

**The Effect of Occupational Licensing on Wages and Employment:
Evidence from Electricians and Massage Therapists**

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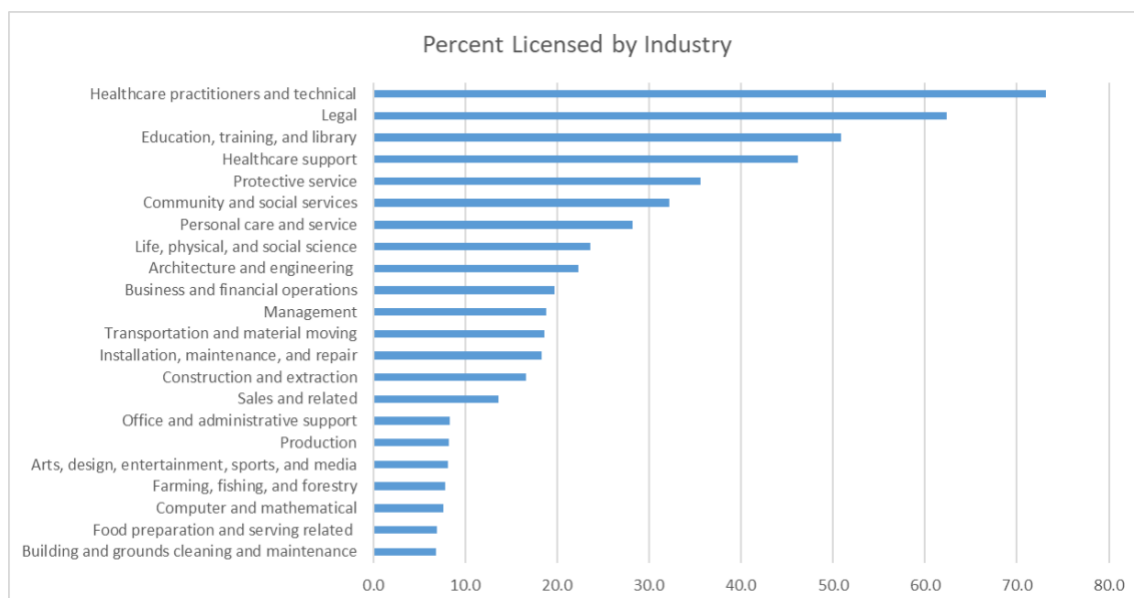
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Introduction

An occupational license is a credential that governments require practitioners to obtain to work in certain occupations (Nunn 2016). Occupational licensing laws require workers to submit verification of training, testing, education, and pay associated fees prior to beginning a job in their chosen field. When implemented appropriately, the state-mandated testing, training, and educational requirements of occupational licensure mitigate potentially harmful health and safety risks for the public. In some professions, improper practice results in serious harm to the public. Occupational licensing reduces the number of unqualified individuals offering their services in that profession, thus increasing overall public safety and welfare. However, because licensing laws are often established independently by each state government, significant differences and disparities in licensing requirements exist across states.

Occupational licensing has grown drastically over the past fifty years, which has led to a greater share of American workers needing a license to work. Accounting for

just five percent of the labor market in the 1950's, licensed workers now make up more than 25 percent of all employed Americans (U.S Treasury Office 2015). Of the 800 occupations listed by the Bureau of Labor statistics, 284 are licensed by at least one state (Carpenter, et. al 2017). The percentage of workers needing licensure varies substantially by occupation. Legal, education, and healthcare occupations license workers at particularly high rates (see figure 1). Over fifty percent of workers are licensed in each of these industries.



Source: Current Population Survey, 2016

Labor market economists argue that the growth in licensing has led to a structure of varying requirements across states, making it challenging for workers to move their skills across state lines, and costly for them to work in a licensed profession. Overly burdensome licensing requirements can create barriers to employment for individuals who may not actually pose a serious risk. Most economists also agree that occupational licensing results in higher wages for licensed workers, which in turn increases consumer

costs. “In occupational licensing, the prevalent costs are increased prices to consumers for goods and services and lost job opportunities for aspiring workers,” noted The Council on Licensing Enforcement and Regulation. (Carpenter and McGrath, 2015). Higher wages benefit licensed workers, but wage disparity can lead to inefficiency and unfairness, including reducing employment opportunities and depressing wages for excluded workers, reducing workers’ mobility across state lines, and increasing costs for consumers.

University of Minnesota economics professor Morris Kleiner asserts that the growth of occupational licensing is restricting labor markets, innovation, and worker mobility resulting in 2.85 million fewer jobs nationally, with an annual cost to consumers of \$203 billion” (Kleiner 2015). Licensing requirements such as fees, exams, and education requirements often drive away potential workers, especially those for whom the costs of licensure are too high. By imposing requirements on people seeking to enter licensed professions licensing reduces employment in the licensed occupation and hence competition, driving up the price of goods and services for consumers (U.S Treasury Office 2015).

Furthermore, occupational licensing laws across states can impede the ability of workers to relocate across state lines. This disproportionately impacts employment opportunities for individuals that move from the job market in one state to another – such as long-term unemployed and otherwise dislocated workers seeking new opportunities, or members of the military and their families who are regularly moved to new places in their service to the country.

For this particular analysis, I am interested in studying how the presence of licensing affects wages and employment levels at the state and occupation levels. Does

an occupation becoming licensed in one state affect wages and employment in ways that do not affect states without a license? Studying states is critical because licensing authorities are primarily state boards rather than national or local entities. The research and the traditional labor market theory around licensing both suggest that wages will increase and employment growth will decrease for states that license a certain occupation. I hypothesize that the same will be true in this analysis.

Literature Review

The significant body of research around occupational licensing focuses on how licensing impacts employment, wages, prices, quality, health and safety, and geographic mobility. Some of these licensing effects are widely accepted as fact, while others do not have the body of evidence to suggest that a significant effect exists.

Employment and Wages

Although estimating employment effects is challenging considering the available data, there is evidence to suggest that occupational licensing restricts the supply of workers in licensed professions. Kleiner (2006) finds that from 1990-2000 employment growth rates are higher in unlicensed states compared to those in licensed states for particular occupations. Additionally, he compares growth rates in occupations with differing levels of licensing (licensed in all states, some but not all, not licensed in any state). He again finds evidence to suggest that licensing slows employment growth. State licensing laws that require English proficiency exams restrict the number of Vietnamese-American manicurists, as well as the overall number of manicurists according to Federman et al. (2006). Kuo (2013) finds that states with the least

restrictive requirements for nurse practitioners have more licensed nurse practitioners than the most restrictive states. In addition, research from Carol and Gaston (2013) finds that state licensing laws for electricians, which require passing an exam or meeting experience requirements, resulted in fewer per capita electricians.

Evidence also points to a wage gap between licensed and unlicensed workers. The majority of these studies agree that the wage premium is somewhere between 10-20 percent. Thornton and Timmons (2010) find that licensing barbers increases wages by 11-22 percent compared to the unlicensed worker with the same education level. These authors also examined massage therapists where they found a wage premium of 16 percent. Kleiner and Vortnikov (2017) obtain a representative sample from all fifty states and perform a cross sectional analysis of licensing effects for individual states. They find licensing results in 10-15 percent wage increase for licensed workers. This work built off of an initial study which also suggests that licensing increases wages by 10-15 percent (Kleiner and Kruger 2013)

It should be noted that this research does not distinguish between wage gains for licensed practitioners and wage losses for the unlicensed who are shut out of the occupation. Additionally, because licensed workers generally have more training and education than unlicensed workers, and may differ in other ways, these wage premiums might reflect fundamental differences across workers rather than being a result of licensing regulations. Controlling for individuals within the occupation helps solve this issue. When controlling for the unobservable characteristics of individuals and occupations, the research suggests a more modest wage premium and often no effect at all. Gittleman, Kleiner and Klee (2015) find that licensed workers receive 8.4 percent higher wages when controlling for detailed occupation. Previously Gittleman

and Kleiner (2013) found that moving to a licensed occupation from an unlicensed occupation resulted in no wage gain. Likewise, Klee (2013) finds little evidence to suggest the presence of a licensing wage gain, and even finds that more stringent licensing regulations can sometimes result in a wage loss for licensed workers.

