa, Utah, and Wyoming – did not include physician occupations in the list of occupations for universal reciprocity. In other words, the other three states – Idaho, Montana, and South Dakota – are the states that adopted the universal reciprocity for physician licenses; these 3 states are the treatment group for the baseline analysis, and the other 8 states are the control group for the baseline analysis. Note that we also conduct counterfactual analyses by assuming the three states that adopted the ULR but did not include physician occupations for the universal reciprocity as the treatment group, checking whether the impact on healthcare utilization is from the 'universal reciprocity' of physician licenses or other unknown factors related to the ULR. Note that the states that accept universal reciprocity of physician licenses impose the same rules and requirements for physicians with the Medical Doctor (MD) degree and those with the Doctor of Osteopathic Medicine (DO) degree.

In 2016, 6 states adopted the IMLC. Out of these 6 states, 5 states adopted the ULR. However, one state – Colorado – excluded physician occupations from the list of occupations for universal reciprocity, and three states – Arizona, Kansas, and Mississippi – added residency requirements for universal reciprocity of physician licenses. For a robustness check, despite the residency requirement, four states include physician occupations to the list of occupations for

universal reciprocity – Arizona, Kansas, Mississippi, and New Hampshire – are chosen as a treatment group, and the two other states – Connecticut and Colorado – are used as a control group. This robustness check provides results on the outcomes of the ULR when the residency requirement – restricting mobile doctors from being allowed to practice by universal reciprocity – is imposed. Table 1 shows the list of states that are being used as treatment and control groups in this study.

3.2 Healthcare Utilization Measures

Although the BRFSS provides numerous useful measures on healthcare utilization, the majority of the measures cannot be used because the survey questions for corresponding measures are asked only for specific groups of respondents based on their age and sex. For instance, the question on 'the time since the last sigmoidoscopy or colonoscopy' was asked to respondents who are aged 50 or older. Similarly, the question on the 'time since the last mammogram' was asked to women only. This leads to having insufficient numbers of respondents to obtain the proportion of respondents that received corresponding healthcare services. In addition, some of the questions are asked biennially (e.g. dental checkup), limiting the possibility of using an event study design to measure the pre- and post-treatment effects in each time interval.

Therefore, we carefully selected three variables whose questions in the survey remained relatively similar across all survey years and were asked to all the survey respondents. First, 'having one or more personal doctors or healthcare providers' is a measure that captures whether a respondent has a personal doctor or healthcare provider. Although the change in the survey question for this measure in 2021 led to an increase in the proportion of respondents who have personal doctors or healthcare providers, this increase was observed at a similar rate across all

states.[1] In Appendix 1, we provided the difference in the proportions of respondents who have one or more personal doctors or healthcare providers from the BRFSS 2020 and 2021, separately by the ULR adoption status; this table shows that the difference in the change in this proportion between the states that adopted and did not adopt the ULR is only 0.3 percentage point. Therefore, this change can be controlled by using time fixed effects of the event study design. Second, 'could not see a doctor because of cost' is a measure that captures whether a respondent experienced trouble seeing a doctor because of high healthcare costs. Lastly, 'received routine health checkups within a year' is a measure that captures whether a respondent received a routine health checkup within a year.

These variables are particularly useful given the time period because these measures are not critically influenced by COVID-19: a potential confounder of the impact of this relaxation of regulations by raising the needs of medical doctors for COVID-19 diagnosis and patient care. These measures are shrunk into state-half-year cells, and the final data is composed of state-level panel data that has a set of healthcare utilization variables. Table 2 provides the descriptive statistics of the sociodemographic characteristics of respondents by the resident states' ULR adoption status and the year of adoption of the IMLC from January to June of 2018.

3.3 Estimation Procedure

For the estimation, we use a Callaway-Sant'Anna (2021) event study analysis. There are two reasons we chose this method. First, because the impact of this regulatory relief is expected to be introduced gradually, event study analysis is more appropriate to capture the change in the magnitude of the effect over time. Second, the ordinary event study analysis is limited in

[1] For more information about the survey question and changes in the responses, check the SHADAC's blog: https://www.shadac.org/topic/behavioral-risk-factor-surveillance-system-brfss-data?page=1

accounting for so-called 'non-parallel outcome dynamics' that lead to biased and inconsistent estimations. Callaway-Sant'Anna (C-S) event study analysis allows us to account for these issues so that we can obtain the causal measures that present the effect of this regulatory relief on healthcare utilization. The estimation model is:

$$Y_{st} = \alpha + \mathbf{ULR}_{st}\boldsymbol{\beta} + s + t + \varepsilon_{st}$$

where s and t are the state and time fixed effects respectively, Y_{st} is the proportion of respondents, living in state s in time t, who received corresponding healthcare service or had medical cost issues, and $\mathbf{ULR}_{st}$ is the vector of event study regressors capturing the time since the ULR was adopted, including both pre- and post-treatment.

