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Analyzing the Influence of Occupational Licensing Duration and Grandfathering on Labor Market Outcomes

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Abstract

The length of time from the implementation of an occupational licensing statute (i.e., licensing duration) may matter in influencing labor market outcomes. Adding to or raising the entry barriers are likely easier once an occupation is established and has gained influence in a political jurisdiction. States often enact grandfather clauses and ratchet up requirements that protect existing workers and increase entry costs to new entrants. We analyze the labor market influence of the duration of occupational licensing statutes for 13 major universally licensed occupations over a 75-year period. These occupations comprise the vast majority of workers in these regulated occupations in the United States. We provide among the first estimates of potential economic rents to grandfathering. We find that duration years of occupational licensure are positively associated with wages for continuing and grandfathered workers. The estimates show a positive relationship of duration with hours worked, but we find moderately negative results for participation in the labor market. The universally licensed occupations, however, exhibit heterogeneity in outcomes. Consequently, unlike some other labor market public policies, such as minimum wages or direct unemployment insurance benefits, occupational licensing would likely influence labor market outcomes when measured over a longer period of time.

Introduction

Occupational licensure is the legal process by which governments (mostly the U.S. states but also local governments and the federal government) identify the qualifications that are required to practice a trade or profession, after which time only licensed practitioners are allowed by law to receive pay for doing the work in the occupation. This form of labor market regulation has rapidly become one of the most significant institutional factors affecting labor markets in the United States and other industrialized countries (Kleiner, 2015). Over the past several decades, the share of U.S. workers holding an occupational license has grown sharply. For example, during the 2012–2013 state legislative sessions, at least seven new occupations were licensed in at least one state—occupations ranging from scrap metal recyclers in Louisiana to body artists in the District of Columbia.[1] U.S. government estimates suggest that over 1,100 occupations are regulated to some extent in at least one state, but fewer than 60 are regulated in all 50 states, showing substantial differences in which occupations states choose to regulate (Department of the Treasury Office of Economic Policy, Council of Economic Advisers, and Department of Labor, 2015).

The time from the implementation of occupational licensing laws may be important in analyzing regulation's influence on the labor market. One rationale is that states often enact grandfather clauses that protect existing workers by allowing them to practice either when licensing laws are passed or after the enactment of new regulations, even though they may not meet the current requirements. We provide among the first estimates of the labor market returns to grandfathering. In contrast, new entrants must have higher entry standards than the existing

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[1] These data are from a LexisNexis search of statutes passed during the legislative session.

members of the occupation.[2] We, therefore, anticipate that individuals who are grandfathered would have incentives to encourage licensing and their continued participation in the occupation at pre-licensing levels of education and training. They would likely obtain economic rents by limiting supply and increasing the demand for the higher quality service.[3] In the labor market, the process of older, lesser trained workers leaving the workforce or moving to other occupations and newer workers with higher entry requirements entering the field takes many years or even decades as the process works its way through the labor market, resulting in potentially higher wages. We examine duration over a 75-year period to determine the influence of occupational licensing on key labor market outcomes.

In examining the influence of occupational licensing duration on the labor market, we initially review the literature of duration effects on labor market outcomes and show that our study is the first comprehensive examination of the issue using more than one occupation and implements a substantially longer time period of analysis. More important, we also present evidence that goes beyond analyzing wage determination to examine hours worked and participation in the regulated occupation for large numbers of workers. Consistent with other findings, we show that occupational licensing raises wages in the regulated occupations and that the duration of state licenses also is associated with higher wages. We find this to be the case across a number of robustness tests, and it is also the case for grandfathered workers. In addition, the estimates show that the duration of state licensing is associated with an increase in yearly hours worked by those in the occupation by almost 2 percent, but that participation in the

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[2] A model of grandfathering presented by Shavell (2007) assumes that if the best standard in period 1 exceeds the level of risk that would be appropriate for the expected harm, grandfathering may be desirable. If in period 2 the known harm is below a threshold, grandfathering is optimal—parties who engaged in the activity in period 1 can maintain their period 1 level of risk in period 2, but parties who enter the activity in period 2 should take the new conventionally optimal precaution for the known harm, and they have certainty of the outcome in the second period.
[3] Another source of rents also may be schools that chose to teach classes that are required for licensing attainment, courses for continuing education requirements, or exam preparation classes (Kleiner, 2015).

occupation in the labor market declines somewhat over the first 30 years after the licensing laws are implemented. However, the labor market outcomes for the occupations we examine exhibit heterogeneity. We implement several sensitivity tests to examine the robustness of our estimates for labor market outcomes. These results are largely consistent with a monopoly model of regulation that shows gains to those in the regulated occupation through higher wages and more hours worked, but which may restrict entrants into the occupation in the long run.

Reviewing Duration in the Labor Market for Licensed Occupations

The duration of occupational statutes has been identified in previous studies as a factor that may raise wages (Law and Marks, 2009, Timmons and Thorton, 2013). In both studies, the authors examined one occupation and focused on wage determination. Our study expands on these studies by examining 13 universally licensed occupations (i.e., licensed in all states), some of which have been regulated in all states for over 100 years and others that just became universally licensed during the past decade. The number of workers in these occupations represents about 60 percent of all universally licensed workers in the United States in 2013 from our estimates using the American Community Survey (ACS). These occupations were chosen because the date of initial licensure was available, there were sufficient observations in the census for statistical analysis, and that the vast majority of workers must obtain a license in order to work (Gittleman and Kleiner, 2016). Also, the states that licensed these occupations regulated them at different times, allowing for a difference-in-differences estimation strategy.