Prices

While the research on wages and data seem to slightly differ in terms of results, licensing's effect on prices is fairly predictable according to numerous studies. Kleiner and Kudrie (2000), Liang and Ogur (1987), Conrad and Sheldon (1982), and Shepard (1978) all study how stricter licensing requirements result in higher prices for dental services. Each study focuses on a different requirement such as difficulty of the dental exam, levels of licensing reciprocity or endorsement ability, and restrictions on number of dental hygienists. All of these studies report a price premium for states with the stricter licensing policies with the impact ranging from 3-7 percent. Kleiner et al. (2014) also studies nursing and reports a price increase of 6 percent for medium levels of regulation and 16 percent for high levels of regulation among nurses. Branching out of the medical field, Kleiner and Todd (2009) study mortgage brokers and find that requiring additional bonding results in 5.4 percent higher prices for mortgage services, but that increasing other licensing requirements shows no effect.

Quality, Health and Safety

The primary purpose for licensing an occupation is to ensure safety for consumers, and increase the quality of the good or services provided. A range of studies examine the question of whether or not licensing achieves this aim which would

be expected if the industry is being limited to those deemed highly qualified. Larsen (2015), Kane, Rockoff, and Staiger (2008), Angrist and Guryan (2007), Kane and Staiger (2005), and Kleiner and Petree (1988) all examine teachers in efforts to determine licensing's impact on quality of services provided. Teacher qualifications and student test scores are the primary means for measuring quality. Out of all of these studies, only one found that licensing had a significant effect on quality of teaching services provided. Larsen (2015) finds when measuring test scores and teacher qualifications that stricter licensing requirements in high-income districts increases quality in both measures. Interestingly, there is no effect in either measure when examining low-income school districts. Kleiner and Kudrle (2000) find no effect on the amount of dental repair needed when licensing requirements are increased, while Holen (1978) did find an increase in quality when entry requirements were increased. Klee (2013), Carpenter (2012), and Healey (1973) find no quality improvements when licensing requirements were increased for accountants, florists, and lab technicians respectively.

Interstate Mobility

Licensing can be a barrier to interstate mobility due to the fact that licensing primarily occurs at the state level. New licenses are typically required when a worker wishes to move across state lines while working in a licensed occupation. The time and money costs that must be incurred to get a new state license often deters people from moving. This licensing impact is the most difficult to study due to the complexities of how the economy affects migration patterns. Research studying the Nurse Licensure Interstate Compact, which allows licensed nurses to practice in any state participating in the interstate compact, finds positive effects of the compact's adoption on interstate

mobility (DePasquale and Strange 2014). The effects are particularly positive for those in the northeast where workers are more likely to live near a state border. In analysis done by the White House occupational licensing report on data from the Survey of Income and Program Participation, the authors conclude that licensed workers are 20

percent less likely to move across state lines than non-licensed workers (White House 2015).

Research Design and Hypothesis

Data

This analysis uses original time-series licensing data from The Council of State Governments along with occupational employment data from the Bureau of Labor statistics (BLS). BLS' Occupational Employment Statistics (OES) program produces annual employment and wage estimates for over 800 occupations using the standard occupation code (SOC) classification system. The data can be accessed at the state, metropolitan area, or nation-wide level. This analysis concentrated on state level data since most occupational licensing is administered by state regulatory boards. I collected primary licensing data by looking at the state statutes and administrative regulations through an online legislative tracking clearinghouse called StateNet. This data was collected as a part of a larger project, of which I was a researcher for The Council of State Governments (CSG). CSG collected several data points such as required education, cost of license, experience or training required, number of exams. For this analysis, I was only interested in year of initial licensure. This is the year that acquiring a license for a particular occupation was made mandatory by state statute. CSG collected licensing data for 34 different occupations. The chosen occupations were selected by four primary criteria. The occupation must be licensed in at least 30 states, require less than a Bachelor's degree, have projected employment growth rate for 2014-2024 at national average or higher, and must total current employment levels of 10,000 or greater, resulting in a total of 34 occupations.

I chose massage therapists and electricians for this analysis because these occupations have more variation in the number of states that license than other

occupations we collected data for. Massage therapists and electricians are licensed by 43 and 44 states respectively, with some states only recently requiring a license. This is more variation than nurses, for example, which all 50 states have licensed for many years. The data needs to have a good mix of licensed vs. non-licensed states in order to capture any licensing effects that might be taking place.

Variables

The primary independent variable within the data is a dummy variable “licensed” which indicates whether or not a state licenses an occupation in a given year. My dependent variables came from the OES data and include total employment and median hourly wages. Wages for the OES survey are straight-time, gross pay, exclusive of premium pay for things like overtime, on-call pay, holiday bonuses, severance pay, etc. The BLS wage estimates are collected annually and are made up of base pay, commissions, production bonuses, and tips. The OES program began collecting data for individual occupations in 1997, but changed the way they defined occupations to use SOC codes in 1999. As a result, my dataset spans from 1999-2016. The BLS houses OES data for each year in different files. I searched each year’s state-level file by the SOC code for massage therapists and electricians to obtain that year’s employment and wage data for each state. I then combined each year’s OES data with the licensing data from CSG to finalize my dataset.

Design and Hypothesis

This analysis uses two different approaches to study the effect of a state changing its licensing policy on measurable outcomes. In particular, I study how a state switching from unlicensed to licensed for certain occupations affects the measurable

economic outcomes of total employment and hourly median wages. From the dataset, states were chosen that became licensed from 1999-2016, based on the time range of the OES data, and compared to control states that do not license the occupation. A difference-in-difference analysis can naturally be applied studying the treatment groups who enacted a salient reform and control groups who did not. Rather than doing a formal regression analysis, simple four-cell difference-in-differences tables will be the most understandable and useful to explain a potential licensing effect. To formalize further, here is an example from the dataset. Iowa introduced a license requirement for electricians in 2007 but Indiana does not have one. I made the four-cell table calculating average electrician wages in the years prior to 2007 in Iowa, average electrician wages in the years prior to 2007 in Indiana, average electrician wages in the years 2007 and after in Iowa, and average electrician wages in the years 2004 and after in Indiana. I then calculated the difference-in-differences estimator based on the differences between the states.

As an alternative, and likely more convincing method, I plot wages for the treatment and control states with hourly median wages the vertical axis and year on the horizontal axis. Drawing a vertical line at the initial licensure year and plotting the time series of wages for Iowa and Indiana will show the potential licensing effect. Deviations from how wages were trending prior to licensure can be attributed to licensing if the effect is similar across several states. Although this analysis will not test statistical significance, the magnitude of economic significance will be benchmarked to prior literature which says that licensing increases wages and decreases employment growth by 10-15%. Deviations in wage and employment trend lines after licensing greater than 10%, as compared to the control state, will be considered economically significant. Available data limited the options for choosing treatment and control states. In order to

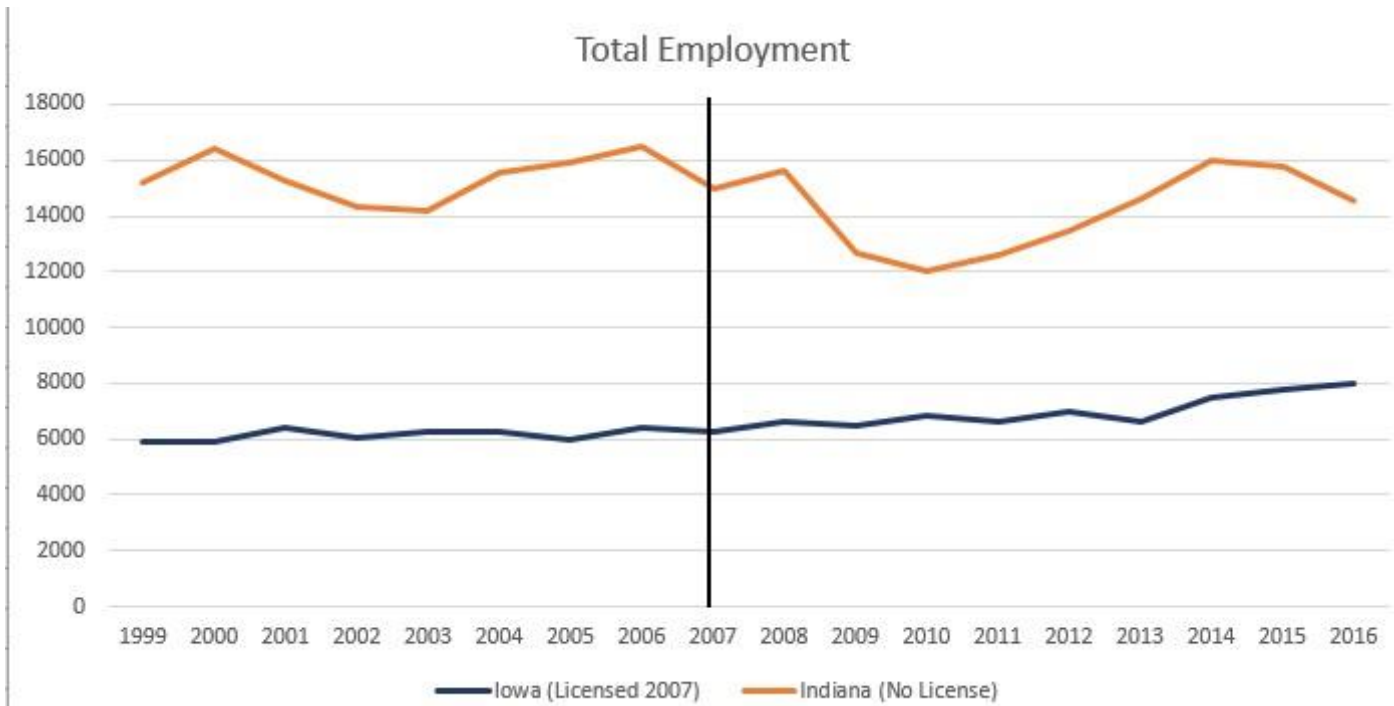
capture a potential licensing effect, data needs to be available for multiple years before and after initial licensure. Because the OES data spans from 1999-2016, this limits my analysis to states who first began licensing between these years. The control states were chosen from the list of states who do not license the occupation at all. There are seven states who do not license massage therapists and six states who do not license electricians. The list of states who do not license was compared to the list of states who began licensing between 1999-2016 to generate the comparisons used for this analysis. States were matched together based on geography and relative population size. It is important to note that comparing a treatment state to a control state only works if they are trending in the same direction prior to licensure. The parallel trend assumption requires that in the absence of treatment, the difference between the compared states remains constant over time. If they are not trending in the same direction, I will discuss why the control state is not a good comparison for the treatment state.