4 Results

4.1 Healthcare Utilization Among the States Adopted IMLC in 2015

Figure 1 shows the results from the C-S event study analysis, using the data from the states that adopted the IMLC in 2015. There are three sub-figures. The first sub-figure, on the upper left corner of the figure, shows the result using 'having personal doctors or healthcare providers (Personal Doctor)' as an outcome. This sub-figure shows that the proportion of respondents having one or more personal doctors or healthcare providers significantly increased among the states that accepted universal reciprocity of physician licenses starting at Time 0. Furthermore, since Time 0, the magnitude of the estimated effects increases as time passes, implying that this proportion further increased over time among the states that accepted universal reciprocity of physician licenses.

The second sub-figure, on the upper right corner of the figure, shows the result using 'could not see a doctor because of cost (Cost Issue)' as an outcome. This sub-figure shows that the

proportion of respondents not seeing the doctor due to the cost significantly decreased among the states that accepted universal reciprocity of physician licenses starting Time 0. The last sub-figure, on the lower left corner of the figure, shows the result using 'received routine health checkups within a year (Routine Check within 1 Year)' as an outcome. Although the estimated effects since Time 0 are positive, these effects are not statistically significant.

Overall, the results from the first two sub-figures provide clear evidence that access to healthcare increased and the concern about medical costs decreased since the universal reciprocity of physician licenses was adopted, implying a positive impact of regulatory relief on consumer benefits.

4.2 Analyses by Age Group

Figures 2 and 3 show the results from the C-S event study analysis, using the outcome variables that were generated from selected respondents based on their ages: ages between 25 and 44 (Figure 2) and ages between 45 and 64 (Figure 3). The sub-figures in Figure 2 show unclear effects of the universal reciprocity of physician licenses. For instance, the first sub-figure shows that the treatment effects are positive and statistically significant since Time 0 and Time -2. On the other hand, the second sub-figure shows that the effects are not statistically significant across all time periods. The last sub-figure shows that the estimated effects are statistically significant since Time 7 and Time -3. These results do not provide clear evidence of the effect of universal reciprocity of physician licenses on healthcare utilization among younger populations.

On the other hand, the first sub-figure in Figure 3 provides clear evidence of the effect of universal reciprocity of physician licenses on healthcare utilization; the difference in the proportion of respondents having personal doctors or healthcare providers is not statistically significant before accepting universal reciprocity of physician licenses, and then it became statistically significant

after accepting this reciprocity. However, the other sub-figures do not provide clear evidence. The second sub-figure shows that the treatment effects are negative and statistically significant since Time 0 and Time -2. The last sub-figure shows that the treatment effects are not statistically significant across all time.

Overall, these results suggest that the effect of universal reciprocity of physician licenses on having personal doctors or healthcare providers is statistically significant across all post-treatment time points for older workers (aged between 45 and 64) who are concerned and need more healthcare services than younger workers (aged between 25 and 44). Since healthcare services become more and more essential as people age, these results are consistent with the growth of healthcare service demand by age.

4.3 Healthcare Utilization Among States Adopted IMLC in 2016: Residency Requirement Limits the Effect of ULR?

Figure 4 shows the results from the C-S event study analysis using the data from the states that adopted the IMLC in 2016. The results in all three sub-figures do not provide the clear effect of the universal reciprocity of physician licenses. Although this may be due to the smaller sample sizes (compared to the previous estimations, the data for this estimation includes significantly less number of states) and/or state-specific heterogeneity, one possible reason would be the residency requirements; out of four states that accepted universal reciprocity of physician licenses, three states – Arizona, Kansas, and Mississippi – imposed residency requirements (i.e. limits the universal reciprocity to state residents) that discourage mobile doctors to practice in these states. In other words, residency requirements are another regulatory barrier that limits out-of-state licensed workers who do not relocate to these states.

4.4 Counterfactual Analysis: Universal Reciprocity or Unknown Factors Related to ULR?

Figure 5 shows the results from the C-S event study analysis using counterfactual treatment group. The data is composed of the measures from the states that adopted the IMLC in 2015, yet the states that passed the ULR without including physician occupations in the list of occupations for universal reciprocity are also included in the treatment group (i.e. counterfactual treatment group). Obtaining the treatment effect using the states that passed the ULR, regardless of including physician occupations in the list of occupations for universal reciprocity, will reveal whether the effect of the ULR on healthcare utilization was from the 'universal reciprocity' of physician licenses or the unknown effects from the ULR.

