Occupational Licensing and Labor Market Impacts in Illinois and the Midwest: Is There a Rigidity Effect?

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ABSTRACT

Occupational licensing is a governmental credential for a worker to practice legally in a profession, affecting 25% of the U.S. workforce. Licensing often imposes substantial entry requirements for potential workers, such as requiring training or passing examinations, which can reduce the labor supply. This, in turn, can weaken the ability of firms and employees to respond to business fluctuations and may impose a hiring rigidity onto the labor market. This report quantifies the rigidity effect of licensing using the employment fluctuation data in Illinois from 2005 to 2018. A 10-percentage point increase in the license coverage of an industry reduces the magnitude of employment growth by one-fourth during periods of economic expansion. The impact of licensing also reduces job loss by one-third during a contracting economy. In addition, the rigidity effect of licensing on the labor market manifests itself as a moderating factor against the 2008 recession and affected about 36% of Illinois workers. This report suggests that the recent wave of licensing reforms throughout the country and to some extent in Illinois should be focus on removing unnecessary job entry requirements, which can then increase labor market flexibility and facilitate worker relocation.

Executive Summary

Occupational licensing refers to a governmental permit for an individual to work legally in a profession. Typical examples include physicians, lawyers, or other health practitioners in which labor regulations usually involve public safety issues. License requirements, such as the number of examinations and the duration of training, vary across states even for the same profession. As of 2017, licensing affects about 25% of the U.S. workforce.

This report, "Occupational Licensing and Labor Market Rigidity in Illinois and the Midwest," from the Project for Middle Class Renewal at the School of Labor and Employment Relations, University of Illinois at Urbana-Champaign, analyzes the effect of licensing coverage on the fluctuation of job creation (due to firm expansion or new establishments) from 2005-2018 and job destruction (due to firm contraction or closing), and relates the impact to Illinois and the 2008 recession.

1.1 Main Findings:

- Illinois has a lower license coverage (around 19% of workers) compared to the Midwest and the National averages.
- The "Education, Health, and Social Service" sector is the most regulated sector in Illinois.
- Licensing reduces the fluctuation of job creation. A 10-percentage point increase in the license coverage of an industry reduces the magnitude of employment growth by one-fourth during periods of economic expansion.
- Licensing also reduces the fluctuation of job destruction. A 10-percentage point increase in the license coverage of an industry reduces job loss by one-third during a contracting economy.
- The rigidity effect of licensing on the labor market manifests itself as a moderating factor against bad economic times. A 10-percentage point increase in license coverage reduces the recessionary impact on job creation by 0.36%, and on job destruction by 7.26%.
- In the 2008 recession (from 2008Q1 to 2009Q2), industries in Illinois on average had a reduction of 5,500 jobs created and an increase of 5,200 jobs eliminated in each quarter.

- The rigidity effect mainly concentrates on the "Construction," "Manufacturing," "Wholesale," and "Professional," industries accounting for 36% of the Illinois worker force.
- Occupational certification, a less restrictive form of employment credentialing, does not generate similar job creation or job destruction impacts.

1.2 Policy Implications:

- Where service quality can be protected, de-licensing may enhance labor market flexibility for firms and employees, creating new jobs and facilitating worker flows.
- Expanding the use of certification bundled with training can help workers with their job search, while not having an adverse effect on labor market flexibility.

2 Introduction

Occupational licensing is a government credential that a worker is required to attain in order to work legally in a profession, affecting nearly a quarter of the U.S. workforce (Bureau of Labor Statistics (BLS), 2019). Typical licensed professions include health practitioners and other public-safety related occupations. The main argument for regulating a profession through licensing is to protect consumers from unrecoverable negative consequences. However, some observers have identified licensing as an institution used to reduce competition and protect the interest of existing practitioners (Smith, 1937; Friedman, 1962).

Policy debates on employment credential regulation have heated up in recent decades. Occupational coverage and requirements for licensing in Illinois have increased. For example, in 2011, the State of Illinois revised the Real Estate License Act and raised the training requirement for entry-level real estate agents. The Illinois State Board of Education also imposed an additional licensing examination to assess teaching readiness of new teachers in 2015. Licensing coverage also expanded to other non-typical occupations such as locksmiths in 2004.[1] There has also been a move to deregulate job entry barriers in the state. A recent example is a bill enacted in 2016 to allow selective ex-offenders to obtain a health care-related professional license.[2]

In the following report, the impact of occupational licensing on labor market flexibility is examined. Because licensing restricts the number of workers available in the market, firms face a higher cost in both hiring and layoffs. Licensing imposes a rigidity effect onto the labor market by reducing the ability of both firms and workers to respond to economic fluctuation. The economics literature, stresses that labor market flexibility is very crucial to job growth and economic development (Lazear, 1990; Botero et al., 2004; Di Tella and MacCulloch, 2005; Javorcik and Spatareanu, 2005). Other studies also find that labor regulations usually reduce labor market flexibility. For examples, Autor, Donohue III, and Schwab (2006) and Kugler and Pica (2008) both find negative impacts on worker flow and employment when firms face a high firing cost in Europe. While the regulatory property of licensing also imposes rigidity onto the labor market, this report is the first attempt to carry out an empirical investigation.

The main reason for insufficient empirical evidence on the dynamic effects of licensing is the lack of appropriate datasets that link employment fluctuation with licensing laws at the

[1] Illinois has become one of the 13 states to license locksmiths. See 225 ILCS 447 Private Detective, Private Alarm, Private Security, Fingerprint Vendor, and Locksmith Act of 2004.

[2] See Public Act 099-0886.

occupation level. To the author's knowledge, the only appropriate publicly available data about employment dynamics is the quarterly statistics on job creation and job destruction from the Bureau of Labor Statistics. However, the information is at the industry level, whereas licensing is a regulation at the occupation level. To measure the rigidity effect, the percent of licensed workers is tabulated for each industry in each state using the latest information on individual licensure in the Current Population Survey (CPS) as a measure of the industry exposure to licensing.

The report finds evidence that from 2005-2018, licensing reduced the fluctuation of both job creations and job destruction. A 10-percentage point increase in an industry's license coverage offset one-sixth and one-fifth of the fluctuation on job creation and job destruction respectively. To alleviate the econometric concern about reverse causality between the overall economic growth and industry employment measures, we examine the relationship between the national average growth rate and the local economy. The rigidity effect of licensing on job destruction is more robust under this refined methodology.

The report also includes a case study about the recent 2008 recession. A 10-percentage point increase in license coverage of an industry reduces the recession impact on job creation by 0.36% and on job destruction by 7.26%. The rigidity effect is greatest on the "Construction," "Manufacturing," "Wholesale," "Transportation," and "Professional" sectors, which affects about 36% of the workers in Illinois.