The difference-in-difference method removes bias in post-licensing comparisons between the treatment and control group that could be the result from permanent differences between those groups, as well as bias from comparisons over time in the treatment group that could be the result of trends due to other causes of the outcome. Ultimately this analysis allows me to visually test the null hypothesis that licensing has no effect on wages in the states that license the occupation. I performed the four-cell difference-in-differences analysis and graph median hourly wages and total employment for two different occupations and several sets of states. After visually inspecting the graphs, I will be able to reject or fail to reject the null hypothesis that licensing has no effect on wages and employment.

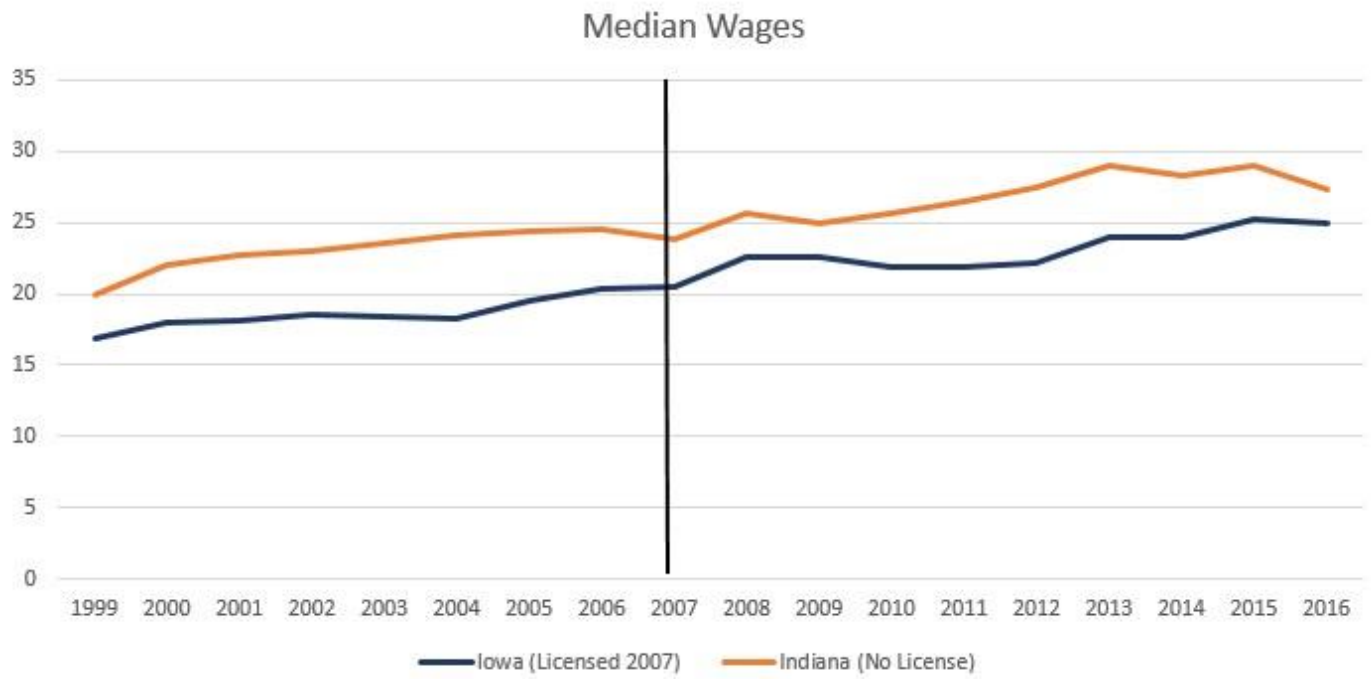
Results

Electricians

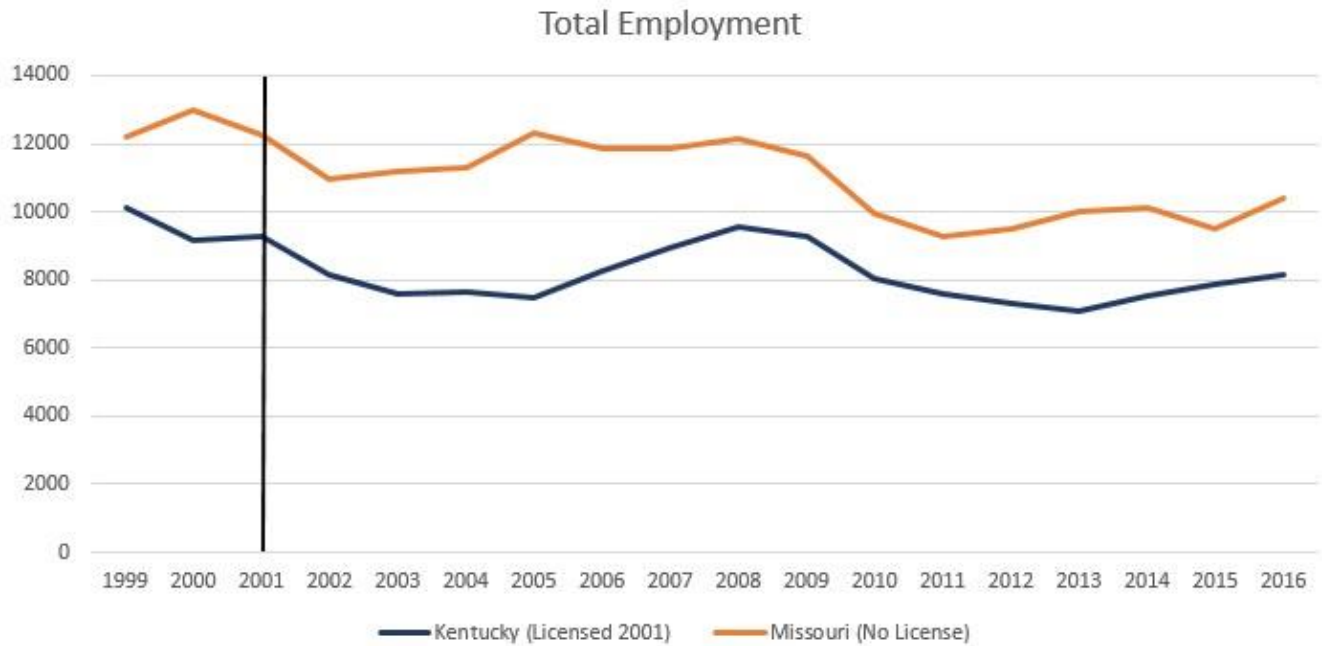
1. Total Employment in Iowa (Licensed 2007) & Indiana (No License)