There are four sub-figures: two sub-figures on the left show the effects of ULR using a true treatment group, and the other sub-figures on the right show the effects using a counterfactual treatment group. The sub-figures in the first row used 'having personal doctors or healthcare providers (Personal Doctor)' as an outcome, and the sub-figures in the next row used 'could not see a doctor because of cost (Cost Issue)' as an outcome. The results in these sub-figures illustrate that the estimated effects are statistically significant only if we use the true treatment group; the results using the counterfactual treatment groups are not statistically significant. Note that the statistically significant estimate in Time 8 in the sub-figure in the upper right corner was obtained from one state (Montana) that adopted the ULR in 2019; the state that did not exclude physician licenses from the list of occupations for universal reciprocity. In summary, these results reveal that the positive impacts of the ULR on consumer benefits are due to the universal reciprocity of physician licenses instead of other unknown factors related to the ULR.

5 Conclusion

We examine how regulatory relief improves consumer benefits by evaluating the impact of universal reciprocity of physician licenses on healthcare utilization. We use public healthcare utilization data to investigate the change in access to healthcare before and after accepting the universal reciprocity of physician licenses. The results from these estimates are consistent with economic theory; the universal reciprocity of physician licenses significantly raises the proportion of respondents accessing healthcare, particularly among older respondents, and reduces the proportion of respondents not getting healthcare services due to cost considerations. We also examine how residency requirements of the ULR change the outcomes using another subset of states that adopted the IMLC in 2016, and show that the positive effect of the ULR on healthcare utilization is not observed among the states that accept universal reciprocity but impose residency requirements. This result implies that the universal reciprocity of physician licenses has a significant role in the decision-making process for doctors who are considering moving, but not in interstate migration. Lastly, we use a counterfactual treatment group to validate whether the positive effect of the ULR on healthcare utilization is due to the universal reciprocity of physician licenses or unknown factors associated with the ULR. Our results clearly reveal that the positive effect is due to universal reciprocity, which is also consistent with economic theory.

The main rationales for occupational licensing are to protect the health and safety of consumers and to ensure a sufficiently high level of product or service quality (Kleiner, 2015). By making would-be practitioners undergo specific training, pass exams, and complete other requirements, according to this rationale, the public is better protected from fraudulent, disreputable, and unqualified service providers, Nevertheless, by making it more difficult to enter an occupation across state lines, licensing can affect employment in licensed occupations, wages of licensed workers, the prices for their services, and reduce worker economic opportunity more

broadly. Further, if these policies result in an inability to achieve regional or local equilibrium, policies that reduce these barriers could enhance both consumer and worker welfare in health care.

Although our study reveals the influence of the ULR on healthcare utilization by utilizing a relevant data set and method, there are limitations. First, the outcome variable 'received routine health checkups within a year' is somewhat limited in reflecting the changes in healthcare utilization in the short term. The routine medical checkup comprises various types of medical examinations with different suggested cycles. For instance, for men aged between 40 and 64, a blood pressure check is recommended at least once every year while a colonoscopy is recommended every 5 years (Davidson et al., 2021; Whelton et al., 2022). Furthermore, these recommendations also vary by age and sex.[2] The outcome variable for routine medical checkups used in this study may account for a shorter interval of time (1 year) than it should have been depending on the types of checkups and the age of respondents. However, the majority of states adopted the ULR in 2020 and 2021, suggesting that the current availability of data cannot take the long-term effect of universal reciprocity of physician licenses into account.

Therefore, future research should extend these findings to obtain the long-term effects of universal reciprocity by utilizing upcoming data sets. Also, it would be fruitful to examine the change in consumer benefits from different occupational sectors, as the ULR includes various occupations for universal reciprocity.

[2] For more information about government's recommendations on routine medical checkups by age and sex, check the NIH's webpage: https://medlineplus.gov/ency/article/002125.htm

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Table 1. Universal Licensing Recognition and Interstate Medical Licensure Compact Status of US States

State		IMLC				ULR				
Name		FIPS	Year	Month	ULR Adopted	Bill Number	Year	Month	Residency Required	Physician License Excluded
Idaho	ID	16	2015	3	O	SB 1351	2020	7		
Montana	MT	30	2015	4	O	HB 105	2019	3		
South Dakota	SD	46	2015	3	O	HB 1077	2021	2		
Iowa	IA	19	2015	7	O	HF 2627	2020	6		Yes
Utah	UT	49	2015	3	O	SB 23	2020	5		Yes
Wyoming	WY	56	2015	2	O	SF 18	2021	7		Yes
Alabama	AL	1	2015	5	X					
Illinois	IL	17	2015	7	X					
Minnesota	MN	27	2015	5	X					
Wisconsin	WI	55	2015	12	X					
West Virginia	WV	54	2015	3	X					
Arizona	AZ	4	2016	5	O	HB 2569	2019	4	Yes	
Kansas	KS	20	2016	5	O	HB 2066	2021	7	Yes	
Mississippi	MS	28	2016	5	O	HB 1263	2021	7	Yes	
New Hampshire	NH	33	2016	5	O	SB 382	2022	8		
Connecticut	CT	9	2016	5	X					
Colorado	CO	8	2016	6	O	HB 1326	2021	1		Yes