The rigidity effect of licensing on the labor market lends support to licensing reforms that remove unnecessary barriers to occupational entry. The advocates of de-licensing instead opt for less restrictive devices, which also assure public safety and service quality. One commonly discussed alternative is occupational certification. This is a private credential issued by a private body, such as a certified human resources specialist. Certification shares many similarities with occupational licensing. For example, both of them require candidates to take training and demonstrate skill competency through tests scores or continuous education. The only element on which these two institutions differ on is that certification only restricts the right to a title, whereas licensing restricts both the right to a title and the right to practice. For example, a computer programmer can still legally work in any private/public company without calling oneself a "certified Java programmer." However, only licensed real estate brokers can legally represent home sellers or homebuyers in all states. The analysis finds that the exposure to certification does not generate the same rigidity effect as licensing does.

3 Employment Effect in Licensing Literature

A commonly accepted wisdom about licensing is that it restricts labor supply and reduces employment. Kleiner (2000) was among the first to quantify the employment effect of licensing. He finds that heavily regulated professions such as dentistry have a lower employment growth than professions with similar educational requirements but fewer or no licensing requirements,such as biological scientists. However, Kleiner also finds that the employment figures in other regulated professions do not present a consistent conclusion. For example, despite being heavily regulated lawyers have a faster growth rate than other similar professions. More recently, Blair and Chung (2019) analyze a nationally representative sample of around 300 professions in the Current Population Survey. They found that state licensing laws in general reduce employment by 17% to 27%. Analyzing the same data, Kleiner and Soltas (2018) and also found a similar reduction magnitude.

Other researchers examined the employment effect of licensing in specific occupations. For example, Carpenter and Stephenson (2006) showed that an increase in educational requirement for accountants reduced the number of candidates sitting for CPA licensure. Federman, Harrington, and Krynski (2006) revealed that English language requirement for a manicurist license in the U.S. hurts the employment of non-English speaking immigrants. Kleiner et al. (2016) showed that reducing the drug prescribing ability of nurses reduced hours worked by 6% to 14%. Hall et al. (2018) demonstrated that female participation on the Uber platform *increases* after deregulation, which suggests that licensing has a negative effect on female employment in the ride sharing industry. In contrast to the majority of the negative finding, Law and Marks (2009) analyze data from the introduction of licensing in a selected group of professions during the period from 1870 to 1960 and find that there are no negative employment effects of licensing for women and minorities. Recently, DePasquale and Stange (2016) found no impacts on the labor supply of nurses following the adoption of the Nurse Licensure Compact, which allows interstate reciprocity of licensure.

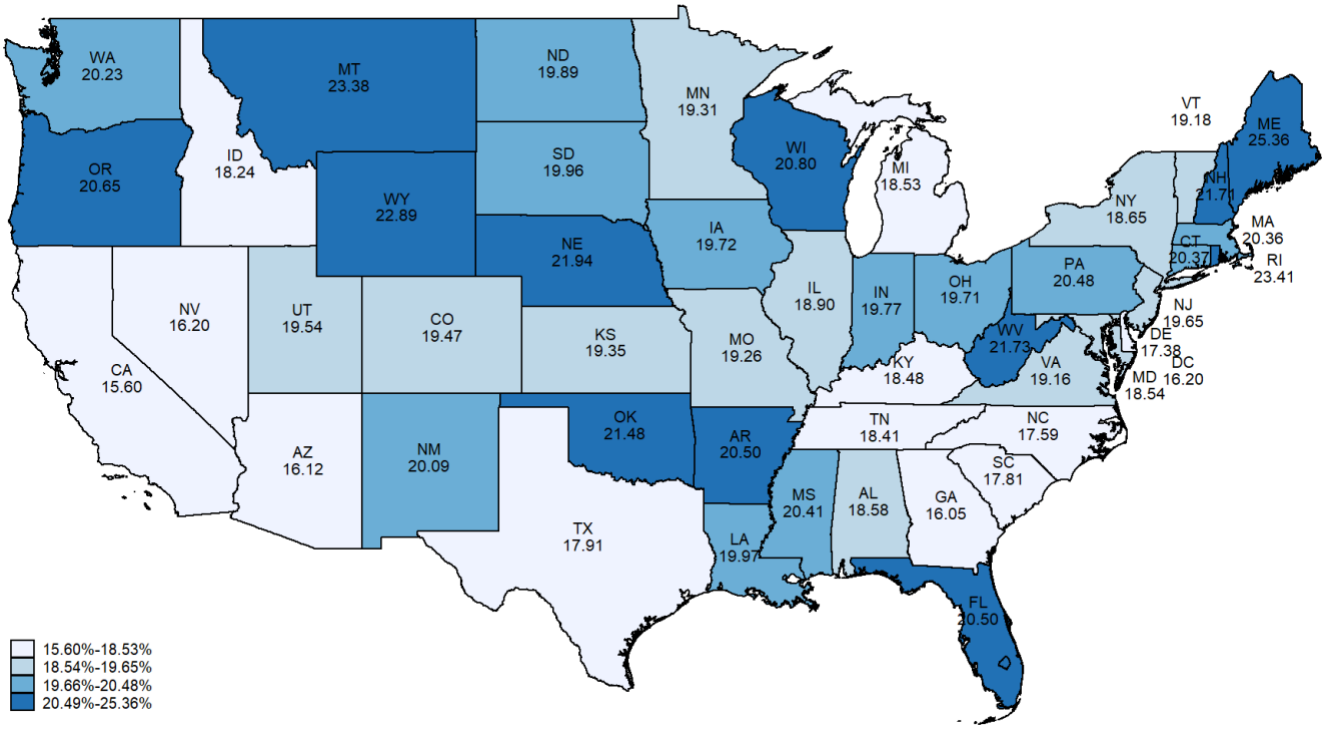
While the literature so far focuses on the *stock* of employment, this report adds to the literature by looking at the *flow* of employment along the business cycle.

4 Descriptive Statistics in Illinois and Midwest

4.1 Licensing

The pattern of license coverage and employment fluctuation by industry in Illinois and the Midwest region is the focus of the data presented below. Throughout this report, the license coverage of an industry of a state is tabulated using the Basic Monthly Survey of the Current Population Survey (CPS), which contains a nationally representative sample of the U.S. population.