The Growth and Wage Effects of Occupational Licensing

Occupational licensing has grown to be one of the largest institutions in the U.S. labor market (Kleiner and Krueger, 2013). To illustrate, funeral attendants are licensed in nine states and florists in only one state. Estimates from national surveys find that the wages of unlicensed

workers are 8 to 15 percent lower than those of licensed workers with similar levels of education, training, and experience (Kleiner, 2006, Kleiner and Krueger, 2013, Gittleman, Klee, and Kleiner, forthcoming). At the upper end, Kleiner and Krueger (2013) find that licensing at the state level confers a wage premium of around 17 percent, and the combination of state and either federal or local licensing has an estimated impact of around 25 percent. Local licenses by themselves are not associated with higher wages, and certification has a smaller effect on wages using estimates from data from the Survey of Income and Program Participation (Gittleman, Klee, and Kleiner, forthcoming).

Unlike the minimum wage or unemployment insurance which requires all employers that are covered by the law to pay the new wage or transfer payment immediately, occupational licensing allows individuals who are working in the occupation, but do not meet the current licensing requirements, to continue working. This practice is called "grandfathering." In addition, the regulated occupation generally has the ability to ratchet up the requirements—that is, raise the requirements for initial entry or movement into the occupation from other political jurisdictions with minimal constraints from policy makers (Wheelan, 1999). Again, individuals who do not meet the current requirements are allowed to keep working with permission from the government. In our analysis, we examine how time from initial licensure, which we call duration, influences key labor market outcomes such as wages, hours worked, and participation in the workforce.

The Role of Different Institutions on Wage Determination and Labor Market Outcomes

A helpful analogy of the influence of institutions in the labor market can be drawn from unions. When unions first organize a firm or establishment, the wage increases are generally small (Freeman and Kleiner, 1990, DiNardo and Lee, 2004, Lee and Mas, 2012). However,

cross-sectional estimates of the impact of unions are between 15 to 20 percent (Hirsch and Macpherson, 2013). The additional cost of having a union worker is approximately $40,500 over the course of that worker's employment with the firm (Lee and Mas, 2012). Moreover, unions appear to raise the wages and benefits with a statistically significant effect the longer they are in an establishment (Freeman and Kleiner, 1990). We examine whether these wage outcomes may also be the case for occupational licensing.

Unions may raise wages through collective bargaining and withholding their labor services through concerted activities to gain wages and benefits. On the other hand, occupational licensing could raise wages by choosing the right set of regulations to restrict supply and limit the tasks of unlicensed workers, and thus enhance demand by signaling and education that they are providing a higher quality service (Friedman, 1962, Spence, 1973). In a manner similar to unions, the institutional mechanism and design that occupational licensing uses also takes time to implement and the full effects may only reach fruition over several decades of strengthening these rules (Hurwicz, 1973).

Background on Grandfathering and Ratcheting Requirements

Initially, the influence of licensing duration on labor market outcomes was identified in a National Bureau of Economic Research volume published in 1945 by Milton Friedman and Simon Kuznets (Friedman and Kuznets, 1945). They noted that in 1911, the American Medical Association, through the implementation of the Flexner Report, ratcheted up requirements for becoming a doctor through tougher admissions requirements, length of education in medical school, and limits on the number of new openings for medical education (Beck, 2004). While increasing the requirements for graduation from medical school and pushing for tougher licensing, the Flexner Report did not require currently working doctors to meet the same higher

requirements; this was a classic case of grandfathering (Beck, 2004). Friedman and Kuznets went on to examine the influence of the regulations more than 20 years later in the late 1930s, and they found that doctors were able to raise their wages by 17 percent more than dentists, who did not substantially change their requirements. This example illustrates how an occupation can raise wages that involved rents to those who were in the occupation and how entry requirements for an occupation were raised for just new entrants.

More recent estimates of the influence of the length of licensing statutes on wage determination include results for massage therapists, nurses, lawyers, and barbers (Law and Marks, 2009, Pagliero, 2010, Timmons and Thornton, 2010, Timmons and Thornton, 2013). The main results suggest that for specific occupations such as massage therapists and barbers, the length of time that a licensing statute has been in place enhances the earnings of these practitioners, but little evidence of the influence of duration was found for nurses (Law and Marks, 2013). However, the estimates are limited to these occupations over a relatively short time period. Our estimates expand upon and provide evidence beyond simply the wage determination effects of licensing duration on labor market outcomes.

Although not explicitly addressed, the process occurs by allowing current practitioners to avoid the explicit general and specific education requirements, internships, tests, continuing education mandates, and good moral character investigations, assuming that they were in good standing prior to the new licensing laws. To the extent that these requirements raise marginal productivity, they may also raise wages. Also, it takes many years for the individuals who did not meet these requirements to leave the occupation or retire, and as a result, the educational quality of the new entrants is higher, and they dominate the current members of the occupation only after a substantial period of time. Moreover, the longer the occupation is licensed, the

greater the ability of the members of the occupation to lobby the legislature and licensing boards to ratchet up requirements for entry within the occupation for those who might enter from unregulated states or occupations. For example, accountants increased the years of university schooling from four to five years in the 1990s in order to attain a Certified Public Accountant (CPA) license (Carpenter and Stephenson, 2006). In addition, physical therapists raised their education requirements from a bachelor's degree in the 1990s to a doctor of physical therapy license by 2016 through 2018 (Cai and Kleiner, 2016). In both cases, the national professional association promoted these enhanced or ratcheted-up requirements through the state boards of licensing or the state legislature. Although the policies may have enhanced the educational quality of the new workers, they could have also reduced access to the occupation by practitioners and consumers and limited the supply of labor to the occupation.