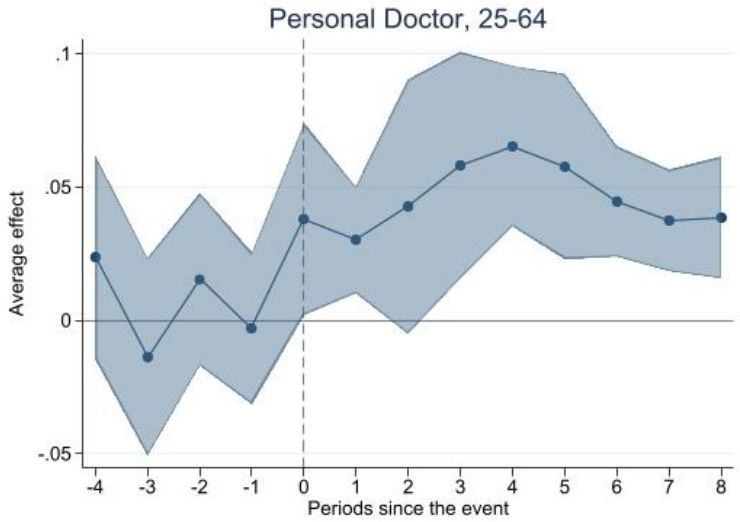
Note: Some states adopted the IMLC before 2015 or after 2016, yet there is not enough number of states that passed the ULR either. Plus, among the states that did not pass the IMLC before 2023, we only have two states that passed the ULR (New Jersey is an exception because it passed the ULR in 2018 which is too early in our research's time frame). Thus, it does not seem plausible to use data from states that are not on this list.

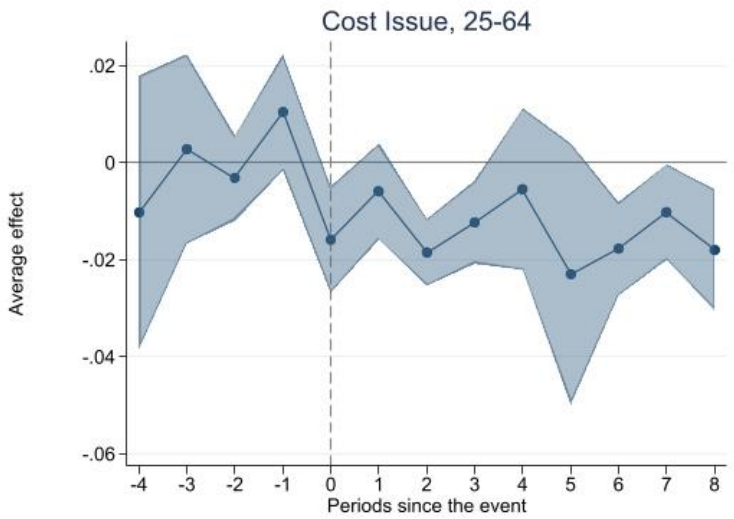
Table 2. Descriptive Statistics

	IMLC in 2015				IMLC in 2016			
Passed ULR	No		Yes		No		Yes	
	Prop/Mean	SD	Prop/Mean	SD	Prop/Mean	SD	Prop/Mean	SD
Healthcare Utilization Measures								
Has Personal Doctor	.792	.406	.752	.432	.884	.320	.784	.411
Cost Issue	.126	.331	.121	.326	.096	.294	.143	.351
Routine Check within 1 Year	.749	.433	.705	.456	.793	.405	.732	.443
Sociodemographic Characteristics								
Women	.522	.500	.510	.500	.537	.499	.539	.499
Age	47.5	11.5	47.0	11.6	49.4	10.6	47.8	11.5
Race and Ethnicity								
NH White	.806	.396	.841	.366	.744	.437	.743	.437
NH Black	.091	.288	.011	.104	.093	.290	.096	.294
NH Others	.055	.229	.082	.274	.074	.262	.064	.244
Hispanic	.048	.214	.066	.249	.090	.286	.098	.298
Level of Education								
Less than HS, HS Grad	.300	.458	.315	.465	.266	.442	.312	.463
Some College or Higher	.698	.459	.682	.466	.729	.444	.685	.464
MSA	.658	.474	.395	.489	.944	.231	.618	.486
Has Health Insurance	.911	.285	.889	.314	.942	.233	.879	.326

Note: Prop - proportion; SD - standard deviation; NH - non-Hispanic; HS - high school; MSA - metropolitan statistical area.

