Occupational Licensing Regulations and Unemployment During the Great Recession

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Recent research examined the link between occupational licensing and unemployment. If occupational licensing creates barriers to employment, we would expect highly licensed states to experience greater increases in unemployment than other states during recessions when jobs are especially scarce. This study examines panel and cross-sectional data to see if counties under severe state licensing requirements suffered from greater unemployment increases during and after the Great Recession of 2007-2009. The estimates in both panel and cross-sectional analysis find higher increases in unemployment during and after the recession in counties that were in states imposing high licensing burdens, controlling for relevant factors.

Keywords: occupational licensing, great recession, unemployment

INTRODUCTION

The U.S. experienced the Great Recession from December 2007 to June 2009, and its unemployment rate grew from 5% to over 10%. Some states suffered more than others did. According to the Bureau of Labor Statistics, six states experienced an increase in their unemployment rate by at least 6 percentage points. Eleven states experienced increases in unemployment rates under 3 percentage points. At the ends of the spectrum, Nevada experienced an unemployment rate increase from 4.5% to 13.6%, but North Dakota only experienced an increase from 3.1% to 3.7%.

A few scholars have investigated the reasons behind the different state experiences of the Great Recession. One study by Connaughton and Madsen (2012) found that states with higher educational attainment and more modernization experienced fewer job losses. Walden (2014) found states recovered faster if they had relatively large shares of their economy in agriculture, energy, financial services, motor vehicle and parts manufacturing, and other durable-goods manufacturing. States also recovered quicker if they had lower taxes and received more federal spending. Deller and Watson (2016) found that states with greater industry diversity experienced more wage and employment stability during the Great Recession.

This study investigates another possible reason for the varying state experiences: occupational licensing requirements. An occupational license is essentially a government permission slip to practice a profession, granted only if the potential worker passes the required exams, has the required education or experience, pays the required fees, and/or satisfies other obligatory hurdles. States vary widely on these rules. One can

imagine that those laid off during the recession had a more difficult time finding employment in states with more burdensome occupational licensing requirements. We investigate this link between licensing and unemployment with data from the Institute for Justice's publication *License to Work II*, a collection of licensing laws for 102 mid-to-low level income occupations (Carpenter, Knepper, Sweetland, & McDonald, 2017). Our study is the first to our knowledge to investigate the impact of licensing rules on recession experiences.

Licensing rules have increased significantly over the years. Kleiner and Krueger (2010) note that 29% of the workforce required a license in 2006 compared to just 5% requiring a license in the 1950s. Over 800 occupations are licensed in at least one state (Carpenter, et al.). Occupational licensing has recently received greater attention from researchers, and bipartisan support for reform is becoming more apparent. Both the Obama and Trump administrations have released reports questioning the extent of current occupational licensing requirements and directed resources for state reform.

Occupational licensing is part of a state's regulatory framework that can affect the ability of the local economy to adjust and recover during a downturn. Unlike many of the other identified factors that other researchers found to influence recession experiences, this variable is under the state government's control.

LITERATURE REVIEW ON EFFECTS OF LICENSURE ON JOB ENTRY

The effects of occupational licensing laws have long captured the attention of economists. Adam Smith in his 1776 work *Wealth of Nations* (Book I, Ch. X, Part II) wrote that his era's apprenticeship laws served to "prevent…the reduction of price, and consequently of wages and profit, by restraining free competition." Milton Friedman (1962) claimed that licensure was a tool for incumbent licensed professionals to secure a monopoly position, and it results in decreased quality and quantity of service provisions. George Stigler's work (1971) supported Friedman's view when his statistical analysis found higher incomes for the licensed occupations than those in unlicensed occupations.

General observation reveals that incumbent professional and trade schools are the ones who usually propose licensing regulations to state legislators, not by consumers. Since licensure requires new entrants to meet minimum standards, it imposes a cost on entry that potentially reduces the labor supply and raises wages for incumbents. Current practitioners understand this relationship and put pressure on state licensing boards to make job entry more difficult. A concern is that current practitioners dominate licensing boards to look out for their own interests, not for the benefit of consumers or new entrants. One study, for instance, found that boards that had some public representation on the boards had fewer "nonsense" regulations, such as loyalty oaths, moral character provisions, and citizenship requirements (Graddy and Nichol, 1989).

Recent years have seen a push for more data, research, and reform. A 2012 and 2017 study by the Institute for Justice (Carpenter, et al.) compiled data on licensing of low-to-moderate income occupations. A 2015 White House report during the Obama administration outlined a framework for licensing reform (White House, 2015). In 2017, the U.S. Department of Labor during the Trump administration funded a three-year project for state policymakers to investigate ways to reduce licensing burdens (Goodwin, 2017). The grant helped create the National Occupational Licensing Database, which identified 34 occupations ripe for reform.

Many researchers examined whether licensure creates wage premiums not explained from gains in human capital or better-quality services. These wage premiums can be evidence of barriers to job entry. Kleiner and Krueger (2013) used the Current Population Survey and Westat survey data to find that holding a license is associated with an 18% wage premium. Another study using data from the European Study of Occupational Regulation by Koumenta and Pagliero (2016) found a smaller premium, on average around 4%, with varying effects for different industries as high as a 19% premium for crafts, 10% for elementary occupations, 8.6% for sales and services, and 6.3% for professional groups. Timmons and Thornton (2010) found that licensing rules are associated with increased barber earnings between 11 and 12%. Wage gains were also present for licensed opticians (Timmons and Mills, 2018).