A Licensing Model with Duration

The model uses a framework in which the work of one occupation or individual cannot legally be done without the inputs of the other occupation. The focus of the model serves as a basis to inform and develop hypotheses about the empirical work, rather than as a fully specified general equilibrium model of production of services under regulation. The model uses a modified standard production function:

$$Q_t^L = f(P(z), K)_t \tag{1}$$

$$Q_t^{UL} = f(P(z), N(z), K)_t, \tag{2}$$

where Q_t^L is the output produced by the licensed practitioner over time t, which we will refer to as "high-skilled services." Q_t^{UL} is the output produced by the unlicensed worker (UL) over time t, which we will refer to as "low-skilled services." $P(z)$ represents the licensed worker's labor, recognizing that output relies on their decision of personal input, and $N(z)$ represents the UL's

labor, recognizing that output relies on the worker's decision of personal input. The variable K represents the quantities of capital inputs used in a service production function (Reinhardt, 1972).

By law, however, the technology needed for ULs to produce Q_t^{UL} is tied to supervision of entry by the licensed practitioner. Nevertheless, within a profit function, the UL's wage is tied to the decisions of the licensed practitioner to add the labor input and technology mix to the high-skilled provider, Q_t^L. Regulation acts like a shifter of both the supply and demand curves with long time lags for full implementation over time t because of grandfathering and the ratcheting up of skills for regulated practitioners. In the model, time is the proxy for grandfathering licensed workers and capturing the work of unregulated or lesser regulated practitioners. For example, a licensed engineer or architect can restrict the work of an unlicensed interior designer, reducing earnings, hours worked, or the number of workers who may choose that occupation over time (Kleiner, 2013). Regulated practitioners, who are generally in control of the production of these services, can allocate relatively low-skilled work to unlicensed workers while taking on higher-skilled and value-added services for themselves and thus increasing their hours worked and earnings, but still restricting the number of workers who may enter the occupation. These central theoretical issues raised in these models are empirical questions that the rest of the paper examines.

The Rationale for Grandfathering and Ratcheting

In the labor market, the process of older, lesser trained workers leaving the workforce or moving to other occupations and newer workers with higher entry requirements entering the field takes many years or decades as the process works its way through the labor market, resulting in potentially higher wages. An illustration of the process over three periods is shown in Appendix Figure 1. The figure shows the evolution of grandfathered participants over time and how they

diminish by leaving the occupation, through occupational mobility, retirement, or death. By the end of the period, only individuals who have gone through the licensing process are in the occupation. However, the process may limit the supply of labor in the long run by increasing entry and mobility requirements, and may allow those licensed in the occupation to gain economic benefits by limiting employment growth. In addition, occupations could also ratchet up the requirements for already licensed occupations. Therefore, licensing duration—the time from the implementation of occupational licensing legislation—may matter. It may take years for the full effects of occupational licensing to be realized in the labor market, and for the analyst to observe these changes on wages, hours, and employment. A similar effect of regulation would occur when the occupation ratchets up the requirements for entry, such as the increases in education that occurred in accounting and physical therapy.

A further implication of the role of time for occupational licensing is that it captures the work of unregulated workers and tasks as exemplified in the *North Carolina State Board of Dental Examiners v. Federal Trade Commission* Supreme Court case (2015). Moreover, legal cases involving the Institute for Justice challenged cosmetologists capturing the work of hair braiding for their occupation. In addition, veterinarians have tried to legally capture the work of farmhands who do teeth filing for horses, suggesting that only trained veterinarians can do these tasks for farm animals. In all of these cases, the number of hours provided in the regulated occupations would grow as unlicensed workers declined and as the tasks were legally mandated by regulated workers, as presented in our theory overview.

The Empirical Model

We gathered statutory information for each occupation by year for each state that passed a licensure law from several different legal data sources. In order to calculate the duration of

licensure for all states, we used a couple of different resources. Our major source of data used a Council of State Governments (1952) report to obtain information by year for each state listing their first licensing legislation for the major universally licensed occupations in our analysis. From this source alone, we were able to obtain 60 percent of the required statutory data for the thirteen universally licensed occupations. We also used the LexisNexis legal resource database to obtain the remaining statutory information.[4]

In order to develop a model with a sufficient time line to analyze how duration may influence labor market outcomes, we use all available data from the census and the American Community Survey (ACS) for a 75-year time period from 1940 to 2015 (Meyer and Osborne, 2005). We begin with 1940 since that was the first year wage data was added to the census. We include in our sample individuals who worked in 13 major universally licensed occupations that had more than 152 million workers over time, and which represented more than 10 percent of the U.S. workforce and about 60 percent of all individuals in universally licensed occupations. The sample includes both blue and white-collar occupations and ones that are high, middle, and low income. We limit the analysis to those 13 universally licensed occupations that have sufficient number of state and year observations in the census and were licensed in all states by 2015, the end of our period of analysis.