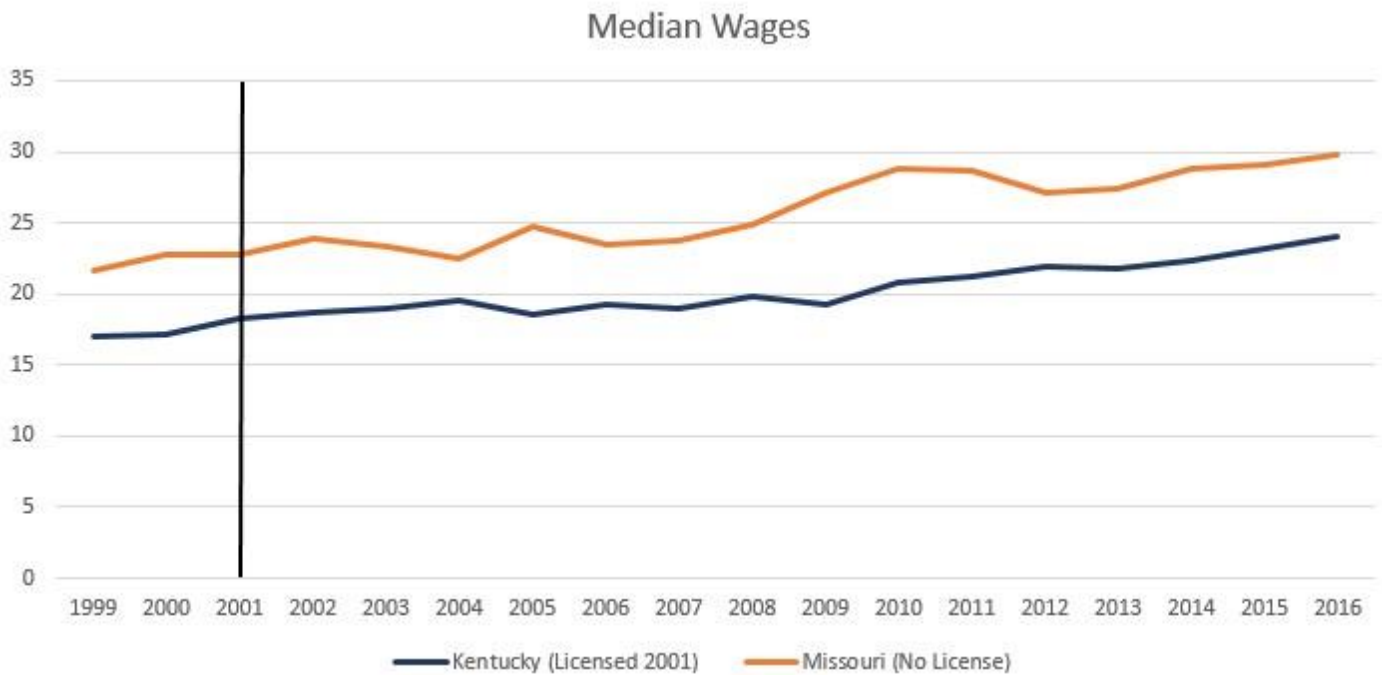
2. Median Wages in Iowa (Licensed 2007) & Indiana (No License)



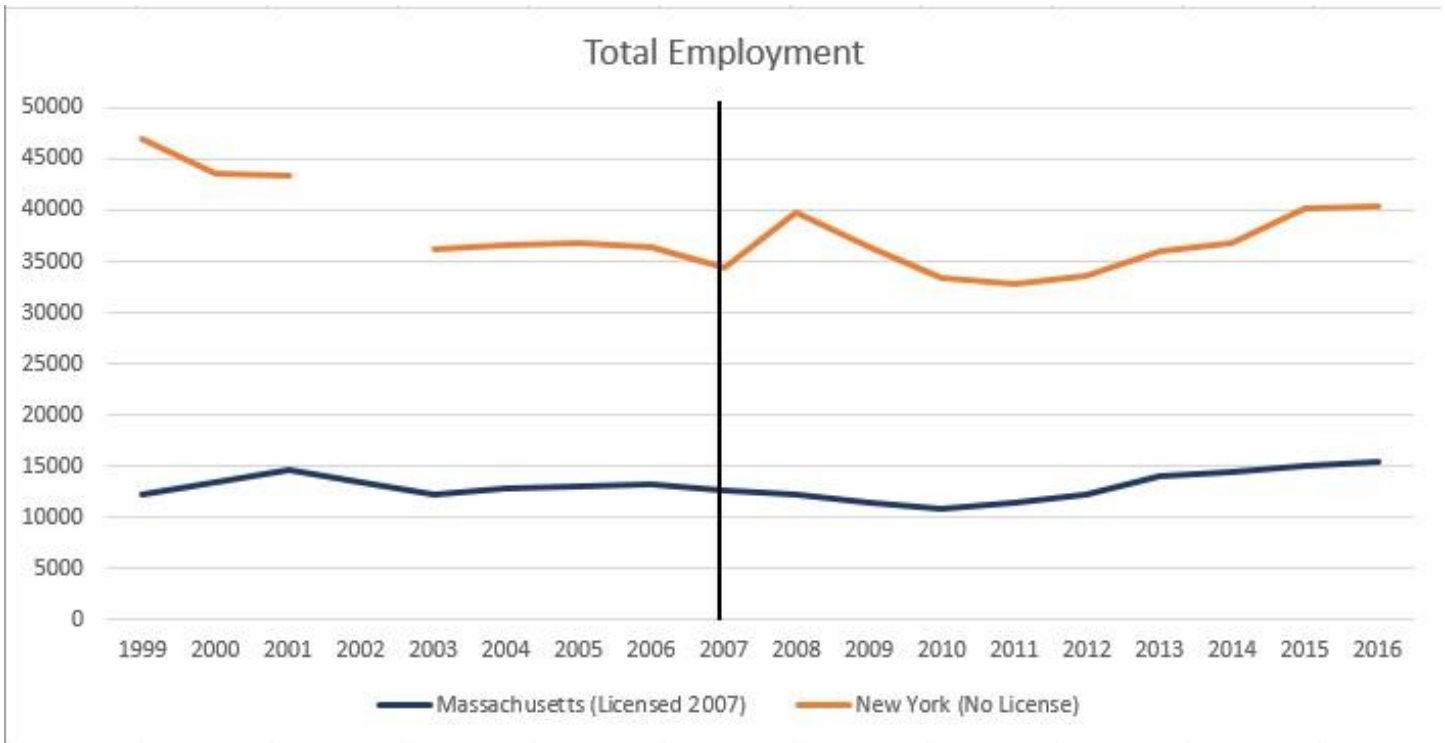
3. Total Employment in Kentucky (Licensed 2001) & Missouri (No License)