Figure 1. Impact of Universal Licensing Recognition on Healthcare Utilization, 2015, All Ages (*N* = 132)





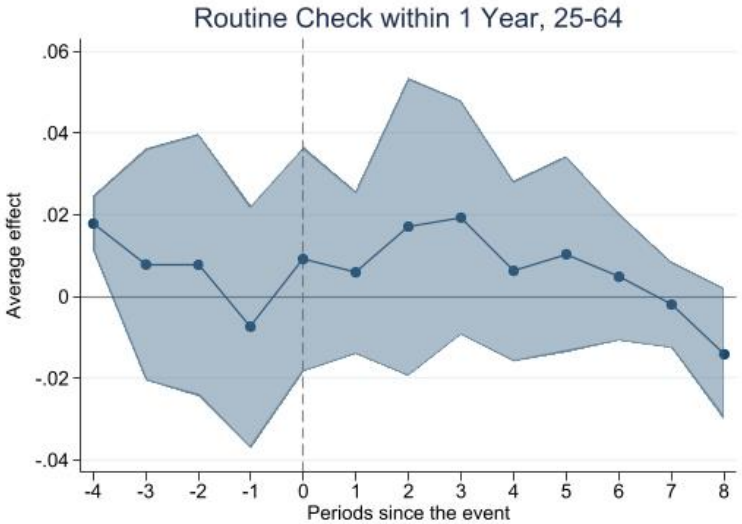
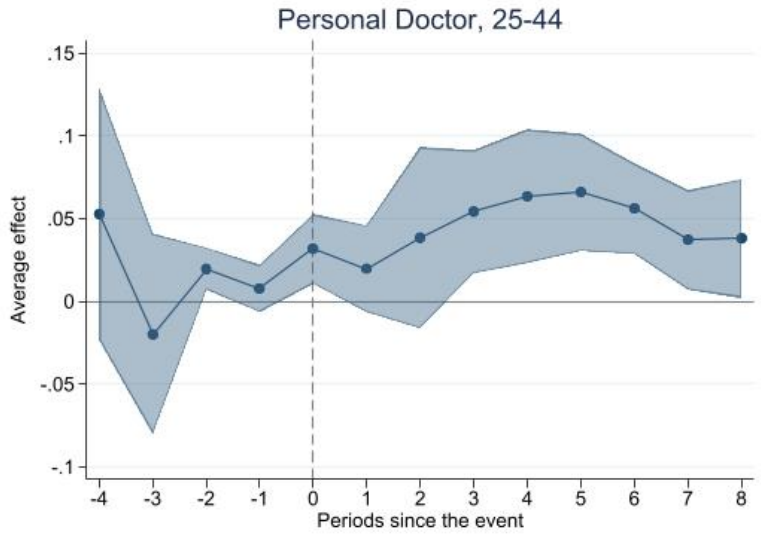
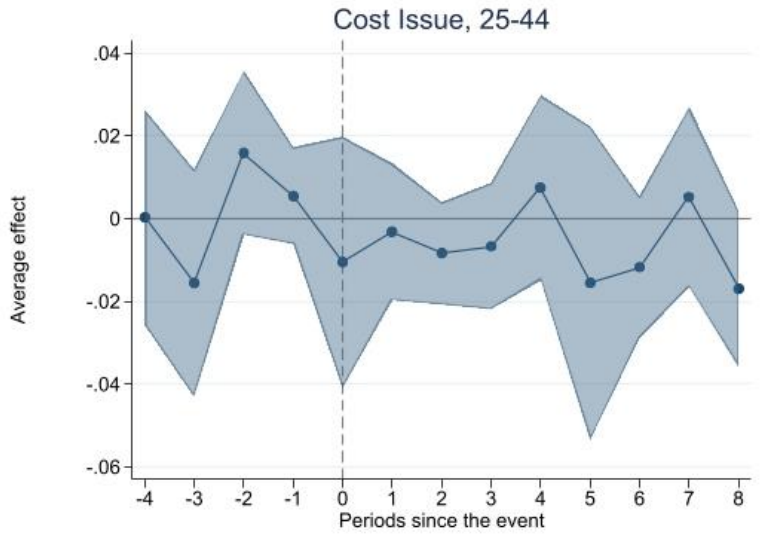


Figure 2. Impact of Universal Licensing Recognition on Healthcare Utilization, 2015, Age 25-44 (*N* = 132)