Figure 1 presents a timeline of state licensures for all occupations under analysis. The sample includes individuals who were either in one of the major universally licensed occupations when it became regulated or in one of the unlicensed occupations during the period. Our analysis

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[4] For the additional remaining information on attorneys for 19 states, we contacted the Supreme Court library and Board of Examiners. We managed to obtain responses for 7 states: Arkansas, Delaware, Illinois, Indiana, Maryland, Michigan, and Minnesota. We replaced the average duration with missing values on attorneys for 12 states: Connecticut, Georgia, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, South Carolina, Utah, and West Virginia, and we denoted with dummy variables in our statistical analysis for completeness (Little and Rubin, 1987).

is limited because we can only include individuals who are covered by licensing statutes, but some may not have attained a license (Gittleman and Kleiner, 2016). Also, we cannot cover the same individuals over their careers as we can with smaller data sets such as the National Longitudinal Survey of Youth (NLSY). However, we define the appropriate treatment groups and varied control groups as described in Table 1. We first define individuals who worked in 13 major licensed occupations as a treatment group, and individuals in occupations that were never licensed throughout the period of analysis as the control group. As a robustness check, we compare the licensed workers to workers in the 13 universally licensed occupations before they were covered by the regulations.

Next, we include standard human capital variables from the census and for more recent years from the ACS, such as gender, age, education, marital status, and potential experience. In order to generate a reliable sample for our analysis, we dropped those individuals whose education is "below 12th grade without a diploma" for dentists, lawyers, accountants, and pharmacists. Also, we dropped those individual whose education level was "below high school diploma" for nurses. For barbers, we screened for those with at most a high school diploma. In addition, individuals older than 65 or younger than 23 and those with years of potential experience below zero were also deleted.[5]

In addition, hourly real earnings were determined by dividing the annual earnings including profits and dividends from work, by annual hours worked, adjusted by the 2014 consumer price index (CPI). Annual hours worked were calculated by multiplying the usual working hours by the number of weeks for the past 12 months. We restrict our sample to full-time workers by eliminating those individuals who worked less than 30 hours a week and less

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[5]We also used individuals with graduate school education for dentists, lawyers, and physicians, and the results were similar. These estimates are available from the authors.

than 48 weeks a year. Also, in addition to these restrictions, the original sample was trimmed by excluding individuals with real hourly wages below the federal minimum wage level in that year and real hourly wages above \$450. The resulting sample consists of 840 million observations from 1940 to 2015 using the census and the ACS sample.[6] In Table 2 we show the means and standard deviations of the individuals in the 13 universally licensed occupations with different licensure statute conditions, and individuals in never licensed occupations[7] in our sample with wage data normalized by the 2014 CPI.[8] In addition, we show in Table 3 descriptive statistics for each licensed and unlicensed worker in the occupations that changed their licensing status during the period of our analysis.

Implementing Descriptive and Causal Estimates

The following sections present both descriptive and causal estimates of our empirical models, initially by using a kernel estimation approach for a descriptive approach and then by using a difference-in-differences causal model that takes into account the different times that each of the occupations in our model initially became licensed in each of the 50 U.S. states over the time period of the analysis.

Nonparametric Kernel Estimation

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[6] We show the number of observations by year in Appendix Table 1.

[7] We manually determine whether each occupation was ever licensed by verifying licensing status through the variable occ1990. For the 1940 census data which lacks the occ1990 variable, we made a crosswalk between occ1990 and occ1950. Data are weighted using population weights.

[8] As more descriptive information about the data, Appendix Table 2 shows the summary statistics of hourly wages and duration in licensed occupations split by year and regulation status. In addition, we show in Appendix Table 4 descriptive statistics for workers in the universally licensed occupations split by median duration. Appendix Table 3 shows the number of observations split by median duration and year. In Appendix Table 5 we also include summary statistics of hourly wages and duration in licensed occupations split by median duration and year.

In order to provide basic descriptive data for more recent and older licensed occupations, we used a nonparametric kernel estimation procedure. The estimates for the effects of occupational licensing duration on wages using the kernel estimation procedure are shown in Figure 2.[9] The estimates are a form of data smoothing. We visually show whether the longer duration of licensing exhibits wider variance in the earnings distribution.

We present the wage distribution changes after licensing legislation is enacted. The solid line represents the wage distribution for unlicensed workers in occupations that were either in one of the major universally licensed occupations when it became regulated or in one of the unlicensed occupations during the period. In the figure we also show the effect of licensing duration on the wage distributions for various time periods. The dashed line is the distribution for licensed workers with a licensing duration of less than 10 years, the dotted line is the distribution for licensed workers with a licensing duration of 11-30 years, the dash-dot line is the distribution for licensed workers with a licensing duration of 31-50 years, and the dash-dot-dot line is the distribution for licensed workers with a licensing duration of more than 50 years. Our nonparametric kernel estimation results show that the wage distributions shift more to the right the longer an occupation has been licensed, suggesting that it takes at least 30 years to fully realize the economic effects of occupational licensing on wage determination. The long time period for the full effect may reflect both the increased demand for the licensed service, the ability to more fully limit supply, and the ability to ratchet up the requirements to attain a license.

Empirically Modeling Duration Effects

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[9] The kernel estimation procedure develops and uses an autoregressive approach to predict observed outcomes and is a theoretical method to provide basic forecasts of observed phenomena.

In order to more fully empirically model the influence of occupational licensing on wage determination, hours worked, and participation in the labor market, we use a basic difference-in-differences approach. Since states implemented their licensing statutes at different times, we are able to develop an estimate of causal inference for the influence of duration on labor market outcomes. We would expect the relationship to initially move slowly as newer licensed workers enter and fewer grandfathered workers continue to work in the occupation. When grandfathered workers retire or leave the occupation, wages would likely increase more rapidly. Furthermore, wages would likely increase when workers' representatives are more fully in control of the supply of labor by ratcheting up requirements.