4. Median Wages in Kentucky (Licensed 2001) & Missouri (No License)



5. Total Employment in Massachusetts (Licensed 2007) & New York (No License)

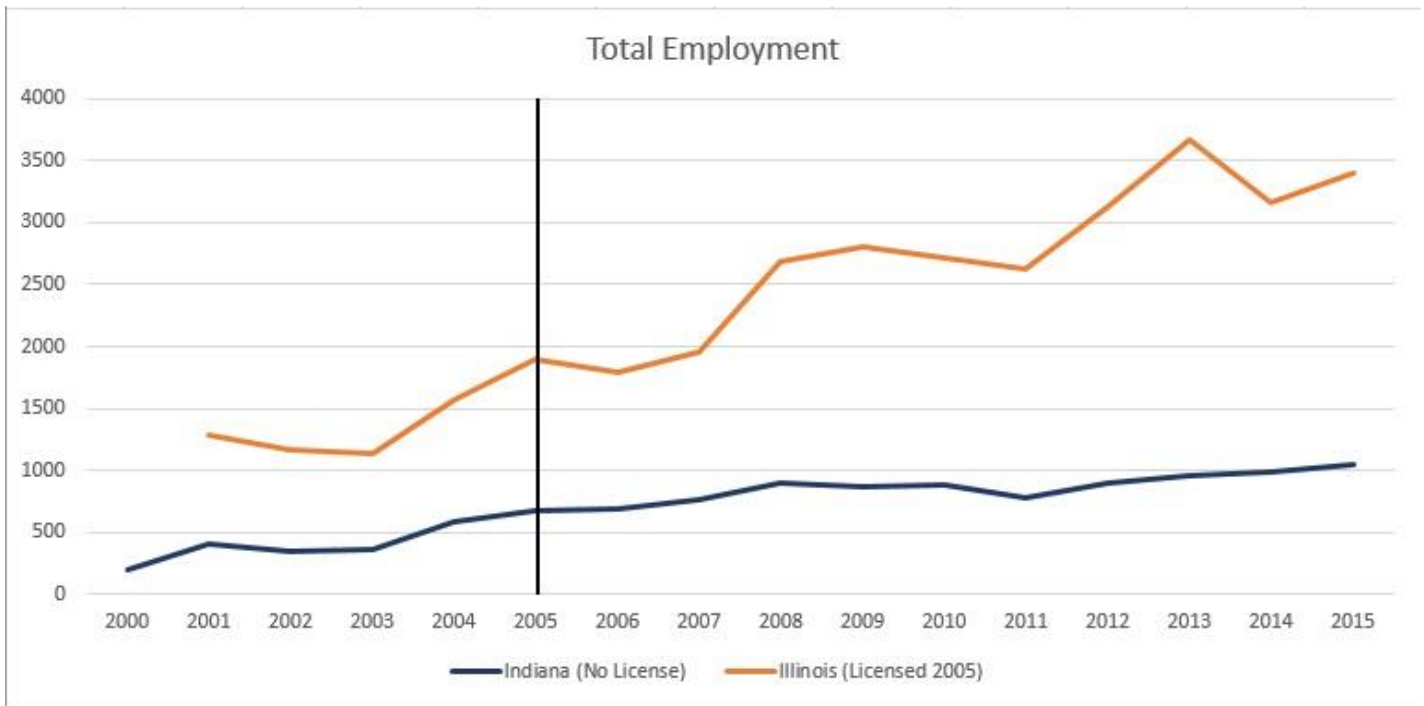


6. Median Wages in Massachusetts (Licensed 2007) & New York (No License)

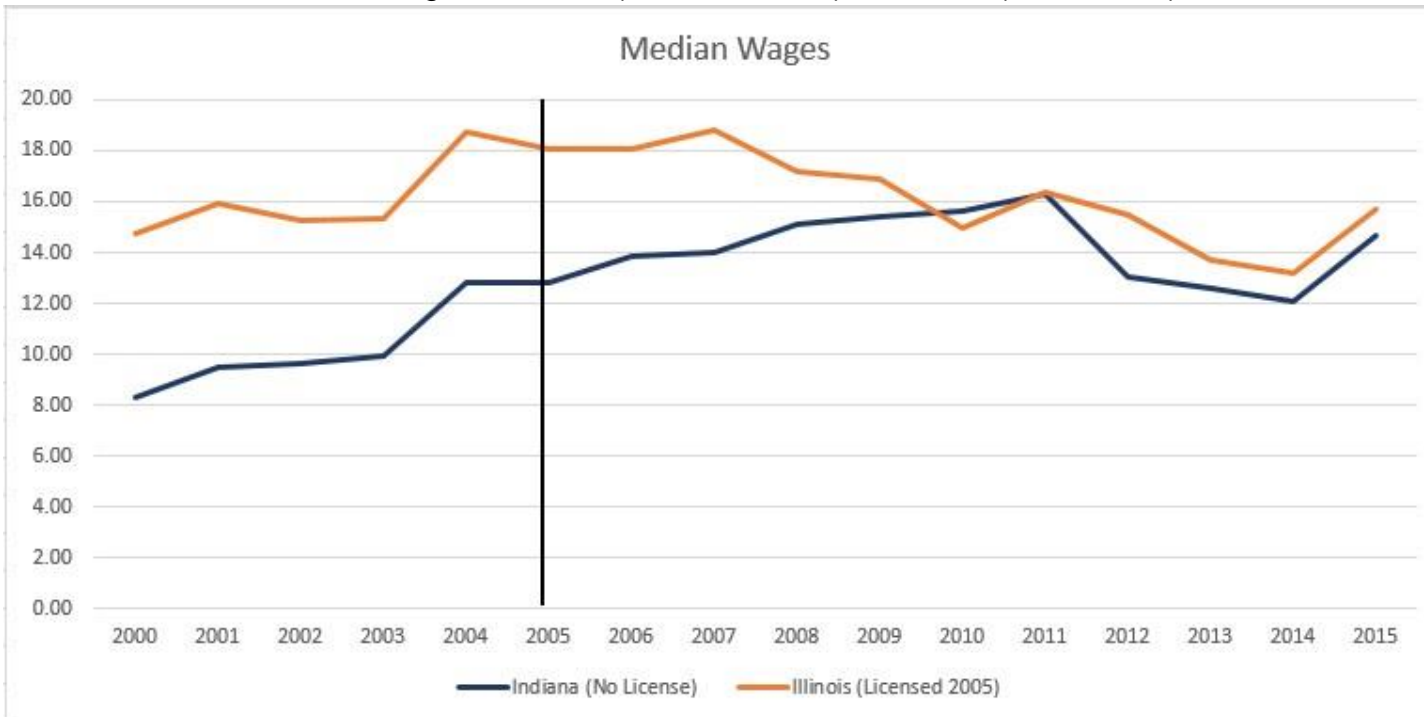


Massage Therapists

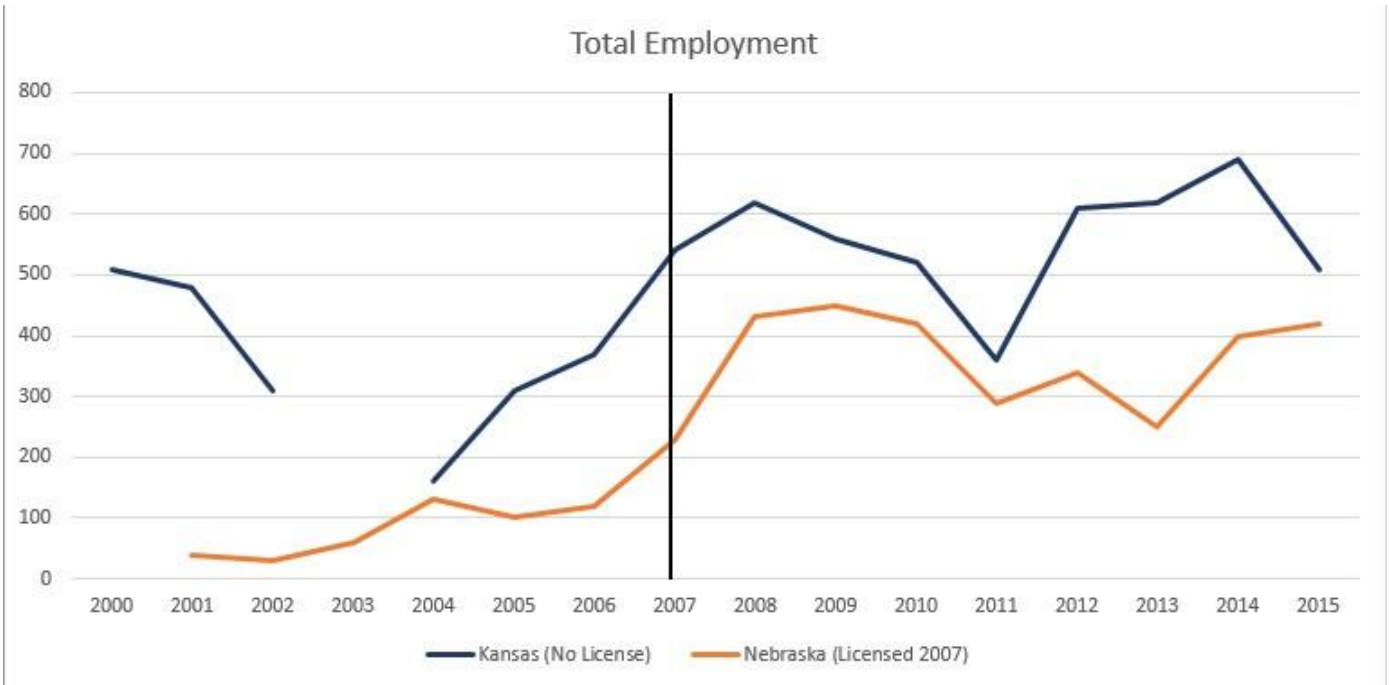
7. Total Employment in Illinois (Licensed 2005) & Indiana (No License)