Some literature focuses specifically on licensure's effect on labor supply. Flanders and Roth (2017) from the Wisconsin Institute for Law and Liberty examined the relationship between the severity of

occupational laws and employment levels in ten different occupations. Overall, more severe licensure laws made for fewer workers. Their data came from the Institute for Justice (Carpenter, et al., 2017) and the Bureau for Labor Statistics. Most labor-supply studies examine specific industries. Simpson, et al. (2016) is a comprehensive national study commissioned by the Beauty Commission Working Group to study how licensing rules affect employment numbers within each state. Overall, they find that when a license requires more curriculum hours, there are fewer working cosmetologists, which is a surprising concession coming from a group with an interest in stricter licensing laws.

Other labor-supply studies examine licensure as a tool to inhibit labor migration. Federman, Harrington, and Krynski (2006) found that English-language requirements for nail technicians decreased the number of immigrant Vietnamese workers in the nail industry. This finding is similar to Peterson, Pandya, and Leblang (2014), who concluded that physician-funded licensure boards made for fewer physician migrants to a state. On the other hand, DePasquale and Stange (2016) found evidence against both of these findings with the implementation of the Nurse Licensure Compact (NLS), an interstate reciprocity agreement, which made no difference in the distribution of nurse practitioners across the U.S. once implemented.

Given the current evidence indicating that occupational licensing requirements are job barriers, we hypothesize that this effect will be particularly evident during recessions. There is little prior research into the intersection between licensure and recessions, but some have mentioned licensure's possible role in larger trends in employment. One such paper, Davis and Haltiwanger (2014), analyzes the US decrease in labor force fluidity, the sum of hires and fires over time. They point out that licensure, amongst other explanations like an aging workforce and a change in supply chains, could be the reason that people change jobs less often than in the past. This fluidity decrease leads to a decrease in national overall employment levels, as shown by Abraham and Kearny (2018). They suggest that the relationship between occupational licensure rules and employment levels needs to be examined more closely.

DATA AND METHODS

The main variable that we are trying to explain is the county-level unemployment rate changes during and after the Great Recession. We obtain yearly county unemployment rates from the U.S. Bureau of Labor Statistics. We also examine the county labor-force participation rate. We derive the independent variable of interest from the Institute for Justice's report *License to Work II* (Carpenter, et al.). They examine state licensing requirements for 102 low-to-moderate occupations across all U.S. states.

We use both the average number of days of education or experience required for a license in the state and the number of occupations that require a license in the state. Selecting just one of those measures can misstate the level of occupational regulation. A state that regulates many occupations will not have a high burden if the per-license burden is very low. A state that has a high per-license burden but licenses few occupations will also not have a high burden. States that have high per-license burdens and a high number of licensed occupations will have a high burden. To get a comprehensive measurement, we multiply those two numbers. We then take the natural log of that product so we can think of it in terms of percentage changes. Least-squares estimates allow us to interpret the coefficient on our licensing variable as change in the unemployment rate coming from the percentage change in the number of occupations plus the percentage change in days required (in decimal form). The data ranges from 2007 to 2016.

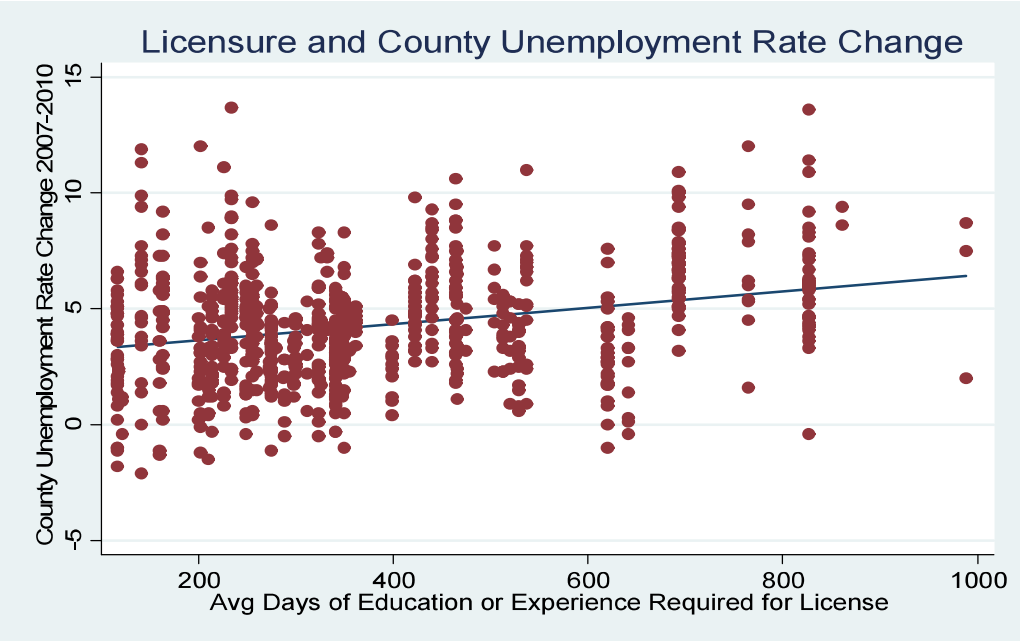
We control for other variables that may affect the impact and recovery from a recession, including housing prices, educational attainment, population, median household income, percentage of the population that identify as male, the percentage of the population that identify as black, and median age. Table 1 provides a description and summary statistics for each variable.