To causally link occupational licensing and labor market outcomes, we employ a difference-in-differences (DID) strategy using data on changes to state licensing requirements for the 13 universally licensed occupations in our sample. Such changes affect the ability of individuals to work in a licensed occupation in a particular state without needing to fulfill additional regulatory requirements. For estimation purposes, our model takes the following form:

$$Y_{ist} = \alpha + \boldsymbol{\delta} Duration_{ist} + X_{it}\beta + \tau_k + \eta_s + \theta_t + \varepsilon_{ist} \qquad (3)$$

where Y_{ist} is the measure of log hourly wage or annual hours worked of individual i in state s in census year t. $Duration_{ist}$ is duration of the initial occupational licensing statute. We use two definitions of this key variable to estimate linear and nonlinear duration effects: 1) years from the start of state occupational licensing statute,[10] 2) the eight dummies for duration to examine the nonlinear duration effect: 0-3 years, 4-10 years, 11-20 years, 21-30 years, 31-40 years, 41-50 years, 51-100 years, and greater than or equal to 101 years. For example, the duration dummy for

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[10] Since we allow for a one-year lag to ensure the licensing statute was already enacted by the time observation is measured, and both earnings and hours data are based on the previous calendar year, years from the start of state occupational licensing statute are calculated as follows:
Duration$_{ist}$=(Year of the Data$_{it}$-1)-(Year when licensing statute enacted$_{ist}$+1)

11-20 equals 1, and the remaining duration dummies equal 0 for individuals in occupations that were licensed for 14 years in 2015. The variable X_{it} is individual characteristics (years of education, gender, race, potential experience, potential experience squared, and marital status), τ_k includes the two- or three-digit 2010 Standard Occupational Classification (SOC) fixed effects, η_s includes state fixed effects, and θ_t includes year fixed effects. The variable of interest in this regression is δ(s), the coefficient(s) on the licensing duration variable. We can interpret δ as the DID estimate(s) of the effect of occupational licensing on log hourly wage or annual hours worked relative to individuals in occupations that are unlicensed throughout our period of analysis:

$$Y_{ist} = \alpha + \boldsymbol{\delta} Duration_{ist} + X_{it}\beta + \eta_s + \theta_t + \varepsilon_{ist} \tag{4}$$

As an additional sensitivity check, we limit the analysis to the major universally licensed occupations and estimate the model in equation (4). δ is the DID estimate of the licensing duration effect of the universally licensed occupations relative to unlicensed occupations in the universally licensed occupations prior to states passing licensing statutes. The other variables have the same definitions as in equation (3).

$$Y_{ist} = \alpha + \boldsymbol{\delta} Duration_{ist} + X_{it}\beta + \gamma Income_{ist} + \eta_s + \alpha_t + \varepsilon_{ist} \tag{5}$$

In equation (5) we show our model of licensed worker participation in the workforce. The variable Y_{ist} indicates whether person i works in a major universally licensed occupation in state s in year t, and $Income_{ist}$ is per capita mean income in state s in year t. The other variables have the same definitions as in equation (3). We use the DID model by exploiting changes in state licensing laws and requirements over time in each of the tables presented in the rest of the paper.

Our sources of identification are the changers in states that adopted occupational licensing laws over time relative to the non-adopters, individuals who were licensed in the same occupation in comparison to those who did not achieve licensure coverage, and any individual who was licensed relative to those who were not licensed. In order to focus only on changers during the period of analysis, we develop separate estimates for occupations that were licensed during the period 1940–2015. In order to focus on changers in licensing, we also examine by discrete time periods the influence of becoming a licensed occupation on the participation rate in the occupation (Law and Marks, 2013). However, we also present estimates of all 13 occupations in our sample, many of which were initially regulated prior to 1940.[11] Moreover, since we do not assume a linear relationship between licensing adoption and its labor market effects, we present nonlinear estimates in our tables.

In Table 4 we show the influence of duration on wages using clustered standard errors at the state-occupation level. We show both linear and nonlinear specifications in the table. In addition, we show in panel A estimates using all the occupations in our sample. In panel B, we show estimates for only those occupations that changed their licensing status over the period of our analysis. In columns (4) and (6), we show the influence of the duration on wage determination with 3-digit occupation controls as a benchmark for our other specifications. The estimates in column (6) show that wage effects increase by 3 percent the first 3 years after adoption, and then wage effects increase gradually to 20 percent for those individuals in occupations that have been licensed for more than 100 years. In column (4), the estimates suggest that for every 10 years that an occupation is licensed, wages increase by a statistically significant 2 percent. Moreover, in column (2), we see that becoming licensed raises earnings by

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[11] Occupation codes for barbers and cosmetologists are first identified in 1960, and therefore we include barbers and cosmetologists after 1960 in our sample.

almost 8 percent, which is at the lower range of estimates in much of the empirical literature on the effects of licensing on wage determination (Kleiner and Krueger, 2010, Kleiner and Krueger, 2013, Gittleman, Klee and Kleiner, forthcoming).

As an additional sensitivity check, we present in columns (7), (8), and (9) the licensing duration effects on hourly wage relative to hourly wage of unlicensed workers in the 13 universally licensed occupations prior to a state passing a licensing statute. The estimate in column (8) suggests that for every 10 years that an occupation is licensed, wages increase by a statistically significant 5 percent relative to the hourly wage of unlicensed workers in the 13 universally licensed occupations prior to the state passing a licensing statute. In column (9), estimates show that hourly wages increase rapidly after 20 years from the implementation of the licensing statutes, suggesting nonlinear duration effects of this form of regulation on hourly wages.