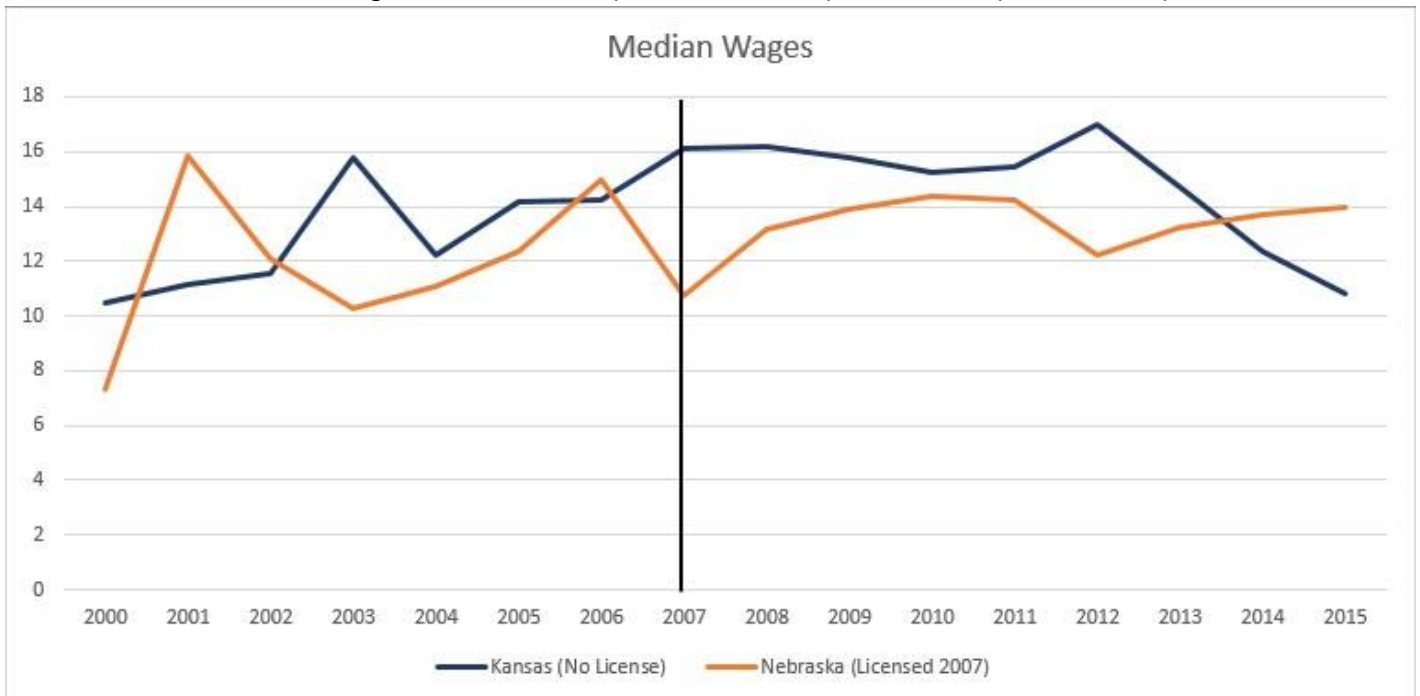
8. Median Wages in Illinois (Licensed 2005) & Indiana (No License)



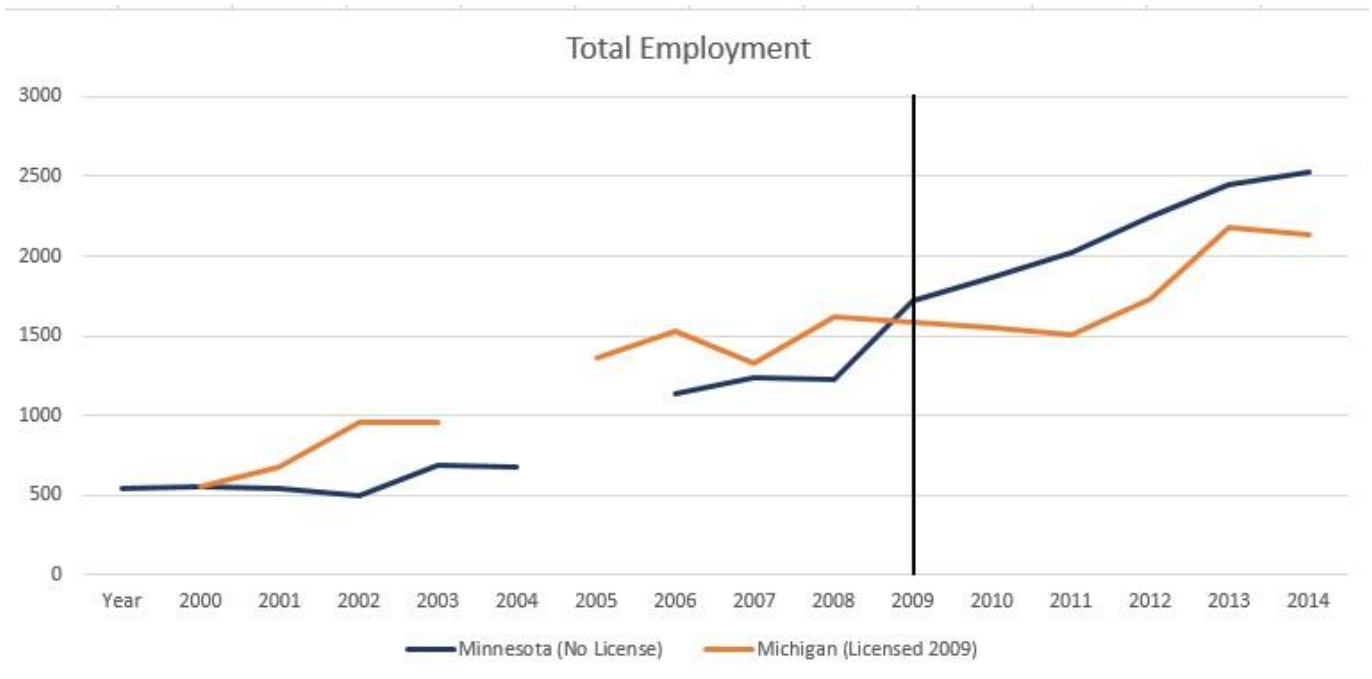
9. Total Employment in Nebraska (Licensed 2007) & Kansas (No License)



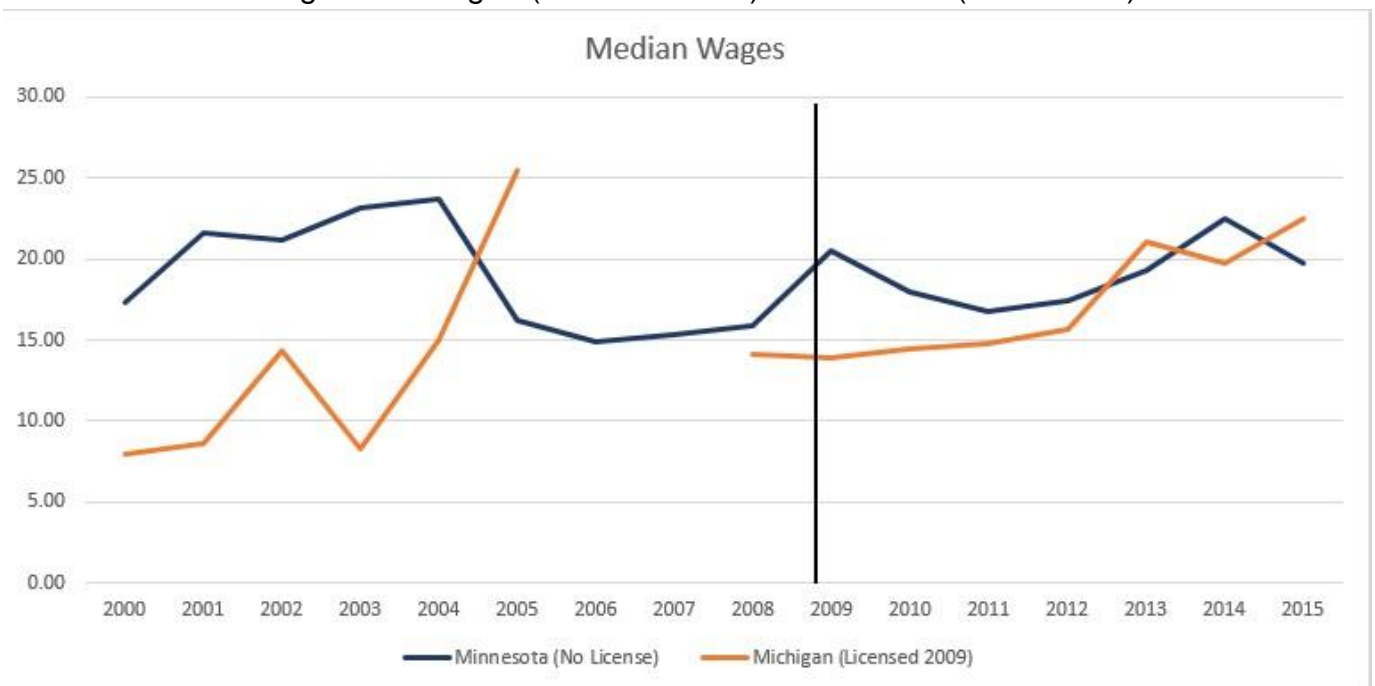
10. Median Wages in Nebraska (Licensed 2007) & Kansas (No License)



11. Total Employment in Michigan (Licensed 2009) & Minnesota (No License)



12. Median Wages in Michigan (Licensed 2009) & Minnesota (No License)



When comparing the time series data plotted for licensed and non-licensed states, there does not seem to be evidence that a wage premium or employment gap exist attributable to licensing. The analysis fails to find evidence that an occupation

becoming licensed has an effect on wages and employment. However as referenced in the literature review, the ways in which licensing affects these economic outcomes varies by occupation. Having only analyzed two occupations, I do not believe that we can apply this result to all occupations generally. There may be a wage premium or employment gap in other occupations as a result of licensing, but for electricians and massage therapists such a conclusion cannot be reached.