TABLE 1
SUMMARY STATISTICS OF COUNTY VARIABLES FOR YEARS 2007-2016

All data from BLS and U.S. Census, except for the licensing data.						
Variable	Description	Obs	Mean	Std. Dev.	Min	Max
Unemployment	Unemployment rate in county.	8033	7.98	3.15	1.30	25.30
Labor Force	Labor-force participation rate in county.	8033	63.71	5.97	22.90	80.90
Occupations Licensed	Data obtained from the Institute for Justice's *License to Work II* report http://ij.org/report/license-work-2/. This data is at the state level for year 2017. The number of low-to-moderate income occupations licensed.	8210	53.38	14.23	26.00	77.00
Days Lost	Data obtained from the Institute for Justice's *License to Work II* report http://ij.org/report/license-work-2/. This data is at the state level for year 2017. The average number of days lost to acquire a license.	8210	378.47	192.89	117	988
Overall Burden	The number of low-to-moderate income occupations licensed multiplied by the average number of days lost to acquire the license. The natural log of the number.	8210	9.75	0.61	8.69	11.08
Education	The % of the county population in the county 25 years and older that have a bachelor's degree.	8075	27.25	10.06	7.30	74.30
Population	The natural log of the population of the county.	8075	12.17	0.89	11.03	16.13
Income	The natural log of the county median household income in inflation-adjusted dollars.	8075	10.85	0.24	10.12	11.81
Black	% of county population that identifies as black	7601	10.90	12.31	0.00	72.49
Housing Price	Natural log of county median house price.	8075	12.05	0.45	10.92	13.84
Male	% of county population that identifies as male.	8075	49.23	1.19	44.47	62.09
Median Age	Median age of county.	8075	37.82	4.48	23.20	67.30

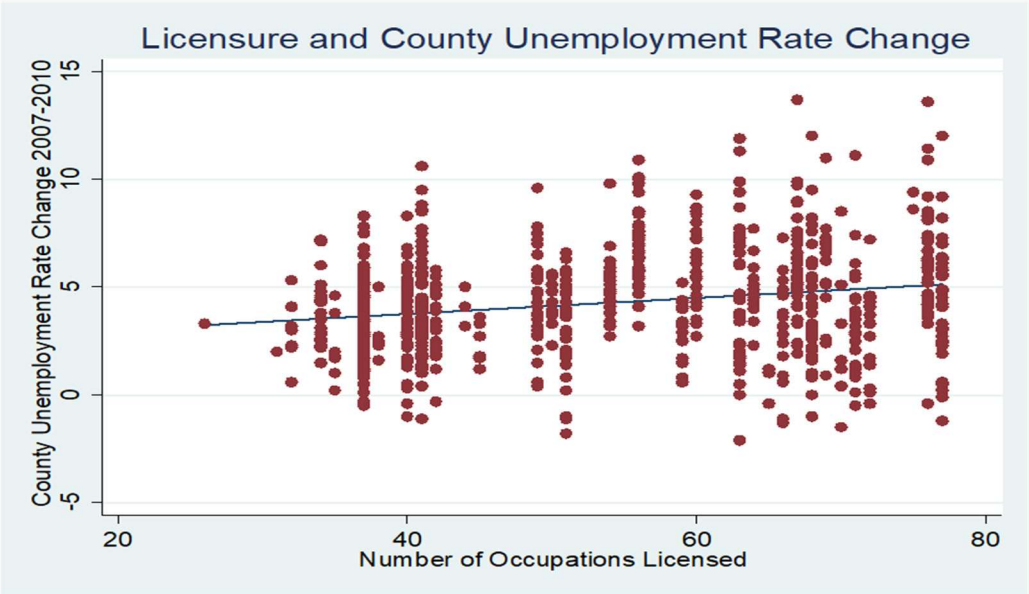
The initial look at the data reveals a positive relationship between licensing burdens and county unemployment rate changes during the Great Recession. Figure 1 displays the changes in unemployment rates from 2007 to 2010 and the average number of days of education and experience required to get a license. Figure 2 shows the relationship between the change in the unemployment rate and the number of low-to-moderate-income occupations that require a license. Both figures show a positive relationship. Figures 3 and 4 display the county unemployment rates for the top 5 licensed states and the county unemployment rates for the bottom 5 licensed states. The states with the most burdensome license requirements experienced higher jumps in their unemployment rates during the Great Recession.

FIGURE 1
OCCUPATIONAL LICENSING EDUCATION AND EXPERIENCE REQUIRED AND COUNTY UNEMPLOYMENT RATE CHANGE FOR YEARS 2007-2010