As a robustness test of our estimates across various specifications or groups of occupations, we found relatively small differences of the wage effects over time across the specifications between older regulated occupations and those who were licensed more recently. As a further test of the strength of our findings, we also utilized the coarsened exact matching method in Iacus et al. (2012) with a DID methodology in order to remove the selection bias caused by endogenous selection into the occupations. Specifically, we perform coarsened exact matching on potential experience and marital status, and perform exact matching on race and gender and found that the results are consistent and robust to those presented in Tables 4 and 5.[12]

In Table 5 we present estimates of the influence of duration of occupational licensing on hours worked per year using clustered standard errors at the state-occupation level. We expect

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[12] Difference in differences estimates combined with Coarsened Exact Matching are shown in Appendix Table 10 and we find consistent nonlinear duration effects on hourly wage and hours worked per year. In addition, the detailed matching summaries are shown in Appendix Tables 8 and 9.

that if an occupation is able to restrict entry and the demand for services in the occupation is constant or rising, then the incumbent workers will work more hours. Moreover, if the substitution effect is greater than the income effect and wages grow through occupational licensing, then we anticipate that workers in the regulated occupation will have an incentive to work more hours.

Using an approach similar to the one shown in Table 4, in Table 5 we begin by estimating the influence of duration with 3-digit occupation controls and linear and nonlinear relationships on hours worked per year. We also show estimates of the two panels for all the occupations in our sample and the ones that experienced changes, and find the results consistent across different groups and specifications. We show in panel A estimates using all the occupations in our sample. We find consistent nonlinear duration effects on hours worked per year using two different control groups. In column (6), we find statistically insignificant licensing effects for the first 3 years from the start of the licensing statute, but hours worked per year start to increase rapidly after 4 years from the introduction of licensing statutes. Licensed workers in occupations that have been licensed for 11-20 years work an extra 78 hours per year compared to never licensed workers. After 40 years from licensing enactment, we find insignificant licensing effects on hours per year. Also, we find in column (2) that becoming licensed is associated with an extra 36 hours worked per year relative to hours worked per year of those never licensed workers.

As a further sensitivity test, in columns (7), (8), and (9) we again limit the sample to the 13 universally licensed occupations and find the nonlinear positive duration effects on hours relative to unlicensed workers in the 13 universally licensed occupations prior to their state passing licensing statutes.

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In panel B, we show the influence of becoming licensed using the occupations that were regulated during the period of analysis. In column (2) in panel B, the estimates of increasing the hours worked due to becoming licensed is more than 36 hours per year for those who were licensed more recently relative to hours worked per year of never licensed workers. Also, the estimates in columns (6) and (9) show the nonlinear duration effects on hours worked per year across two different comparison groups, suggesting consistent results relative to those in panel A.[13] The resulting increase in hours worked per year could be due to the substitution effect of wage increases dominating the income effect for the occupations evaluated in our sample. Again, we show the influence of becoming licensed using the occupations that were regulated during the period of analysis and those who were licensed during earlier periods.

To further examine the influence of occupational licensing in the labor market, we also provide basic approximations of the potential rents that occupational licensing offers to individuals who are grandfathered to show the potential incentives for these individuals to promote this type of regulation. To develop these estimates, we use those individuals whose expected tenure in an occupation occurred during the period that the occupation initially became licensed. To illustrate, if an occupational therapist had 10 years of experience and licensing occurred after she had been in the occupation for 5 years, then that person would be considered grandfathered. In this example, individuals with tenure less than 5 years would be considered to have entered the occupation after licensing and would be a new entrant who started after the initial regulation of the occupation. In Table 6, we show descriptive statistics for grandfathered

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[13] As an additional robustness check, we implemented a two-stage procedure that uses the state as the unit of observation rather than individual characteristics (Hanushek, 1974; Amemiya, 1978; Conley and Taber, 2011). These results are available from the authors.

workers and find that about 10 percent of individuals in the 13 universally licensed occupations are grandfathered over the period we examine in our analysis.

In Tables 7 and 8, we show the DID estimates of influence of grandfathering on labor market outcomes. We again show the influence of grandfathering using the occupations that were regulated during the period of analysis, and those who were licensed during earlier periods. The results in Table 7 show that individuals who are grandfathered gained 0.3-0.7 percent per year in earnings, and their overall earnings are about 4 percent higher than their unlicensed control groups. In terms of the grandfathering effects on hours worked per year, estimates in Table 8 show that individuals who are grandfathered work 13-47 more hours than their unlicensed control groups. We also find that duration is positively and nonlinearly associated with hourly wage and hours worked per year.[14]

In Table 9 we show the earnings effect of grandfathering relative to new entrants into the occupation. In columns (3) and (4), we use ACS data from 2001 to 2015 to provide analysis of grandfathered workers in occupations in states that recently enacted licensing statutes. In this case, new entrants make about 26.9 percent more than grandfathered workers. However, using Oaxaca decomposition analysis, human capital differences widen the wage gap to 28.4 percent because new entrants require substantially higher human capital to obtain occupational licensure (Oaxaca, 1973). But we also find that the unexplained portion—or the potential rents to grandfathered workers—is able to explain about almost 2 percent in the wage gap in favor of

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[14] As a further robustness check, we employ the coarsened exact matching method in Iacus et al. (2012) with a DID methodology in order to solve the common support problem and the selection bias problem. The matching methodology pairs each grandfathered worker with an unlicensed worker in the comparison group based on pre-treatment characteristics, so that the comparison group of workers have similar pre-treatment characteristics as the grandfathered workers with whom they are paired. Specifically, we perform coarsened exact matching on education, experience, and marital status, and perform exact matching on race and gender. The results of these estimates are shown in Appendix Table 11.

grandfathered workers. Therefore, occupational licensing offers potential rents to individuals who are grandfathered into occupational licensing relative to unlicensed workers or new licensed entrants with similar observable covariates.