This null result is more convincing for electricians than massage therapists. Figures 1 and 2 compare employment and wages Iowa (licensed 2007) and Indiana (no license). The wage trend lines move almost identically in figure 2, while employment in Iowa seems to steadily increase year to year, which does not align with the hypothesis. If licensing restricted employment for electricians in Iowa, we would expect to see the trend line decrease at a faster rate than Indiana after 2007. Figures 3 and 4 comparing Kentucky (licensed 2001) and Missouri (no license) show a similar pattern. The trend line for wages moves almost identically between the two states with only very slight deviations. One could argue that the employment trend lines do not hold to the parallel trend assumption, but I think the lines post-licensure move closely enough together that they are a good fit for comparison. The lines are nearly identical after 2001 with no visible effect from licensure. Likewise, in figure 6, Massachusetts and New York do not trend parallel initially. However, starting in 2005 wages do trend parallel and fit very tightly together even after Massachusetts became licensed in 2007.

These graphs show a convincing null result for electricians. When looking at the plotted time series data, the trend lines barely changes at all upon initial licensure. If a licensing effect did exist, we would expect the line to trend upward for wages and downward for employment after a state licenses electricians. However, when comparing with the control states that do not license, the trend lines hardly deviates at

all upon initial licensure. This result is consistent across all three sets of state comparisons.

The result seems to hold even for an occupation within an entirely different industry. The trend lines for massage therapists are more erratic, but still does not seem to support a possible licensing effect. There must be other effects at work causing the wage and employment lines to shift, but these shifts do not occur in sync with the treatment state adopting a license requirement. In figure 7 employment is increasing at a faster rate for Illinois (licensed 2005) than Indiana (no license) which again contradicts the hypothesis that licensing would restrict employment growth in the licensed state. Likewise, in figure 8 the wage trend line for Illinois decreases after 2005 while wages are growing in Indiana. This is the opposite of what should be occurring according to the hypothesis. Figure 9 shows employment trend lines in Kansas (no license) and Nebraska (licensed 2007) staying relatively constant to each other. There is a significant deviation from 2011-2014, with Kansas' employment increasing by almost 50%, however 2014 and 2015 show that figure regressing back towards the mean which shows that this was a temporary spike rather than a lasting increase in employment growth rate. Figures 10, 11, and 12 all seem to be violating the parallel trend assumption of difference in difference, and therefore I do not think we can make definitive comparisons between states. Overall these results are less convincing for massage therapists, but if a licensing effect was as certain as the literature indicates, we should see evidence in the graphs. No evidence is present, and therefore I do not believe we can conclude that such an effect exists for either occupation.

There are sizeable gaps in the data in figures 5, 9, 11, and 12. These gaps are due to wage or employment estimates not being available for that year or years. I do not believe these gaps are significant to the conclusion because in each instance there is

three years worth of data after the gap to analyze how wages were trending prior to licensure. The gaps in the data occurred far enough before initial licensure that they should not be significant.

The appendix contains initial four cell difference-in-difference tables. These tables also indicate that no clear effect exists upon initial licensure. There are no identifiable patterns among the state comparisons between wages and employment pre and post licensure. However, these tables are generally only helpful when a clear pattern does exist. They are almost certainly picking up a lot of unidentifiable noise. This analysis primarily focuses on the graphs as a better means for identifying a potential effect.

Discussion

It may be the case that a licensing effect takes many years to be seen. The increase in wages and decrease in employment could be a slow, gradual process over the course of many years that eventually restricts entrants into the profession, but does not do so initially. As discussed in the literature review, when controlling for state and occupation fixed effects, the licensing wage premium shrinks. Most of these studies employ very large panel datasets that span 20-30 years. If the wage premium is smaller than originally theorized, it may be even smaller or even totally negligible within the first few years of initial licensure.

Perhaps it is also the case that the licensing requirements adopted are not severe enough to deter an aspiring practitioner from entering the occupation.

Electricians

States	Experience	No. Of Exams	Length of Renewal	Continuing Education	Initial Cost	Renewal Cost
Iowa	16000, h	1	3	18	75	75
Kentucky	4, y	1	1	6	150	50
Massachusetts	8000, h	1	3	45	330	104

Massage Therapists

States	Training Hours	No. Of Exams	Length of Renewal	Continuing Education	Initial Cost	Renewal Cost
Illinois	600	1	2	48	370	87.5
Michigan	500	1	3	54	290	115
Nebraska	1000	1	2	24	322	127

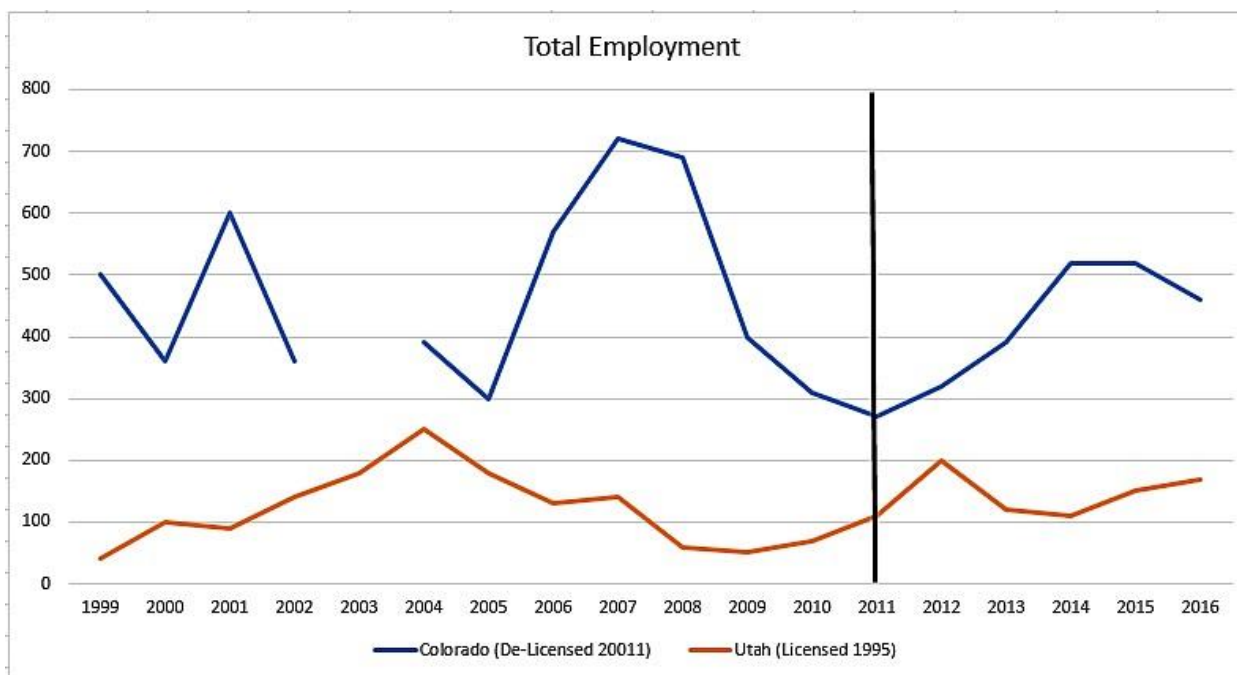
The above tables outline the licensing requirements for electricians and massage therapist in each treatment state where a license was adopted. Based on the previous literature, if a licensing effect did exist for these occupations, you would expect the effect to be even more noticeable in the graphs for Nebraska and Iowa. The training and experience requirements for these two states are double the requirements for the other states who also recently adopted a license. It is important to note a significant difference between these two occupations. The fact that an electrician's license requires experience hours means that the non-licensed worker can still perform the duties of an electrician as an apprentice. They are still earning money and working as an electrician underneath someone with a license. Hence the licensed is not necessarily a barrier to enter the occupation, but a barrier to upward mobility within the occupation. A massage therapy license requires training hours from an approved training program. These hours are different from experience because they are instructional hours that take place in a school and not in an actual work setting. The aspiring massage therapist is statutorily forbidden to perform the duties of a massage therapist without these training hours. Therefore, in this instance the license is a barrier to enter the occupation. This distinction is important particularly for electricians. It could be the case that these

licensing requirements do not restrict employment or deter entry into the occupation because the requirements can be achieved over time while still practicing in the profession. I still initially expected the requirements for massage therapist to be severe enough to deter entry although the analysis did show that to be the case.