Figure 1: Licensing Coverage (% of all workers) by State



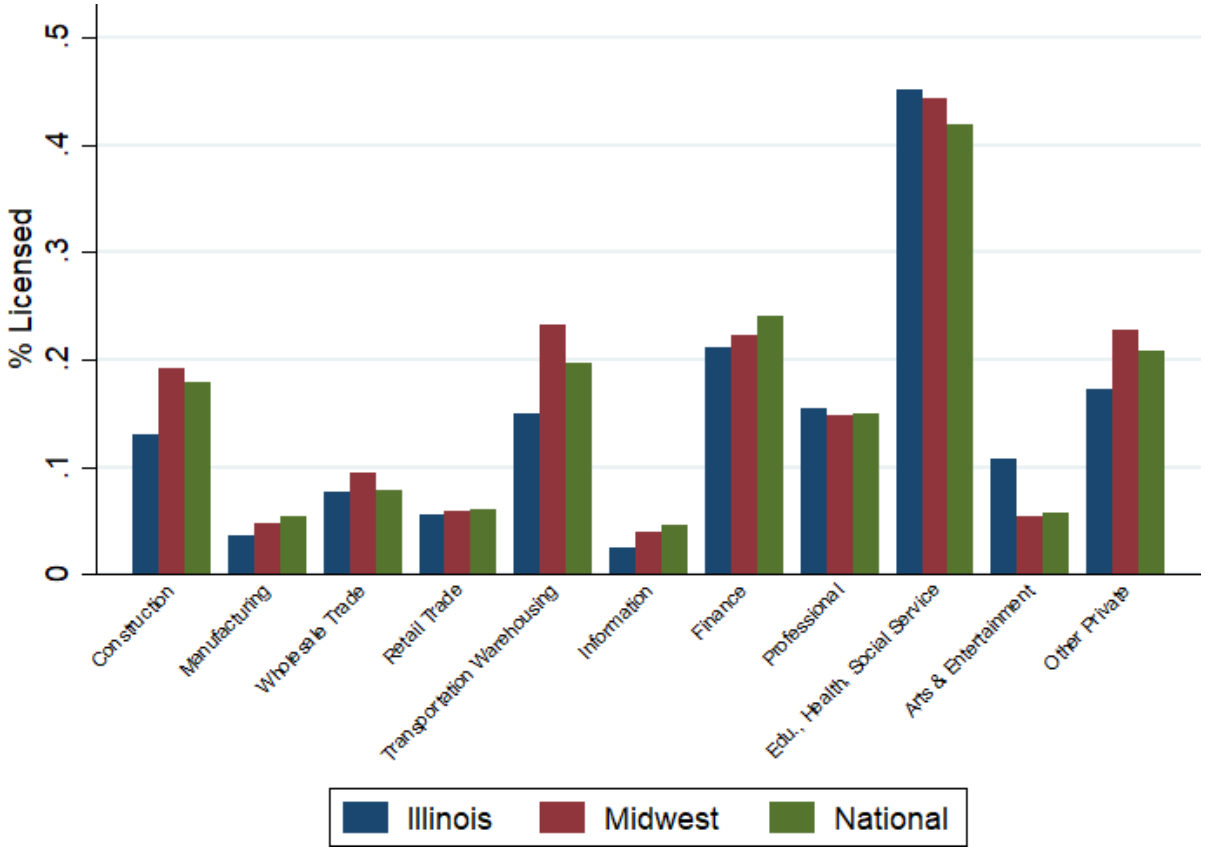
Data Source: Basic Monthly Survey of Current Population Survey (Jan 2016 - March 2019)

Starting in 2016, the CPS includes information on individual licensure. The sample is restricted to individuals aged between 18 and 64 with positive earnings. An individual is licensed if 1) his or her credential is issued by a government body and 2) that credential is required by the current job. License coverage of an industry in a state is measured by the percent of workers whose jobs require a governmental credential (adjusted for sampling weight).

Figure 1 visualizes differences in state license coverage across the U.S. At 19% Illinois is less restrictive than the national average and among the Midwest region, Wisconsin is the most restrictive (21%). Figure 2 breaks down the license coverage by industry. Similar to other studies, the "Education, Health, and Social Service' sector is heavily licensed (around 42% of the workers).

Illinois again has lower license coverage than the Midwest and National averages in most of the industries. This figure reveals that there are many intra-industry variations across states to identify the effect of license exposure. Table 1 depicts the common licensed professions in Illinois' 11 most regulated industries.

Figure 2: Licensing Coverage (% of all workers) by Industry



Data Source: Basic Monthly Survey of Current Population Survey (Jan 2016 - March 2019)

The percent column shows the percent of workers in the industry who are licensed workers. The most commonly licensed professions in Illinois are similar to those in throughout the U.S. For example, in the "Wholesale Trade" and "Transportation" industries about 30% to 40% of the licensed workers are truck drivers in both Illinois and the nation.

In the "Construction" sector, the major licensed profession is "Electrician." Note that electrician licensing in Illinois takes place at the municipal level, rather than at the state level. The state of Illinois and the city of Chicago do however require plumbers to be licensed and both administer and examination.

Table 1: Common Occupations Among Licensed Professions (By Industry)

Illinois		National	
Profession	%	Profession	%
Construction			
Electricians	16.56	Electricians	15.27
Plumbers	11.98	Construction Managers	11.64
Manufacturing			
Other Managers	8.36	Truck Drivers	8.90
Welding, Soldering, and Brazing Workers	6.62	Other Managers	6.33
Judicial Workers	6.27	Welding, Soldering, and Brazing Workers	6.21
Wholesale Trade			
Truck Drivers	33.33	Truck Drivers	34.76
Retail Trade			
Sales Supervisors	20.28	Pharmacists	17.46
		Sales Supervisors	16.41
Transportation and Warehousing			
Truck Drivers	49.14	Truck Drivers	48.84
Information			
Telecommunications Line Installers	22.22	Telecommunications Line Installers	10.19
		Librarians	8.66
		Other Managers	6.40
Finance			
Real Estate Brokers and Sales Agents	16.60	Real Estate Brokers and Sales Agents	25.07
Insurance Sales Agents	10.55		
Professional			
Lawyers	36.09	Lawyers	25.52
Education, Health, and Social Services			
Registered Nurses	21.35	Registered Nurses	18.60
Elementary and Middle School Teachers	15.38	Elementary and Middle School Teachers	17.18
Arts & Entertainment			
Food Service and Lodging Managers	20.73	Food Service and Lodging Managers	14.39
		Chefs and Cooks	12.71
Other Private			
Cosmetologists	40.08	Cosmetologists	36.60

Note: The statistics are tabulated from the Monthly CPS (2016-2018). This table shows common licensed occupations in an industry in Illinois and the whole US. The % column presents the percent of workers in the industry among the licensed workers.

4.2 Employment Fluctuation

The measure on employment fluctuation is pooled from the quarterly business dynamics statistics hosted by the Bureau of Labor Statistics. This series breaks down employment fluctuation into job creation (due to firm opening or expansion) and job destruction (due to firm closing or contraction). The official economic downturn prior to the 2008 recession is the Y2K scare in 2001. Its official end date, defined by the National Bureau of Economic Research (NBER), is the fourth quarter of 2001. Therefore, this study analyzes the sample from 2002Q1 to 2018Q4, which is the most recent available date.