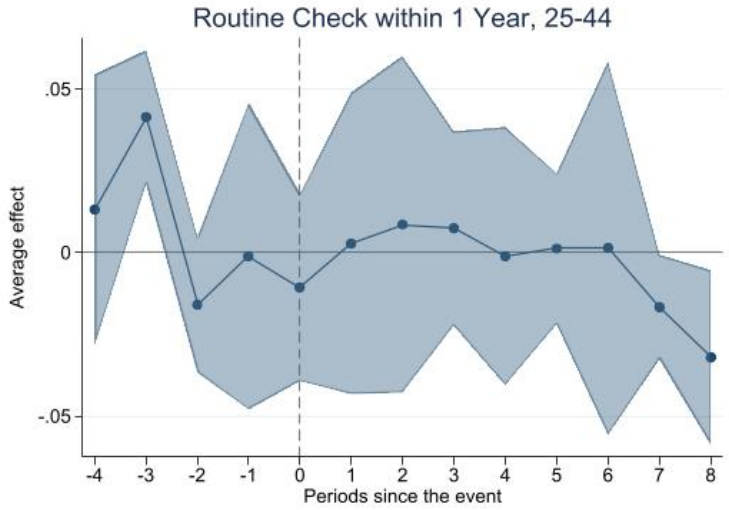
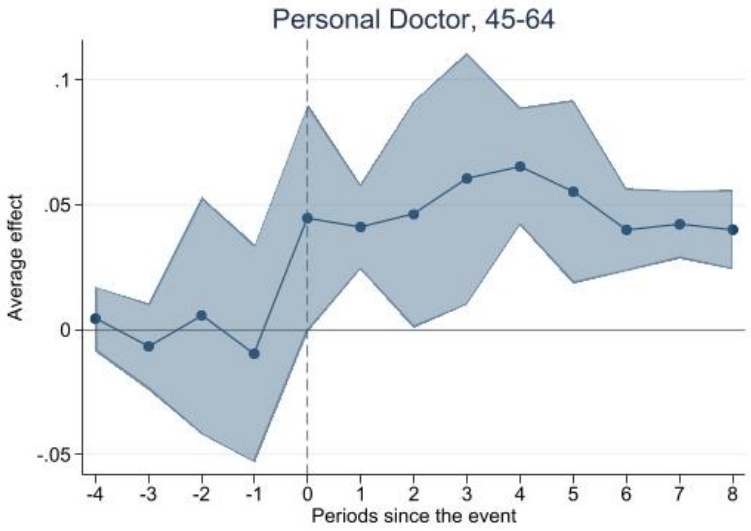
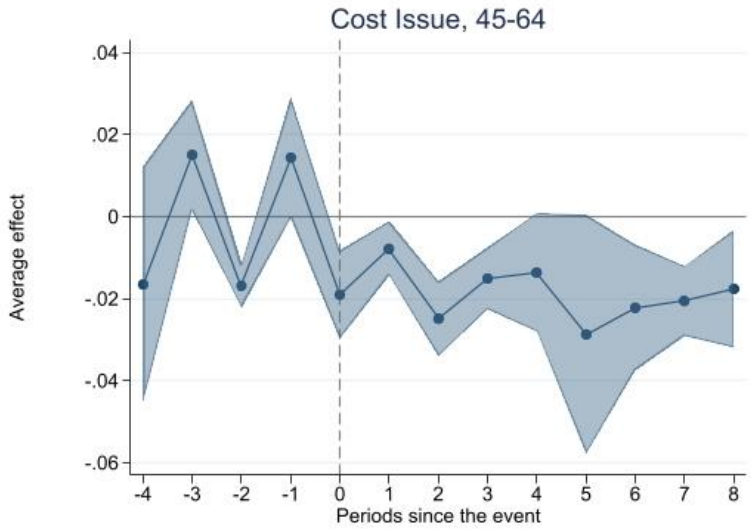


Figure 3. Impact of Universal Licensing Recognition on Healthcare Utilization, 2015, Age 45-64 (*N* = 132)