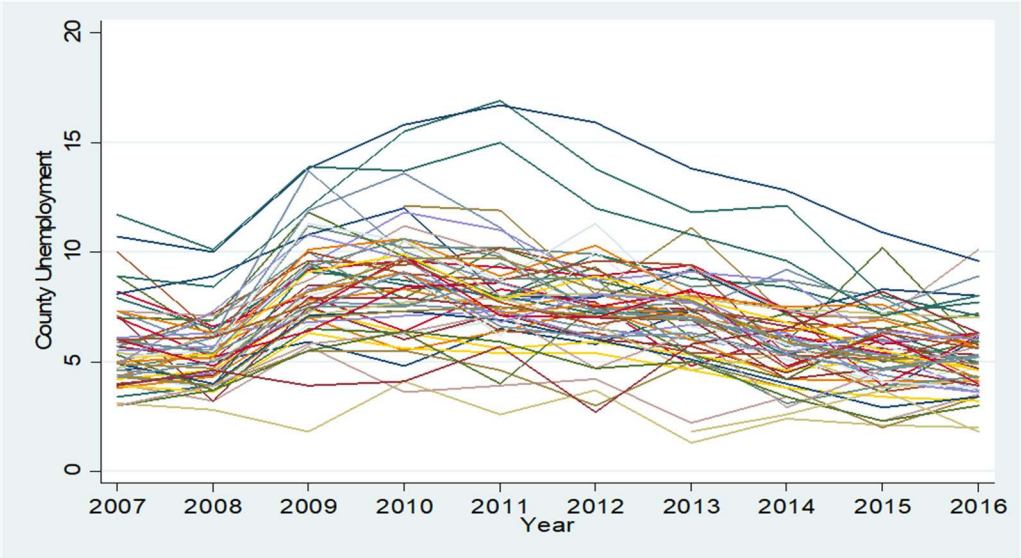
Notes: Each point in Figure 1 represents a county. The average days of education and experience required for a license is at the state level for low-to-moderate-income occupations. We retrieved the licensing data from Carpenter, et al., 2017.

FIGURE 2
NUMBER OF OCCUPATIONS LICENSED AND COUNTY UNEMPLOYMENT RATE CHANGE FOR YEARS 2007-2010



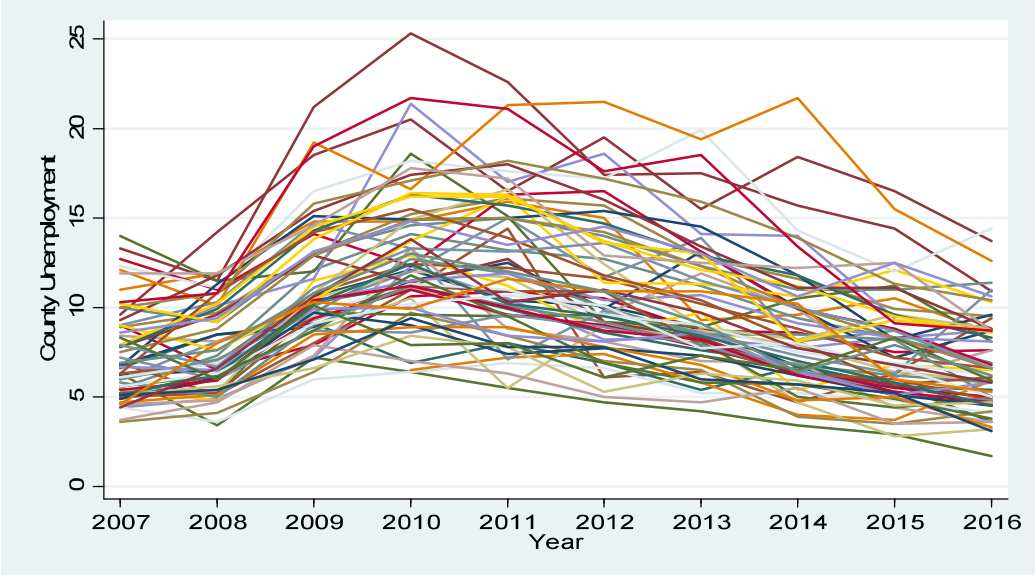
Notes: Each point in Figure 2 represents a county. The number of occupations licensed is at the state level for low-to-moderate-income occupations. We retrieved the licensing data from Carpenter, et al., 2017.

FIGURE 3
COUNTY UNEMPLOYMENT RATES IN STATES WITH LOWEST OCCUPATIONAL LICENSING BURDENS



Notes: The lines in figure 3 are counties that are in the 5 states with the lowest occupational licensing burdens as measured by the Institute for Justice. These states are Pennsylvania, Kansas, Wyoming, Nebraska, and North Dakota. We take the number of low-to-moderate wage occupations licensed and multiply it by the average number of days lost for each license.

FIGURE 4
COUNTY UNEMPLOYMENT RATES IN STATES WITH HIGHEST OCCUPATIONAL LICENSING BURDENS



Notes: The lines in figure 4 are counties that are in the 5 states with the highest occupational licensing burdens as measured by the Institute for Justice. These states are Arkansas, Arizona, California, Hawaii, and Nevada. We take the number of low-to-moderate wage occupations licensed and multiply it by the average number of days lost for each license.

We have a panel set-up at the county level, but we do not have variation across time within states for the licensing variable. We only have licensing data for 2017. Therefore, we cannot use a fixed-effects method when looking at county-level data. We instead report both random-effects and Hausman-Taylor estimates. These techniques allow for both time-invariant variables and time-varying variables. We also use a difference-in-difference approach, categorizing the top-five licensed states as a treated group during the recession. We initially use cross-section OLS estimates to examine the relationship between licensing requirements and unemployment rates across counties at a given period of time, and then we look at the changes that occurred during the recession. All methods show a positive correlation between occupational licensing burdens and unemployment rates. Some evidence also exists for a negative relationship between occupational licensing burdens and labor-force participation rates.