Figure 3: Industries With Higher License Coverage Have Less Fluctuation in Job Creation

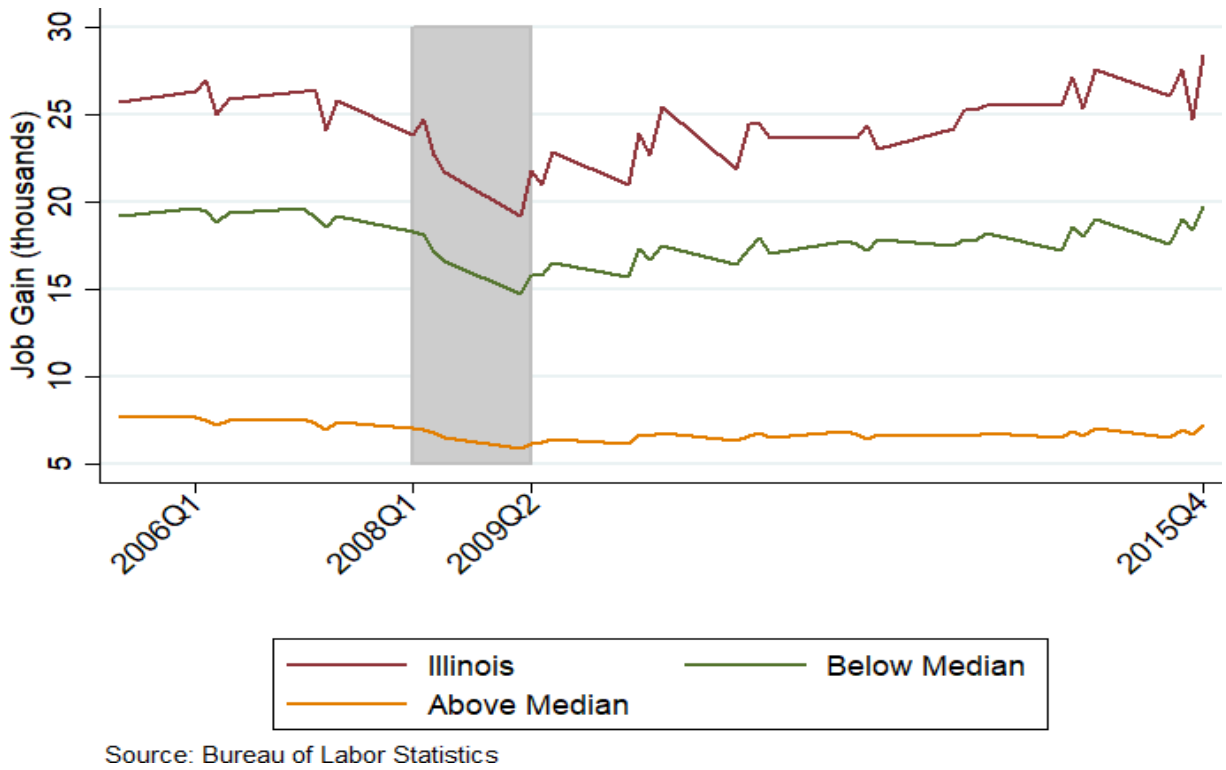
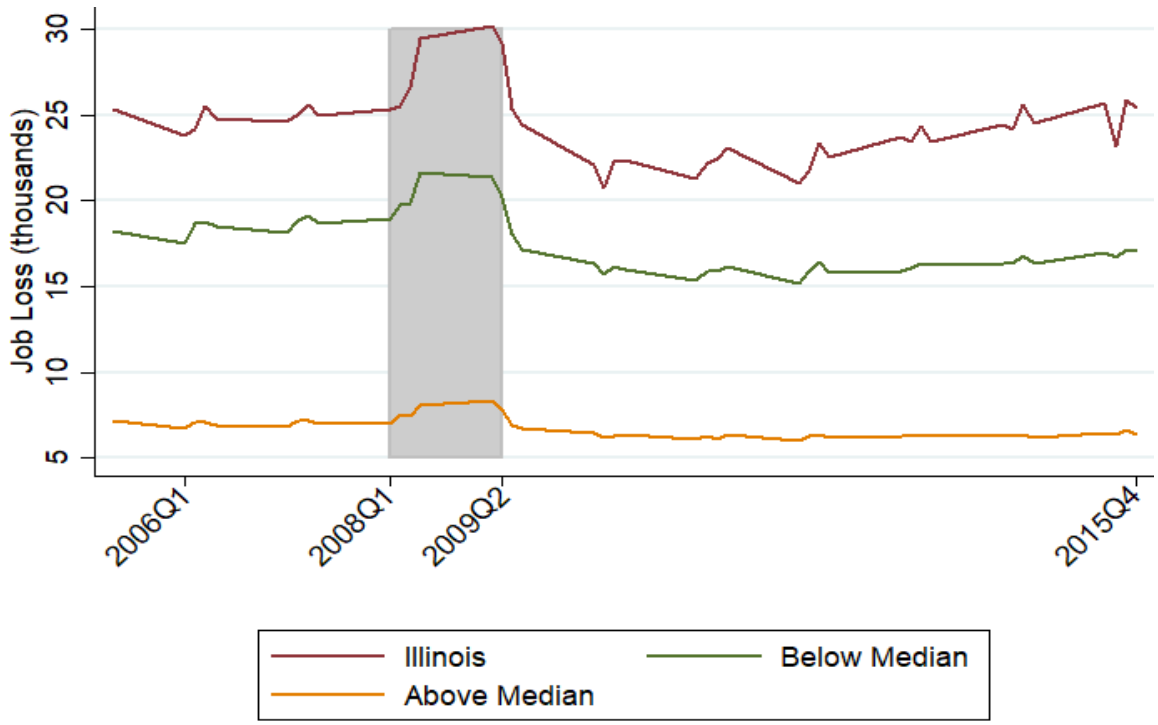


Figure 3 highlights the NBER official period for the recent 2008 recession from 2008Q1 to 2009Q2. The red line shows that the industry average from 2006-2015 for job creation in Illinois was approximately 25,000 jobs. It also indicates a big drop during the recession. From the peak to the trough of the recession, industries in Illinois created 20% fewer jobs. On average, there was a 3,000 reduction in jobs created in each quarter during the recession. This performance is

comparable to other states.[3] The green and yellow lines categorize industries based on whether they are below or above the median license coverage. Two observations are suggestive of the hypothesis that licensing reduces labor market flexibility. First, industries with higher license coverage (yellow line) created fewer jobs. Second, they were less vulnerable to the 2008 recession and in general to the business cycle. The same conclusion on labor market flexibility can also be found in regards to job loss.

Job destruction data is presented in Figure 4. Again, the red line represents the industry average of job destruction in Illinois, which were roughly 25,000 jobs. From the peak to the trough of the recession, an industry in Illinois destroyed 20% fewer jobs. On average, there was an increase of 2,700 jobs lost in each quarter during the recession. The green and yellow lines represent industries, which are below or above the median license coverage. The same conclusion emerges as in job creation. Industries with higher license coverage lost fewer jobs. Job destruction, like job creation, also fluctuated less along the business cycle.