Another possible reason for this result is a violation of the difference-in-difference assumption that there are no confounding policies or spillover effects from events outside of licensure that are affecting these figures. One major economic shock that certainly impacted wages and employment nationwide was the great recession of the late 2000s. Having treatment and control states helps to control for the recession effects consistent across all states, but some states were hit harder and took longer to recover. Spillover effects from the recession are likely captured in the graphs, and could lead to false conclusions. A state like Michigan, for example, saw a steep drop in employment for massage therapist around the time where regulation began. However this also coincided with the years of the recession where Michigan's state economy was hit particularly hard due failures in the automotive industry. The spillover from those effects are likely captured within the graphs. However the consistency of the trend lines across state comparisons, particularly among electricians, leads me to believe that state recession spillover effects are not effecting the results.

This null result is important to policy makers who are always looking to grow their state's economy. Occupational licensing reform has been a workforce priority of the two most recent presidential administrations with President Obama's administration releasing a 76-page policy framework for state officials, and the Trump administration awarding large grants for state occupational licensing reform. However, if the result of a state licensing a certain occupation is negligible, policymakers should focus their efforts elsewhere when figuring out how to grow their state economies. Arguments from

publicized reports from the Institute of Justice and the Obama Administration say that removing these licensing barriers will result in an influx of new practitioners into the occupation which will stimulate job growth. The evidence from this analysis does not show that this would be the case. This analysis finds no evidence that licensing affects wages or total employment in any visible way. If an occupation becoming licensed does not affect wages or employment, then deregulating an occupation likely won't affect these outcomes either. BLS studied the history of states de-licensing occupations, and found there have only been eight instances where a state completely removed a requirement for licensure (Thornton and Timmons 2015). One of these instances was private investigators in Colorado who made acquiring a license a voluntary activity in 2011.



As this figure indicates, when compared with Utah who has licensed private investigators since 1995, there does not seem to be a drastic change in employment after the private investigator's license became voluntary in 2011. Colorado saw peak employment of private investigators in 2007 while the occupation was still regulated. It

would not make sense to conclude that removing the licensing requirement resulted in a new influx of workers. The increase from 2011 to 2015 seems to be more due to postrecession regression to the mean rather than a result of the occupation being delicensed.

Limitations

The most significant limitation in this analysis is the number of years where data was able to be retrieved. Due to changes in the standard occupation classification system, data was only collected from 1999-2016. As speculated in the section above, wage premiums and employment shifts due to licensing could take many years to be seen in a state's economy. Ideally this analysis could be done with 30-40 years of data to see how wages and employment trend for several decades after an occupation becomes licensed. This also limits the number of occupations and state comparisons available for analysis. To have proper treatment and control states, the data must have a mix of states who began licensing after 1999 licensed vs. non-licensed states. With more years available, the analysis would be able to include occupations where states primarily began licensing it before 1999. Perhaps the wage and employment trends would look differently in these occupations that have been licensed for longer amounts of time. Expanding the analysis to include more occupations and more state comparisons would strengthen the results.

Expanding the research to include more occupations is particularly important for policymakers who wish to enact salient licensing reform. Electricians and massage therapists are occupations that fit the methodological needs of this analysis, however the employment levels for these occupations as a percentage of the total labor force is small. If a policy maker were interested in licensing reform that would be felt by a

greater percentage of practitioners, he would likely choose occupations such as nurses or teachers which are have both been highly regulated for many years. Reforming licensing among these occupations would be felt more than reform among electricians and massage therapists.

Lastly this analysis does not employ any formal statistical methods. I did not set a level of statistical significance for the results, and did not produce standard errors. However, given the analysis finds zero licensing effect, this is not important. The clear and transparent results the methods of this analysis provide is more valuable to a policymaker than complex regression techniques that produce standard errors. The economic significance of this analysis is equally important for policy analysis. On economic significance grounds, the evidence of this analysis is clear that the licensing effects are not meaningfully significant because they are not visible and consistent across the state comparisons.

Conclusions

The findings of this research fail conclude that a wage premium or employment gap exist when comparing licensed vs non-licensed states for electricians and massage therapists. When graphing trend lines for total employment and median wages in treatment and control states, there seems to be no apparent change attributable to a state adopting a license. This result is contrary to the hypothesis and does not generally agree with the research which says that licensing premiums increase wages by 10-15% and slows employment growth rates in licensed states. Licensing has recently been a trendy topic for policymakers, however this analysis does not find evidence that more government regulation for certain occupations will have any significant impact on wage

or employment growth for state economies. Future research should include more occupations and longer time series in order to strengthen these results.

Appendix

Electricians

	Average Pre 2007 Median Wages	Average Post 2007 Median Wages	Licensing Effect
Indiana (No License)	23.04	26.76	
Iowa (Licensed 2007)	18.54	22.96	
	-4.51	-3.80	0.71

Dif-in-dif estimator	Average Pre 2007 Employment	Average Post 2007 Employment	
Indiana (No License)	15423.75	14231.00	
Iowa (Licensed 2007) Dif-in-dif estimator	6151.25	6956.00	
	-9272.50	-7275.00	1997.50

	Average Pre 2001 Median Wages	Average Post 2001 Median Wages	Licensing Effect
Missouri (No License)	22.24	26.01	
Kentucky (Licensed 2001)	17.10	20.42	
Dif-in-dif estimator	-5.14	-5.59	-0.45
	Average Pre 2001 Employment	Average Post 2001 Employment	
Missouri (No License)	12580.00	10891.88	
Kentucky (Licensed 2001)	9650.00	8108.13	
Dif-in-dif estimator	-2930.00	-2783.75	146.25

	Average Pre 2007 Median Wages	Average Post 2007 Wages	Licensing Effect	Median
New York (No License)	26.27	30.72		
Massachusetts (Licensed 2007)	23.79	28.47		
Dif-in-dif estimator	-2.48	-2.25	0.23	
	Average Pre 2007 Employment	Average Post 2007 Employment		
New York (No License)	39968.57	36356.00		
Massachusetts (Licensed 2007)	13111.25	12949.00		
Dif-in-dif estimator	-26857.32	-23407.00	3450.32	

Massage Therapists

	Average Pre 2005 Median Wages	Average Post 2005 Median Wages	Licensing Effect
Indiana (No License)	14.59	13.40	
Illinois (Licensed 2005)	15.48	14.45	
Dif-in-dif estimator	0.89	1.05	0.16
	Average Pre 05 Employment	Average Post 05 Employment	Licensing Effect
Indiana (No License)	893.33	1010.00	

Illinois (Licensed 2005)	3018.33	3285.00	
Dif-in-dif estimator	2125.00	2275.00	150.00

	Average Pre 2007 Median Wages	Average Post 2007 Median Wages	Licensing Effect
Kansas (No license)	12.79	14.86	
Nebraska (Licensed 2007)	12.00	13.28	
Dif-in-dif estimator	-0.79	-1.58	-0.79
	Average Pre 2007 Employment	Average Post 2007 Employment	Licensing Effect
Kansas (No license)	356.67	558.89	
Nebraska (Licensed 2007) Dif- in-dif estimator	80.00 -276.67	358.89 -200.00	76.67

	Average Pre 2009 Median Wages	Average Post 2009 Median Wages	Licensing Effect
Minnesota (No License)	18.83	19.17	
Michigan (Licensed 2009)	13.40	17.43	
Dif-in-dif estimator	-5.44	-1.74	3.70
	Average Pre 2009 Employment	Average Post 2009 Employment	Licensing Effect
Minnesota (No License)	733.75	2008.57	
Michigan (Licensed 2009) Dif- in-dif estimator	1050.00 316.25	1757.14 -251.43	-567.68

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