ANALYSIS

Table 2 reports cross-sectional least-squares regression estimates at the county level. This allows us to take an initial look at the cross-county variation predicted by changes in occupational licensing burdens. The dependent variables are county unemployment and labor-force participation rates. The independent variable of interest is the state occupational licensing burdens for the low-to-moderate income occupations, as reported by the Institute for Justice (Carpenter, et al.). The first column of Table 2 measures the overall occupational licensing burden as the number of occupations licensed multiplied by the average number of days required to get a license (then logged). This measure puts weight on both licensing variables. The overall burden has a positive and statistically significant relationship with the unemployment rate. For every 10% increase in the state's overall burden across counties, the model predicts an increase in the county unemployment rate of 0.05 percentage points. The model controls for educational attainment (% of 25+ with a bachelor's degree), population, median household income, the percentage of population that identify as black, median housing price, the percentage of population that identify as male, and median age in the county.

TABLE 2
CROSS-SECTION OLS ESTIMATES FOR U.S. COUNTIES IN 2016. OCCUPATIONAL LICENSING AND UNEMPLOYMENT

2016 Cross-Section OLS Estimates for U.S. Counties						
Variable	Unemployment (1)	Unemployment (2)	Unemployment (3)	Labor Force (4)	Labor Force (5)	Labor Force (6)
Overall Burden	0.48***			-2.02***		
	0.13			*0.27*		
Days Lost		0.00119***			-0.01***	
		0.00042			*0.00*	
Occupations Licensed			0.02***			-0.05***
			0.00			*0.01*
Education	-0.07***	-0.07***	-0.07***	0.04*	0.04**	0.06***
	0.01	*0.01*	*0.01*	*0.02*	*0.02*	*0.02*
Population	0.13*	0.10	0.15**	0.10	0.21	*0.05*
	0.07	*0.07*	*0.07*	*0.16*	0.16	0.16
Income	-3.26***	-3.39***	-3.24***	16.51***	16.87***	16.91***
	0.41	*0.41*	*0.43*	*0.98*	*0.97*	*1.05*
Black	0.03***	0.03***	0.03***	0.02	0.01	0.01

	0.01	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*
Housing Price	0.86***	1.03***	1.01***	-0.48	-0.87	-1.61***
	0.28	*0.27*	*0.26*	*0.61*	*0.59*	*0.59*
Male	0.03	0.02	0.03	-0.38**	-0.33*	-0.35*
	0.08	*0.08*	*0.08*	*0.18*	*0.17*	*0.18*
Median Age	-0.01	-0.01	-0.01	-0.60***	-0.59***	-0.59***
	0.02	*0.02*	*0.02*	*0.05*	*0.05*	*0.06*
Constant	25.18***	29.65***	0.02***	-53.46***	-73.78***	-62.83***
	5.66	*6.09*	*0.00*	*10.87*	*11.23*	*11.64*
N	774	774	774	774	774	774
r2	0.37	0.36	0.36	0.68	0.68	0.67
F	53.56	54.16	53.63	151.30	153.00	137.60

Notes: Table 2 displays cross-sectional OLS estimate at the county level. The dependent variable for columns 1-3 is the unemployment rate. The dependent variable for columns 4 through 6 is the labor-force participation rate. Robust Standard Errors are in italics. *** 1% significance level, ** 5% significance level, * 10% significance level.

Model 2 in table 1 runs the same regression as model 1, except the licensing variable is the average number of days lost to obtain a license in a low-to-moderate income occupation in the state. The coefficient is positive and statistically significant. An increase of 100 days of education or experience required for a license is associated with a 0.01 percentage-point increase in the unemployment rate.

Model 3 uses a different measurement occupational licensure: the number of low-to-moderate-income occupations licensed in the state among the 102 occupations surveyed by the Institute for Justice. The coefficient is again statistically significant. An increase of 10 occupations that require a license is associated with an increase of 0.2 percentage points in the unemployment rate.

Models 4 through 6 run the same regressions as models 1 through 3, but it replaces the dependent variable with the labor-force participation rate. Here we also see a statistically significant coefficient on the license variable in each model. Increases in licensing burdens are associated with decreases in the labor-force participation rate. For instance, model 6 predicts that an increase in 10 occupations licensed would be associated with a decrease in the labor-force participation rate of 0.5 percentage points.

Examining the control variables, education attainment and income has the predicted sign and have a statistical-significant relationship with unemployment and the labor-force participation rate. Higher housing prices are associated with higher unemployment rates. Higher percentage of the population that identify as black has a positive relationship with unemployment.

Table 3 again estimates cross-sectional OLS for counties, this time it examines the differences in unemployment and labor force participation changes from the recession. Average national unemployment reached its maximum in 2010. The market crash occurred in December 2007. Therefore, we examine the change in unemployment from 2007 to 2010, and then we look at the changes three years after the unemployment peak. The dependent variable in model 1 is the change in county unemployment from 2007 to 2010. The variable of interest is the overall licensing burden, as described in the previous table. Data for the licensing variable is only for one year (collected between 2012 and 2017), but we have no reason to believe that relative licensing burdens significantly changed across counties around the time of the recession. All other variables in model 1 are differences between 2007 and 2010. The overall licensing burden has a positive and statistically significant relationship with the change in unemployment rates between 2007 and 2010. A ten-percent increase in licensing burdens is associated with a 0.05 percentage-point increase in changes across county employment between 2007 and 2010. We also observe a positive and statistically significant relationship between the overall licensing burden and the unemployment rate change from 2007 to 2013.