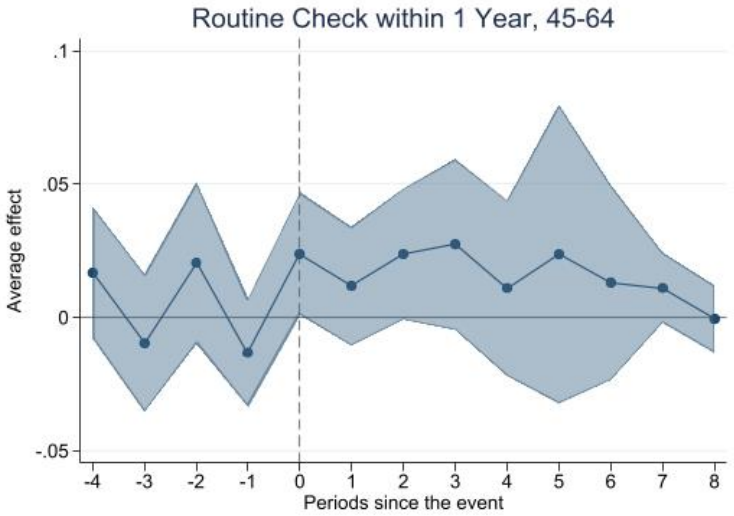
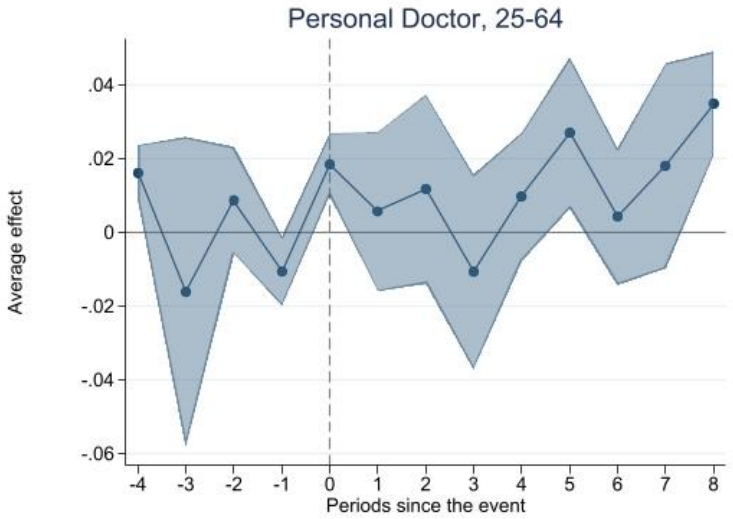
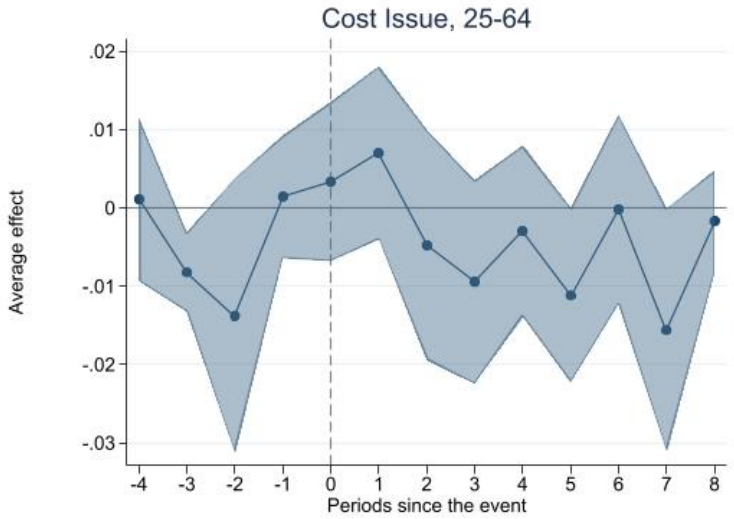


Figure 4. Impact of Universal Licensing Recognition on Healthcare Utilization, 2016, All Ages (*N* = 72)