Figure 4: Industries With Higher License Coverage Has Less Fluctuation in Job Destruction



Source: Bureau of Labor Statistics

[3] The Midwest, in contrast, created 15% fewer jobs from the peak to the trough of the recession. On average, there was about a 1,400 reduction in jobs created in each quarter during the recession. (Source: Bureau of Labor Statistics)

5 Rigidity Effect of Occupational Licensing

To analyze the relationship between job gain (job loss) and license exposure of an industry the study employs a multivariate regression model. Table 2 summarizes the variables used in the regression. The technical details appear in the Technical Appendix I.

The outcomes of interest are job gain and job loss respectively. The key variables of interest are the percent of licensed workers and the real GDP growth of an industry in a given state. The control variables are included in the statistical model to eliminate the state differences in employment properties. In the last row of the table, the percent of occupational certification of an industry in a state is presented and will be used in a later section of this report to contrast with the employment effects brought on by licensing.

Table 2: Comparing Key Variables Across Regions, 2005-2018

	Illinois		Midwest		National	
	mean	sd	mean	sd	mean	sd
Outcomes:						
job gain (,000)	25.04	16.34	12.56	11.63	13.69	18.72
job loss (,000)	24.69	15.74	12.36	11.54	13.21	17.78
Key Variable:						
license(%)	0.14	0.11	0.16	0.11	0.16	0.11
Growth	0.02	0.13	0.02	0.16	0.02	0.17
Control Variables:						
self-employed (%)	0.09	0.06	0.11	0.07	0.11	0.07
government workers (%)	0.10	0.14	0.11	0.15	0.12	0.17
college graduates (%)	0.35	0.15	0.29	0.13	0.30	0.15
union members (%)	0.04	0.03	0.03	0.02	0.02	0.02
Placebo Variable:						
certification(%)	0.03	0.01	0.03	0.01	0.03	0.01
Observations	605		6,490		27,598	

Note: Data sources include the Bureau of Labor Statistics, Basic Monthly Survey of the Current Population Survey, and the Bureau of Economic Analysis. 'Job gain', 'Job loss', and 'growth' are time averages at state-by-industry level. Other variables are the averages of state-by-industry units and are static over time. Sample period is from 2005Q2 to 2018Q4.

Table 3 reveals that a 10-percentage point increase in license coverage of an industry in Illinois reduces job creation by 3.2%. However, the moderating effect also occurs and is more robust on job destruction. A 10-percentage point increase in license coverage of an industry reduced job creation by 5%.

Table 3: Higher Licensing Coverage Is Associated With Less Response To Business Cycle

VARIABLES	(1) jobgain	(2) jobloss
license	0.341	0.384
	(0.300)	(0.295)
growth	0.114***	-0.165***
	(0.0186)	(0.0263)
growth*license	-0.321***	0.500***
	(0.0914)	(0.117)
Constant	9.654***	9.678***
	(0.143)	(0.141)
Observations	27,598	27,598
R-squared	0.957	0.953

Note: Dependent variables are the log of job gain and job loss respectively from 2005Q2 to 2018Q4 retrieved from the Bureau of Labor Statistics. 'License' refers to the 'percent' of licensed workers in an industry in each state and is tabulated using CPS Basic Monthly Survey from Jan 2016 to March 2019. 'Growth' refers to the quarterly percentage change in real GDP (state-by-industry level) obtained from the Bureau of Economic Analysis. All regressions control for state-by-industry average in percent of self-employment, percent of college education, percent of union membership, percent of government workers, state and industry fixed effect. Coefficient estimates significant at 1%, 5%, and 10% level are denoted with ***, **, and *, respectively. Standard errors in parenthesis are clustered at state-by-industry level.

Table 4 presents the results using an Instrumental Variable (Bartik) strategy to circumvent the concern of a reverse causality problem. Interested readers can refer to the Technical Appendix for a more detailed discussion of this statistical method. In brief, we need to make sure the real GDP is causing the change in job gain and job loss, rather than just a pure correlation with the employment fluctuation.

Importantly, after instrumenting the "growth" variable and the interaction term, the rigidity effect of licensing on job creation in Column 1 goes away, though the sign remains negative. In contrast, the interaction term in Column 2 remains statistically significant. The magnitude is also similar to that in Table 3. This suggests that the rigidity effect of licensing on job destruction is more robust than that on job creation.

Table 4: Moderating Effect on Job Loss More Robust Under the IV strategy

VARIABLES	(1) job gain	(2) job loss
license	0.346	0.303
	(0.299)	(0.303)
growth	0.462***	-1.995***
	(0.0768)	(0.139)
growth*license	-0.427	5.010***
	(0.444)	(0.699)
Constant	9.657***	9.665***
	(0.143)	(0.141)
Observations	27,598	27,598
R-squared	0.954	0.920
First-Stage F (Kleibergen-Paap)#	79.05	79.05

Note: Dependent variables are the log of job gain and job loss respectively from 2005Q2 to 2018Q4 retrieved from the Bureau of Labor Statistics. 'License' refers to the 'percent' of licensed workers in an industry in each state and is tabulated using CPS Basic Monthly Survey from Jan 2016 to March 2019. 'Growth' refers to the quarterly percentage change in real GDP (state-by-industry level) obtained from the Bureau of Economic Analysis. All regressions control for state-by-industry average in percent of self-employment, percent of college education, percent of union membership, percent of government workers, state and industry fixed effect. Coefficient estimates significant at 1%, 5%, and 10% level are denoted with ***, **, and *, respectively. Standard errors in parenthesis are clustered at state-by-industry level. # The IVs in the first stage include the Bartik instrument and its interaction term with 'license'.

Table 5 below looks at the impact of industry exposure to certification, to determine if it replaces licensing without causing the same rigidity effect on the labor market. In the CPS survey, a certificate is defined as a credential issued by a private entity. Licensing and certification have many similar elements. Both require exams, fees, or training. The requirements also depend on the taste of consumers and the labor market structure. The main difference is that a certificate only restricts the right to "title," while a license restricts the right to practice an occupation.

With many properties in common, the exposure to certification of an industry serves as an appropriate variation for a placebo test. If certification exposure does not cause a rigidity effect on job creation and job destruction, confounding factors such as differences in employment structure could be rule out. While the analysis suggests a rigidity effect it does not yield significant results. The results provide additional evidence that the regulatory property of licensing cause a rigidity effect on the labor market.