TABLE 3
CROSS-SECTION OLS ESTIMATES FOR COUNTIES BEFORE AND AFTER THE GREAT RECESSION

3 Years Before and After Recession Trough				
Variable	Unemployment change 2007-2010	Unemployment change 2007-2013	Labor Force change 2007-2010	Labor Force change 2007-2013
	(1)	(2)	(3)	(4)
Overall Burden	0.48**	0.32**	-0.30	-0.52***
	0.23	0.16	*0.26*	*0.20*
Education % change	0.00	-0.01	0.09	0.11**
	0.07	*0.04*	*0.07*	*0.05*
Population % change	0.00	-0.02*	0.01	-0.01
	0.03	*0.02*	*0.05*	*0.02*
Income % change	34.13	-23.94	37.78	-31.74
	31.80	*27.57*	*33.77*	*33.88*
Black % change	0.26***	-0.04	-0.05	-0.22**
	0.10	*0.08*	*0.15*	*0.10*
Housing Price % change	-0.05***	-0.01*	-0.01	-0.01
	0.02	*0.01*	*0.02*	*0.01*
Male % change	0.15	0.12	0.02	0.26
	0.22	*0.17*	*0.24*	*0.18*
Median Age change	0.16*	0.00	-0.36***	-0.54***
	0.09	*0.05*	*0.11*	*0.07*
Constant	-1.79	-0.90	2.37	4.83**
	2.25	*1.65*	*2.52*	*2.04*
N	288	495	288	495
r2	0.16	0.05	0.05	0.15
F	5.08	3.21	2.08	13.59

Notes: Table 3 displays cross-sectional OLS estimate at the county level. The dependent variable for columns 1 and 2 is the unemployment rate changes from 2007 to 2010 and from 2007 to 2013. The dependent variable for columns 3 and 4 is change in the labor-force participation rate from 2007 and 2010 and from 2007 to 2013. Robust Standard Errors are in italics. *** 1% significance level, ** 5% significance level, * 10% significance level.

Models 3 and 4 are the same as models 1 and 2 except the labor-force participation rate replaces the unemployment rate. The overall burden does not have a statistically significant relationship when only observing the 3-year change, but it does when observing the 6-year change. According to model 4, an increase of 10 percent in licensing burdens across counties is associated with a decrease in labor-force participation rates of 0.05 percentage points between 2007 and 2010.

Table 4 uses the panel data for years 2007-2016 and runs a random-effects model and Hausman-Taylor model. These models allow us to examine relationships between and across counties across time. A fixed-effects estimation is not possible because the licensing variable is time invariant. Since we cannot use fixed effects, we must be concerned about endogeneity. The time-invariant variable may be related to county-specific characteristics leading to a biased estimated relationship between state occupational licensing requirements and the within-county unemployment rate variation.

TABLE 4
RANDOM-EFFECTS AND HAUSMAN-TAYLOR ESTIMATES FOR LICENSING BURDEN AND RECESSION EXPERIENCE

Panel Estimates for U.S. Counties 2007-2016				
	Random Effects with Yearly Time Effects		Hausman-Taylor Estimation	
Variable	Unemployment	Labor Force	Unemployment	Labor force
Overall Burden	0.98***	-1.85***	4.42***	1.02
	0.10	*0.18*	*0.86*	*1.37*
Education	-0.07***	0.07***	0.01	-0.10***
	0.01	*0.01*	*0.01*	*0.01*
Population	0.53***	0.12	2.29***	-4.76***
	0.07	*0.14*	*0.31*	*0.42*
Income	-5.79***	9.46***	-15.23***	4.25***
	0.35	*0.39*	*0.45*	*0.38*
Black	0.039***	0.0043	-0.024	-0.17***
	0.0047	*0.0087*	*0.019*	*0.021*
Housing Price	-0.22	-0.84	-5.22***	0.07
	0.17	*0.21*	*0.29*	*0.24*
Male	0.11***	0.06	0.16***	0.01
	0.03	*0.04*	*0.05*	*0.04*
Median Age	0.03***	-0.50***	0.04*	-0.89***
	0.01	*0.02*	*0.02*	*0.02*
Initial Income	2.80***	7.05***	11.90***	20.51***
	0.39	*0.61*	*1.48*	*2.30*
Constant	20.13***	-72.58***	27.88*	-116.86***
	3.37	*5.92*	*17.17*	*26.40*
N	7329	7329	7329	7329
r2 within	.6174	0.45	Not Applicable	Not Applicable
r2 between	.5377	0.71	NA	NA
r2 overall	.5808	0.68	NA	NA
Year effects?	Yes	Yes	NA	NA

Notes: Table 4 uses a panel dataset at the county level for years 2007-2013, which is three years before and three years after the peak unemployment rate. Models 1 and 2 display random-effects estimates and models 3 and 4 display Hausman-Taylor-estimates.

We tackle the possible endogeneity two-fold. First, we include another time-invariant variable that could likely be a source of correlation with the error term: county median household income in 2005. This variable can serve as an indicator of economic development, which may be correlated with many county-specific characteristics. Choosing the 2005 date allows us to be sure that the variation in the later-year variables does not determine 2005 median household income. Second, the Hausman-Taylor estimates use a 2-stage least squares estimator. We treat licensing requirements as endogenous and instrumented with the time-varying variables. Time-varying variables do not correlate with fixed county-specific characteristics because they are demeaned with a fixed-effect treatment before being used as instruments.