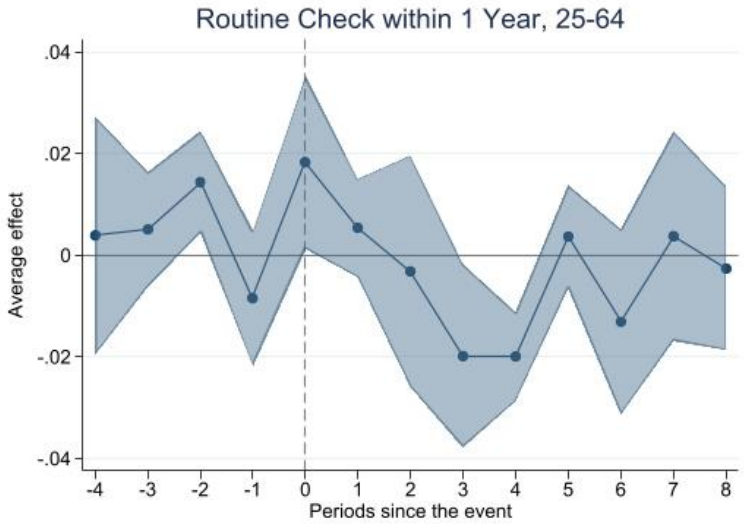
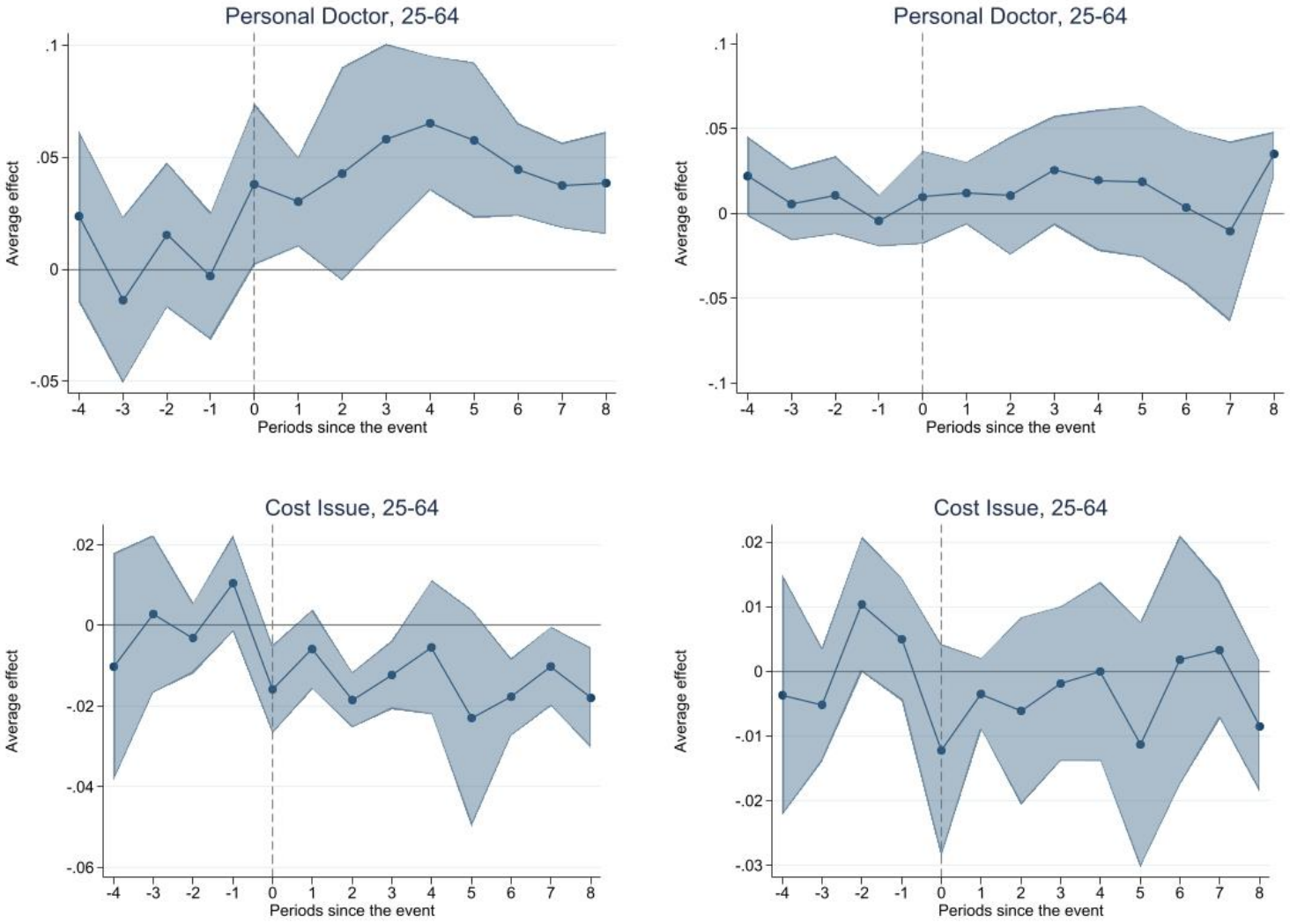


Figure 5. Counterfactual Analyses: Measuring Effect of Interstate Reciprocity of Physician Licenses (*N* = 132)

True Model | **Counterfactual Model**



Appendix A. Comparison of Measures Between 2020 and 2021: Having One or More Personal Doctors or Healthcare Providers

	No ULR		ULR	
Year	Mean	SD	Mean	SD
2020	.802	.047	.782	.057
2021	.862	.039	.845	.043
Diff (2021-2020)	.060		.063	

Note: The above descriptive statistics show the proportion of respondents who have one or more personal doctors or healthcare providers in 2020 and 2021, separately by the ULR adoption status: the states that adopted the ULR are included in the group "ULR", and those that did not adopt the ULR are included in the group "No ULR."