To the extent that an increase in hours worked could reflect a reduction in the number of practitioners, we next turn our attention to Table 10, which focuses on labor market participation of licensed workers. Perhaps one of the most speculated about yet little researched areas of occupational licensing is the role of this regulated institution on the labor supply of regulated practitioners (Law and Marks, 2013). In Table 10 we estimate the influence of the duration of an occupational license statute on labor market participation in universally licensed occupations, using different methods of categorizing the occupations in our sample. Unlike our previous analysis, we now include in our sample all individuals in the labor force in order to determine whether licensing affected participation in universally licensed occupations relative to all other occupations. In addition, we focus on the licensing effects on participation for individuals in universally licensed occupations with duration less than 65 years relative to occupations with duration greater than 65 years. Our estimates show the influence of the passage of the licensing statute by 3-year intervals following the passage of the law. Throughout the first 30 years following the passage of the statute, occupational licensing reduces labor force participation in universally licensed occupations. Our results imply that the occupations that are most likely to be licensed were regulated in an earlier period, and ratcheting up the requirements results in fewer workers. These declines in the number of workers in universally licensed occupations may be the reason for wages going up and the number of hours worked by practitioners increasing, as shown by Tables 4 and 5. Consistent with the theoretical section, occupational licensing statutes can provide the basis for regulated practitioners reallocating work toward members in their own

occupation at the expense of other workers in the occupation. An illustration of the issue is provided in the case of *North Carolina State Board of Dental Examiners v. Federal Trade Commission* (2015). The result of these practices could be the higher observed pay.

Any DID-type strategy relies on the assumption that treatment and control groups do not follow differential trends over time. In order to provide a further robustness check on the estimates shown in Tables 4 and 5, in Figure 3 we show the slope of the hourly wage curve before and after the change to licensure. Wages in the regulated occupations are relatively flat before the introduction of licensing, but decrease slightly immediately following regulation. Perhaps this is because of the surge in the number of people who want to enter the regulated occupation and the hours worked of those in the licensed occupation now that licensing has been introduced and lower-skilled grandfathered practitioners can continue to work, but the regulations have little bite initially. After the start of initial regulation, hourly wages increase as the duration of licensing grows, also perhaps because of workers who were grandfathered, leaving the occupation and the ability of the representatives for the occupations to ratchet up the legal requirements for entry. The statistically significant difference in slopes of the wage lines before and after the change to licensure presented in Figure 3, along with the similarities between the 13 universally licensed and never licensed groups shown in Tables 2 and 3, suggest that the DID approach of identification has validity for our empirical model.[15]

To further test the strength of our findings shown in Tables 4 and 5, we also check this assumption by including leads and lags of changing requirements. Specifically, we add indicator variables for 1-6 years before adoption, years 0-30 after adoption, and year 31 onward. Of these

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[15] The estimates in Figure 3 show only occupations that changed regulatory status over the period we examined from 1940 to 2015. We also charted all the individual occupations in our sample, and they showed similar plots; these results are available from the authors.

38 indicator variables, we note that the first 37 are equal to 1 only in the respective year, while the final variable is equal to 1 in each year following the 31st year after adoption.

Figures 4 and 5 plot estimated licensing effects on hourly wage and annual hours by including the leads and lags of changing the requirements. In panel A for each figure, we estimate the licensing effects of individuals in the universally licensed occupations relative to the labor market outcome of individuals in never licensed occupations at yearly intervals in the six years prior through the more than 30 years following the adoption of a licensing requirement. Using an approach similar to that in panel A, panel B shows the licensing effects of licensed individuals in universally licensed occupations relative to the labor market outcome of unlicensed workers in the universally licensed occupations prior to states passing licensing statutes. Overall, Figures 4 and 5 suggest that occupational licensing does affect hourly wage and annual hours worked.[16]

Occupations can have different market and institutional reasons for varying wage effects. For example, dentists usually control the dental licensing boards that determine job requirements for their occupation and auxiliary occupations such as hygienists and assistants. Other occupations such as occupational therapists are under the control of or are dominated by boards of physical therapy and are less able to restrict entry into their occupation. Moreover, physicians have long been licensed and have considerable market power as well as the advantage of having convinced the public and lawmakers of the potential adverse consequences of missed diagnoses and public health effects. In this way, they are able to limit entry and obtain long-run economic benefits (Ketel, et al., 2016). In Figures 6 and 7 we show estimates for a wide variety of occupations using the various control groups, each of which may have experienced different

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[16] Similar analysis for occupations that changed their regulation status are shown in Appendix Figures 2 and 3. Each point estimate in Figures 4, 5, and Appendix Figures 2 and 3 is shown in Appendix Tables 6 and 7.

economic and institutional environments on the road to becoming licensed. In each figure, panel A represents average duration effects for each occupation, and panel B represents heterogeneous licensure effects over different occupations.[17] Considered together, Figures 6 and 7 suggest that wages are generally similar but that dentists, for example, have much higher wages and lower hours worked as a consequence of occupational licensing.