Table 5: Certification Coverage Does Not Generate the Same Rigidity Effect (IV)

VARIABLES	(1) job gain	(2) job loss
Cert	0.268	0.0455
	(0.996)	(0.956)
growth	0.442***	-1.300***
	(0.0969)	(0.175)
growth*Cert	-1.749	2.438
	(3.797)	(6.925)
Constant	9.685***	9.701***
	(0.141)	(0.139)
Observations	27,598	27,598
R-squared	0.954	0.920

Note: Dependent variables are the log of job gain and job loss respectively from 2005Q2 to 2018Q4 retrieved from the Bureau of Labor Statistics. 'Cert' refers to the percent of workers having a credential issued by a private body in an industry in each state and is tabulated using CPS Basic Monthly Survey from Jan 2016 to March 2019. 'Growth' refers to the quarterly percentage change in real GDP (state-by-industry level) obtained from the Bureau of Economic Analysis. All regressions control for state-by-industry average in percent of self-employment, percent of college education, percent of union membership, percent of government workers, year fixed effect, state and industry fixed effect. Coefficient estimates significant at 1%, 5%, and 10% level are de-noted with ***, **, and *, respectively. Standard errors in parenthesis are clustered at state-by-industry level.

6 Licensing, Midwest Employment and the 2008 Recession

How did occupational license exposure in the Midwest impact overall employment during the 2008 recession? (See, Technical Appendix I for the details of the analysis).

The Midwest sample is presented in the odd number columns of Table 6. Licensing coverage has a positive and significant impact on both job creation and job destruction. The "recession" indicator shows the expected result: the 2008 recession reduced job creation and increased job destruction. However, licensing created a buffering effect during bad economic times. In contrast, the impact on job creation is small and not significant. When focusing on the Midwest sample, licensing only moderates the recession impact on job destruction but not job creation. However, this pattern may be regional, or it may be caused by the lack of identifying power due to small cross-sectional variation.

Therefore, it is important to examine the National sample in the even number columns of Table 6 to generalize the conclusion. The 2008 recession, on average, caused a reduction in job creation by 22% (about 5,500 jobs in Illinois) and an increase in job destruction by 20.9% (about 5,200 jobs in Illinois) each quarter. During the recession with reduced job creation and increased job destruction, a 10-percentage point increase in license coverage of an industry was associated with 0.81%higher job creation and 6.3% lower job destruction. By the comparison, the Midwest impact on job creation was roughly 0.36% and 7.26%of the recession impact on job destruction.

The analysis using both the Midwest and National sample consistently point to the same qualitative result: the rigidity effect of licensing during the 2008 recession is stronger on job destruction than on job creation.

Table 6: Licensing Moderates The Recession Impacts

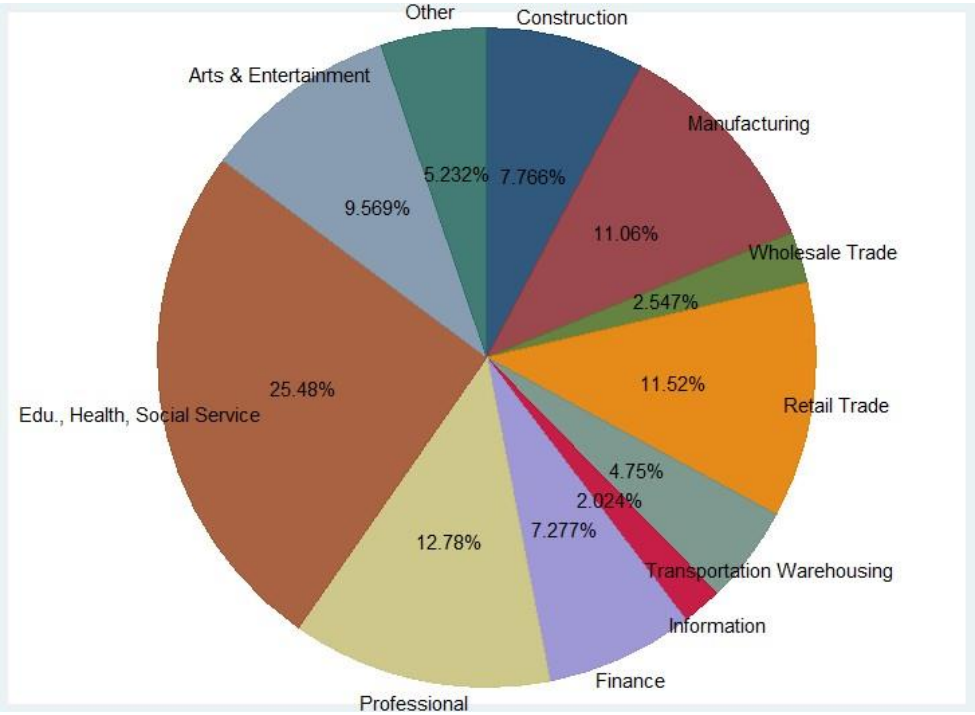
	Job Gain		Job Loss	
VARIABLES	(1) Midwest	(2) National	(3) Midwest	(4) National
license	1.293***	0.324	1.347***	0.454
	(0.442)	(0.300)	(0.431)	(0.294)
recession	-0.184***	-0.220***	0.220***	0.209***
	(0.0202)	(0.00974)	(0.0397)	(0.0150)
recession*license	-0.0369	0.0811***	-0.726***	-0.633***
	(0.0646)	(0.0299)	(0.134)	(0.0582)
Constant	4.467***	2.832***	4.393***	2.816***
	(0.333)	(0.143)	(0.326)	(0.142)
Observations	6,490	27,610	6,490	27,610
R-squared	0.971	0.960	0.967	0.959

Note: Dependent variables are the log of job gain and job loss respectively from 2005Q2 to 2018Q4 retrieved from the Bureau of Labor Statistics. 'license' refers to the 'percent' of licensed workers in an industry in each state and is tabulated using CPS Basic Monthly Survey from Jan 2016 to March 2019. 'Recession' refers to the period between 2008Q1 and 2009Q2 (NBER official definition). All regressions control for state-by-industry average in percent of self-employment, percent of college education, percent of union membership, percent of government workers, year fixed effect, state and industry fixed effect. Coefficient estimates significant at 1%, 5%, and 10% level are denoted with ***, **, and *, respectively. Standard errors in parenthesis are clustered at state-by-industry level.

7 Employment Fluctuation by Industry During 2008 Recession

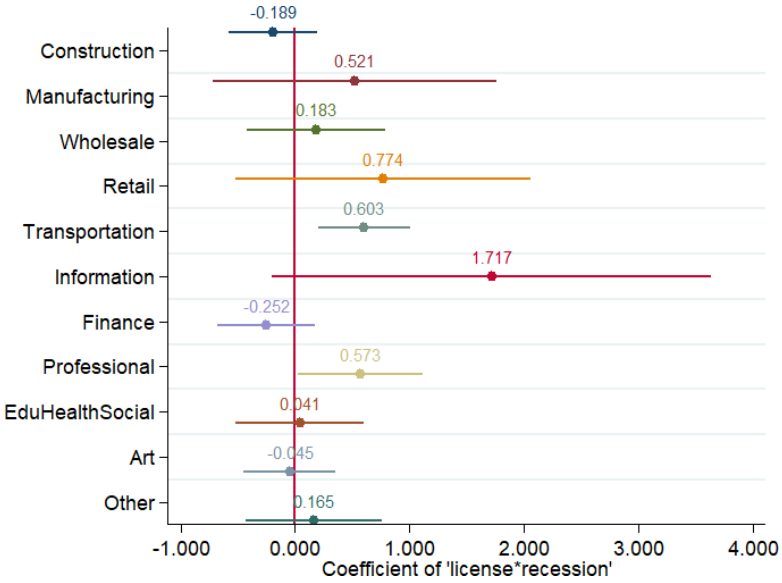
How relevant was the licensing impact on employment fluctuation in a particular industry in Illinois during the 2008 recession? Figure 5 breaks down the industry composition in Illinois by the percent of licensed covered workers. The biggest sectors in Illinois, are "Education, Health, Social Service", "Professional," "Retail Trade," and "Manufacturing." We therefore can quantify the impact of licensing on Illinois by looking at which industries drive the buffering effect.