The overall licensing burden has a positive and statistically significant relationship with unemployment in models 1 and 3. We observe a negative and statistically significant relationship between licensing burdens and the labor-force participation rate in model 2.

Tables 5 and 6 present estimates from a difference-in-difference approach. In table 5, a county that experienced a recession in a state that ranks as a top-five state (or top 10 percent) in licensing burdens is considered the treated group and gets a value of 1. Other counties were untreated because they were not exposed to such restrictions during the recession. The coefficient on the variable *Top 5 x 2010* in model 1 indicates the difference in county unemployment rate changes between those in the top-5 burden states and the other states from 2007 to 2010. This difference-in-difference coefficient is positive and statistically significant. Those counties in states with the highest licensing burdens experienced the greatest increases in unemployment rates of 1.54 percentage points. No significant differences in the changes between the two groups occurred in the labor-force participation rates between 2007 and 2010.

TABLES 5
TOP 5 BURDENSOME VS THE REST. DIFFERENCE-IN-DIFFERENCE ESTIMATES

Difference-in-Difference Approach				
Variable	Unemployment	Labor Force	Unemployment	Labor Force
	2007, 2010 data	2007, 2010 data	2007, 2013 data	2007, 2013 data
Top 5	1.18***	-2.98***	1.20***	-2.99***
	0.33	0.54	*0.31*	*0.54*
2010	3.90***	-0.11		
	0.11	*0.19*		
Top 5 x 2010	1.54***	-0.35		
	0.53	*0.69*		
2013			1.98***	*-1.69****
			0.10	*0.20*
Top 5 x 2013			0.95**	*-0.64*
			0.48	*0.70*
Black	0.06***	-0.02***	0.06***	-0.02*
	0.01	*0.01*	*0.01*	*0.01*
Population	0.37***	0.32	0.21***	0.37***
	0.08	*0.11*	*0.06*	*0.11*
Male	0.19*	-0.35**	0.22***	-0.34***
	0.10	*0.17*	*0.06*	*0.13*
Housing Price	0.25	-1.24***	0.25	-1.28***
	0.21	*0.35*	*0.18*	*0.35*
Income	-5.42***	17.39***	-5.09***	17.76***
	0.37	*0.65*	*0.34*	*0.65*
Age	0.13***	-0.55***	0.08***	-0.59***
	0.02	*0.04*	*0.01*	*0.04*
Constant	42.92***	-74.33***	41.35***	-77.56***
	5.33	*9.48*	*3.91*	*8.50*
N	1494	1494	1494	1494
r2	0.59	0.61	0.45	0.64
F	217.50	193.99	125.96	201.82

Notes: Table 5 displays difference-in-difference estimates at the county level. A county that experienced a recession in a state that ranks as a top-five state in licensing burdens is the treated group (gets a value of 1). For instance, the coefficient on the variable *Top 5 x 2010* in model 1 indicates the difference in county unemployment rate changes between those in the top-5 burden states and the other states from 2007 to 2010. Robust Standard Errors are in italics. *** 1% significance level, ** 5% significance level, * 10% significance level.

Models 3 and 4 in table 5 include three years after the peak of unemployment rates. The coefficient on the variable *Top 5 x 2013* in model 3 indicates the difference in county unemployment rate changes between those in the top-5 burden states and those in the other states from 2007 to 2013. The coefficient is positive and statistically significant. Those counties in highly licensed states were still experiencing worse employment outcomes in 2013.

Notice that the *top 5* variable is statistically significant in all models. The counties in highly licensed states have higher unemployment rates and lower labor-force participation rates before, during, and after the recession. The difference-in-difference approach also reveals that the increases in unemployment rates were greater in counties subjected to relatively high licensing burdens.

The top-five approach in table 5 is useful for simple interpretation, but it is arbitrary. What about using the top 6 or top 10 instead? In table 6 the difference-in-difference approach is again used, but the licensing burden variable is continuous. Each county that was exposed to a different occupational licensing burden level receives a different "treatment" during the peak of unemployment. For instance, model 1 in table 6 estimates predict that a county exposed to ten-percent more state occupational licensing burdens experienced a 0.11 percentage-point increase in unemployment rate in 2010. Model 3 predicts that a county with ten-percent more licensing burdens experienced a 0.07 percentage-point higher unemployment rate in 2013. Models 2 and 4 examine the effect on the labor-force participation rate, but find no statistically significant estimates for the difference-in-difference coefficient.