Figure 5: Industry Composition in Illinois (Percent of Workers Involved)



As shown in Figure 6, the rigidity effect of licensing during the recession on job creation mainly concentrated on the "Transportation" and "Professional" sector. A 10-percentage point increase in license coverage is associated with 6.03% and 5.73% more job creation during recession respectively in the two sectors. The magnitude of the effects is about one-third to one-fourth of the "recession" coefficient in Table 6. In other industries, the estimates are either too small or imprecisely estimated. This explains why in the full sample the moderating effect of licensing on job creation is relatively small compared to that on job destruction.

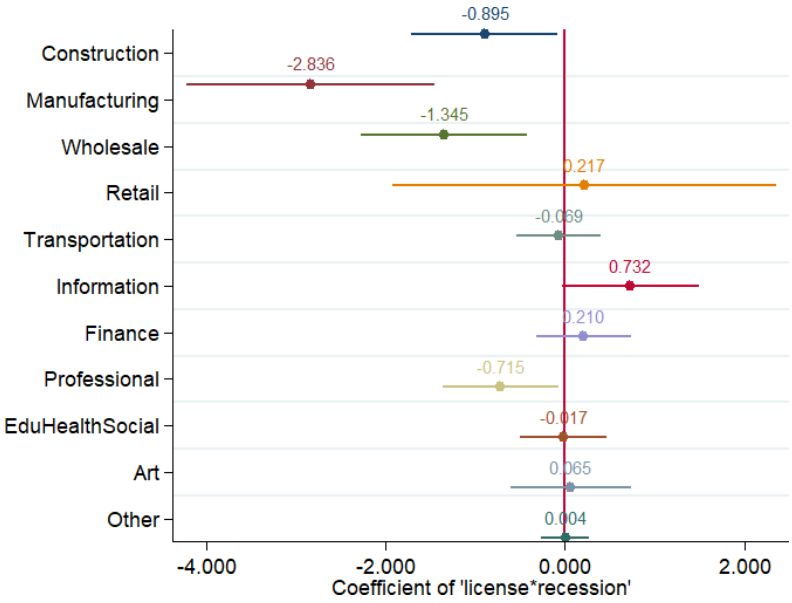
Figure 6: Coefficient of 'Recession* License' by Industry (Job Gain)



Note: The dot and the bar for each industry represent point estimate and 95% confidence interval respectively.

Figure 7 carries out the same exercise for job destruction. Comparing the position of the interval bars with the red line, the rigidity effect of licensing on job destruction mainly impacted the "Construction," "Manufacturing," "Wholesale," and "Professional" industries. In terms of the influence on Illinois' economy, about 36% of the workers are affected.

Figure 7: Coefficient of 'Recession*License' by Industry (Job Loss)



Note: The dot and the bar for each industry represent point estimate and 95% confidence interval respectively

8 Conclusion and Policy Implication

Labor market flexibility benefits both employers and workers: it facilitates job growth and worker flows. During the period studied (2005-2018), the net impact of licensing on job creation and job loss was very slight. While this study finds a moderating effect of licensing against recessionary conditions (i.e. lower reduction in job creation and less job destruction during the 2008 recession), it may also hinder the relocation of workers to new jobs during bad economic periods.

Based on the current finding, this report offers two policy suggestions. First, consideration should be given to examining and removing unnecessary licensing requirements in order to enhance job flows. Second, occupational certification is recognized as a substitute for licensing to achieve work quality assurance. This study supports this recommendation since certification does not generate labor market rigidity as licensing does.

A caveat about the current discussion is that the variation of license coverage is coming from state differences. Therefore, interpreting the causal impact of licensing has to be taken with caution. It is likely that a state with certain population properties and the labor market performance is more or less likely to push forward licensing laws. The negative association found here could possibly be caused by unobserved common factors. Nonetheless, this report serves as a starting point for researchers to look at the dynamic effect of licensing.

References

Autor, David H, John J Donohue III, and Stewart J Schwab. 2006. "The costs of wrongful-discharge laws." *The Review of Economics and Statistics* 88 (2):211–231.

Blair, Peter Q and Bobby W Chung. 2019. "How Much of Barrier to Entry is Occupational Licensing?" *British Journal of Industrial Relations*.

Botero, Juan C, Simeon Djankov, Rafael La Porta, Florencio Lopez-de Silanes, and Andrei Shleifer. 2004. "The regulation of labor." *The Quarterly Journal of Economics* 119 (4):1339–1382.

Bureau of Labor Statistics (BLS). 2019. *Labor Force Statistics from the Current Population Survey*. Information access on the web, last accessed on 2019-10-13.

Carpenter, Charles G and E Frank Stephenson. 2006. "The 150-hour rule as a barrier to entering public accountancy." *Journal of Labor Research* 27 (1):115–126.

DePasquale, Christina and Kevin Stange. 2016. "Labor supply effects of occupational regulation: Evidence from the nurse licensure compact." Tech. rep., National Bureau of Economic Research.

Di Tella, Rafael and Robert MacCulloch. 2005. "The consequences of labor market flexibility: Panel evidence based on survey data." *European Economic Review* 49 (5):1225–1259.

Federman, Maya N, David E Harrington, and Kathy J Krynski. 2006. "The impact of state licensing regulations on low-skilled immigrants: The case of Vietnamese manicurists." *American Economic Review* 96 (2):237–241.

Friedman, Milton. 1962. *Capitalism and freedom*. University of Chicago press.

Hall, Jonathan V, Jason Hicks, Morris M Kleiner, and Rob Solomon. 2018. "Occupational Licensing of Uber Drivers." *Unpublished working paper presented at the ASSA* .

Javorcik, Beata Smarzynska and Mariana Spatareanu. 2005. "Do foreign investors care about labor market regulations?" *Review of World Economics* 141 (3):375–403.

Kleiner, Morris M. 2000. "Occupational licensing." *Journal of Economic Perspectives* 14 (4):189–202.