TABLE 6
DIFFERENCE-IN-DIFFERENCE ESTIMATES FOR LICENSING BURDEN AND RECESSION EXPERIENCE

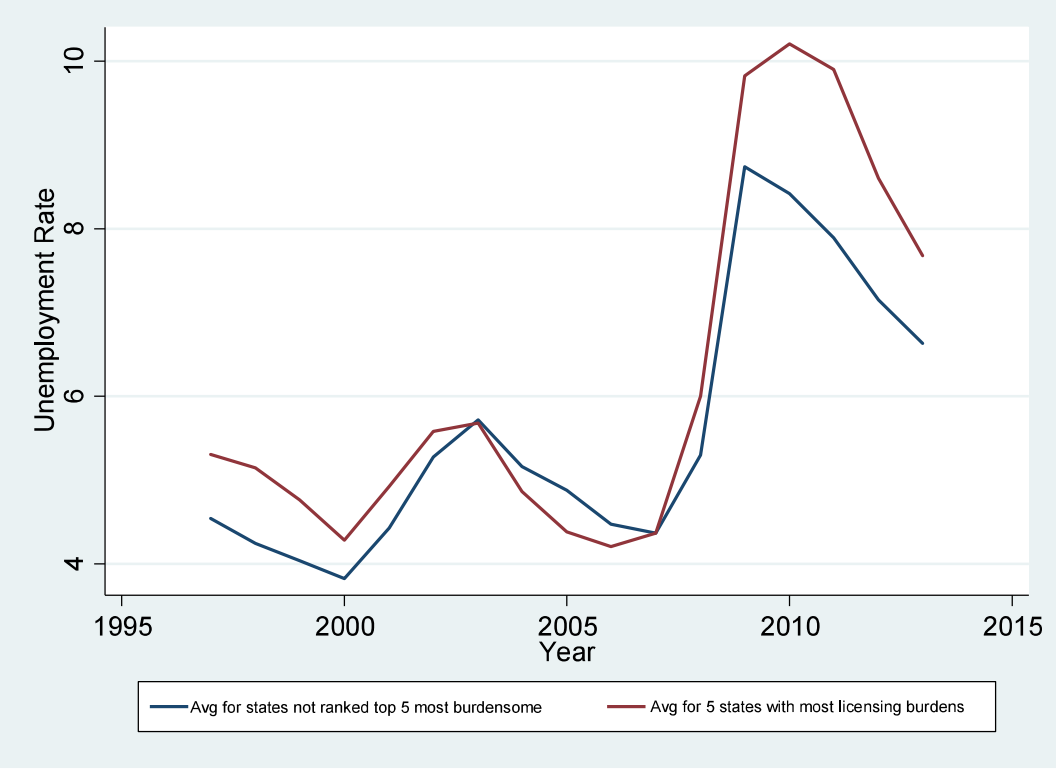
Difference-in-Difference approach with Multiple Treatment Levels				
Variable	Unemployment 2007, 2010 data	Labor Force 2007, 2010 data	Unemployment 2007, 2013 data	Labor Force 2007, 2013 data
Overall Burden	0.31**	-1.67***	0.26**	-1.72***
	0.13	0.25	*0.13*	*0.25*
2010	-6.65***	1.20		
	1.90	*2.94*		
Overall Burden x 2010	1.10***	-0.14		
	0.20	*0.30*		
2013			-5.16***	*2.21*
			1.71	*2.98*
Overall Burden x 2013			0.74***	*-0.40*
			0.18	*0.31*
Black	0.04***	-0.01***	0.05***	0.01
	0.01	*0.01*	*0.01*	*0.01*
Population	0.46***	0.15	0.28***	0.20*
	0.08	*0.11*	*0.06*	*0.11*
Male	0.23**	-0.41***	0.26***	-0.40***
	0.10	*0.17*	*0.06*	*0.12*
Housing Price	0.12	-0.61***	0.28	-0.59
	0.22	*0.38*	*0.19*	*0.37*
Income	-5.58***	17.22***	-5.37***	17.49***
	0.36	*0.62*	*0.34*	*0.62*
Age	0.11***	-0.53***	0.07***	-0.57***
	0.02	*0.04*	*0.01*	*0.04*

Constant	40.92***	-59.89***	39.00***	-61.88***
	5.44	*9.27*	*4.01*	*8.28*
N	1494	1494	1494	1494
r2	0.59	0.61	0.45	0.65
F	221.45	203.16	123.26	218.13

Notes: Table 6 displays difference-in-difference estimates at the county level. In the first two columns, a county is "treated" with different state occupational licensing burdens in 2010, where unemployment rates were at a peak. In the third and fourth columns, a county is treated with different state occupational licensing burdens in 2013, where states have had significant recovery. The difference-in-difference estimates are the coefficients on the Burden x 2010 and the Burden x 2013 variables. Robust Standard Errors are in italics. *** 1% significance level, ** 5% significance level, * 10% significance level.

One criticism of using a difference-in-difference approach is that there could be a pre-treatment trend that could explain the post-treatment differences. Our treatment is high licensing during a recession. Figure 5 looks at the unemployment rates in the top-5 licensed states and those not in the top 5. They tend to move together. The period between 2003 and 2007 actually experienced higher unemployment rates for those states with less burdens, though we are not controlling for other factors. There is no clear pre-treatment trend that would explain the post-crash gap in unemployment rates between the two groups. After the 2007 crash, both groups experienced a large increase, but the highly licensed states were disproportionately affected. This gap was still apparent in 2013.

FIGURE 5
UNEMPLOYMENT RATES FOR THE TOP-FIVE MOST-LICENSED STATES



Notes: Figure 5 displays the average unemployment rates for the top-5 licensed states and the rest of the states between 1997 and 2013.

CONCLUSIONS

The February 2020 national unemployment rate was 3.5% according to the Bureau of Labor Statistics. When the economy experiences these relatively low unemployment rates, we do not always notice the effects of labor regulations. When jobs are abundant, a potential worker not qualified for one job can find another. During recessions, the available jobs can shrink and occupational licensing burdens may create a significant barrier for the unemployed. This paper finds evidence that counties in highly licensed states suffer greater increases in unemployment, and that increase is still apparent three years into recovery. Policymakers concerned with both their local economy and their readiness for downturns, such as the COVID-19 recession, can reform their occupational licensing rules to allow people to adjust and find work when jobs are scarce.

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