Kleiner, Morris M, Allison Marier, Kyoung Won Park, and Coady Wing. 2016. "Relaxing occupational licensing requirements: Analyzing wages and prices for a medical service." *The Journal of Law and Economics* 59 (2):261–291.

Kleiner, Morris M. and Evan Soltas. 2018. "A Welfare Analysis of Occupational Licensing in U.S. States." Mimeo, Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3140912.

Kugler, Adriana and Giovanni Pica. 2008. "Effects of employment protection on worker and job flows: Evidence from the 1990 Italian reform." *Labour Economics* 15(1):78–95.

Law, Marc T and Mindy S Marks. 2009. "Effects of occupational licensing laws on minorities: Evidence from the progressive era." *The Journal of Law and Economics* 52 (2):351–366.

Lazear, Edward P. 1990. "Job security provisions and employment." *The Quarterly Journal of Economics* 105 (3):699–726.

Smith, Adam. 1937. "The wealth of nations [1776]."

Technical Appendix I

The baseline model is as follows:

$$log(Y_{I,s,t}) = \beta_0 + \beta_1 LicenseCoverage_{I,s} + \beta_2 Growth_{I,s,t}$$

$$+ \beta_3 Growth_{I,s,t} * LicenseCoverage_{I,s} + \mathbf{X}_{I,s}\Gamma + \theta_I + \theta_s + u_{I,s,t} \qquad (1)$$

$Y_{I,s,t}$ refers either to the number of new employment created (job gain) or existing employment destroyed (job loss) in industry I in state s in quarter t. $LicenseCoverage_{I,s}$ is the percent workers who are licensed in industry I in state s, measuring the license exposure of an industry. $Growth_{I,s,t}$ refers to the quarterly percentage change in real GDP (state-by- industry level) obtained from the Bureau of Economic Analysis, spanning from 2005Q2 to 2018Q4. $\mathbf{X}$ is a vector of state-by-industry average in percent of self-employment, percent of college education, percent of union membership, and percent of government workers to absorb the differences of worker characteristics. These statistics are static over the sample period and are tabulated using the Basic Monthly CPS from 2005 to 2018. θ_I and θ_s are industry fixed effect and state fixed effect to capture business fluctuation due to industry or state differences. β_3 is the main coefficient of interest measuring additional responses of employment to business cycle brought by licensing. According to the hypothesis that licensing reduces labor market flexibility, the signs of β_2 and β_3 are expected to be opposite to each other.

To circumvent this concern, a Bartik instrument is used for $Growth_{I,s,t}$:

$$IV_{I,S,t} = \sum_{i=1}^{I} \delta_{I,s} * Growth_{I,t}$$

$Growth_{I,t}$ refers to the national percentage change in quarterly real GDP of industry I. The identifying assumption is that the national average of industry growth rate is not correlated with the local economy. The national growth rate will then be treated as an exogenous shock affecting each state differently according to the industry composition $\delta_{I,s}$, which is obtained by the number of workers in industry I in state s divided by the total number of workers in state s. To avoid changes on the industry shares due to employment fluctuation during the sample period, the industry shares of each state are tabulated using the monthly CPS in 2004.

To carry out the analysis on the 2008 recession, Equation 1 is augmented to the following model:

$$Y_{I,s,t} = \alpha_0 + \alpha_1 LicenseCoverage_{I,s} + \alpha_2 Recession + \alpha_3 Recession * LicenseCoverage_{I,s}$$

$$+ \mathbf{X_{I,s}}\Gamma + \theta_I + \theta_s + \theta_t + u_{I,s,t} \qquad (2)$$

α_2 measures the effect on the outcomes caused by the 2008 recession, whereas α_3 measures whether license intensity causes differential responses. The sign of α_3 is expected to be opposite to that that of α_2 if there exists a rigidity effect of licensing against the recession. There are two differences compared to the main specification: "Recession" refers to the period from the 1st Quarter in 2008 to the 2nd Quarter in 2009 which is the official recession periods announced by the National Bureau of Economic Research. This replaces the "growth" measure and specifically looks at the rigidity effect of licensing during the recent recession. Second, a time fixed effect, θ_t, is added to capture employment fluctuation at different points of time.

Technical Appendix II

This subsection is to explain sources behind the high R-squared in the statistical model.

Column (1) and (4) of Table 3 present the result for job creation and destruction without fixed effects. 'License', 'growth', and the four industry-state controls can only explain about 4% of the variations of job gains or job losses. In Column (2) and (5), industry fixed effect is added to control for industry differences. This raises the explanatory power of the model to about 40%. By adding the state fixed effect in Column (3) and (6) , the model further controls for state differences in employment fluctuations such as the size and composition of population. This increases the explanatory power of the model to about 95%.

Here are two important notes regarding the interpretation. The rare case of high R- squared is due to the inclusion of fixed effects to control for state and industry confounding factors so as to better identify the effect of license coverage. Therefore, the high explanatory power of this model does not imply that licensing (and other state-by-industry covariates) strongly predict employment fluctuation. Second, the sign of licensing exposure in Column (3) and (6) is positive but the magnitude is imprecisely estimated. It does not mean licensing has a *causal* and positive effect on both job construction and destruction. Rather, it picks up the state-by-industry differences that the other covariates may fail to control. Again, the emphasis of this report is β_3, the reaction of different licensing intensity along the business cycle.

Table A1: The Significance Of Industry and State Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)
	jobgain			jobloss		
license	0.357	-4.326***	0.336	0.0876	-4.241***	0.392
	(0.583)	(1.355)	(0.300)	(0.574)	(1.349)	(0.295)
growth	-0.00732	0.0498**	0.0599***	-0.154***	-0.0965***	-0.0810***
	(0.0331)	(0.0212)	(0.00981)	(0.0350)	(0.0229)	(0.0128)
Constant	8.833***	11.29***	9.654***	8.836***	11.26***	9.679***
	(0.164)	(0.461)	(0.143)	(0.162)	(0.458)	(0.141)
Observations	27,598	27,598	27,598	27,598	27,598	27,598
R-squared	0.040	0.404	0.957	0.046	0.398	0.953
Control	X	X	X	X	X	X
Industry fixed effect		X	X		X	X
State fixed effect			X			X

Note: Dependent variables are the log of job gain and job loss respectively from 2005Q2 to 2018Q4 retrieved from the Bureau of Labor Statistics. 'License' refers to the 'percent' of licensed workers in an industry in each state and is tabulated using CPS Basic Monthly Survey from Jan 2016 to March 2019. 'Growth' refers to the quarterly percentage change in real GDP (state-by-industry level) obtained from the Bureau of Economic Analysis. Control variables include state-by-industry average in percent of self-employment, percent of college education, percent of union membership, and percent of government workers. Coefficient estimates significant at 1%, 5%, and 10% level are denoted with ***, **, and *, respectively. Standard errors in parenthesis are clustered at state-by-industry level.