From a policy perspective, our estimates are consistent with the decision of the U.S. Supreme Court in holding that dentists were operating as monopolists in reallocating tasks to themselves when the North Carolina State Board of Dental Examiners outlawed the work of "teeth whiteners" (*North Carolina State Board of Dental Examiners v. Federal Trade Commission*, 2015). Our results suggest that occupational licensing works slowly over time as older, less skilled workers retire or move to other occupations and the state boards or legislatures that regulate the professions ratchet up the requirements for entry. Our ability to begin to document these changes shows how important labor market institutions work with deliberate speed to enhance the work and pay arrangements for their members, in contrast to policies such as the minimum wage or changes in unemployment insurance policies, whose influence is more immediate (Kleiner, 2015).

Conclusions

Since the implementation of new occupational licensing statutes takes time to fully carry out, duration of occupational statutes should matter in influencing labor market outcomes. For example, states often enact grandfather clauses that allow continuing practitioners to continue working without meeting the new requirements, or they ratchet up the requirements for entry, such as education and reciprocity agreements with other states or nations, that protect existing

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[17] Tables for each occupation are available from the authors.

workers. One implication is that new entrants must have higher regulatory standards than those already in the occupation. The process of older, less educated workers leaving and newer workers with higher entry requirements entering the occupation takes time to work its way through the labor market. Our analysis uses a model in which licensed practitioners influence the number and kinds of jobs that they and unregulated workers can do over the long run. We use data for 13 large, diverse licensed occupations covering a 75-year period to examine the labor market effects of initial licensure. Consistent with a theory of regulation, our results show that grandfathered workers' wages rise relative to unlicensed individuals' wages in our two control groups. Moreover, there are incentives for incumbents in the occupation to raise standards because they can get higher wages. However, the relative number of workers in the occupation declines somewhat. Our study should allow policy analysts and policy makers to develop and implement more informed decisions on the long-run implications of the rapidly growing labor market institution of occupational licensing.

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Figure 1. Timeline of When Occupations Became Licensed
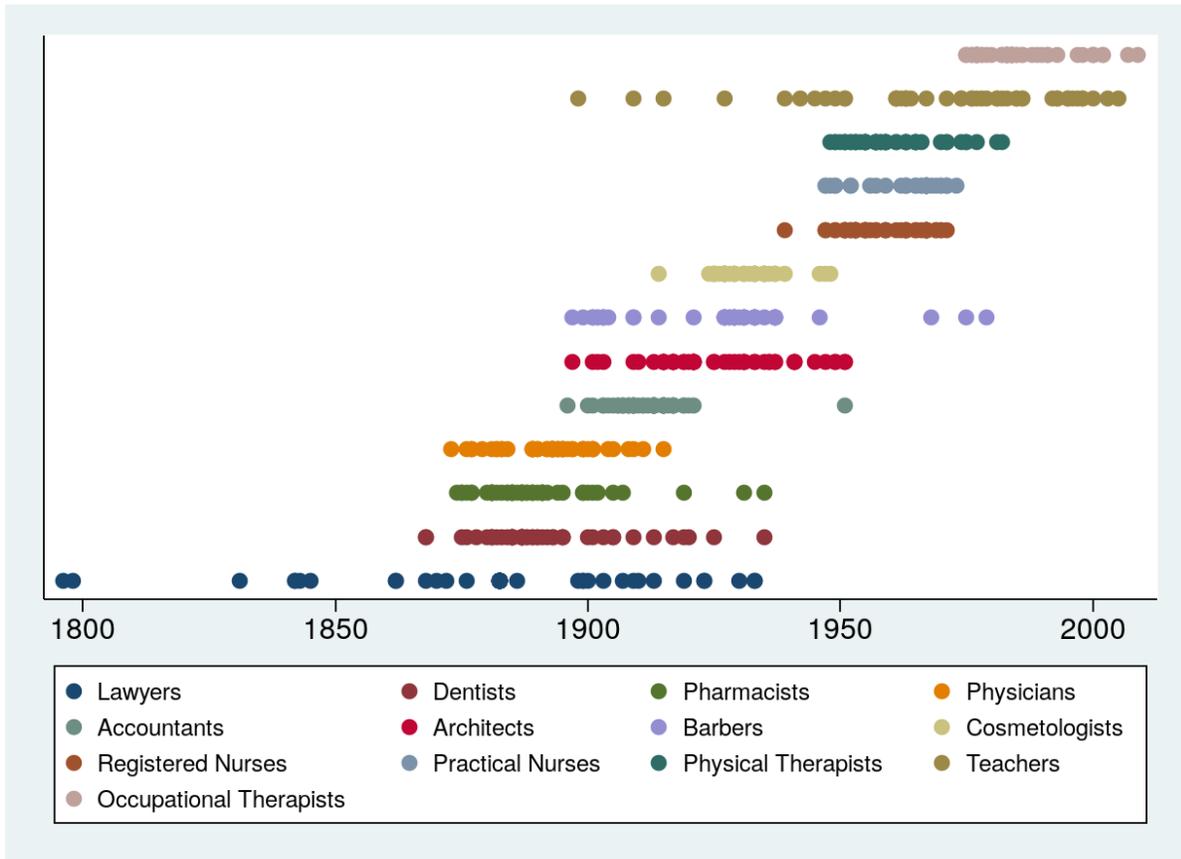
Note: Developed from the authors' examination of the initial implementation of occupational licensing using *Occupational Licensing Legislation in the States* (Council of State Governments, 1952) and LexisNexis legal data services.

Figure 2. Estimated Densities of Log Hourly Wage by Licensure and Duration
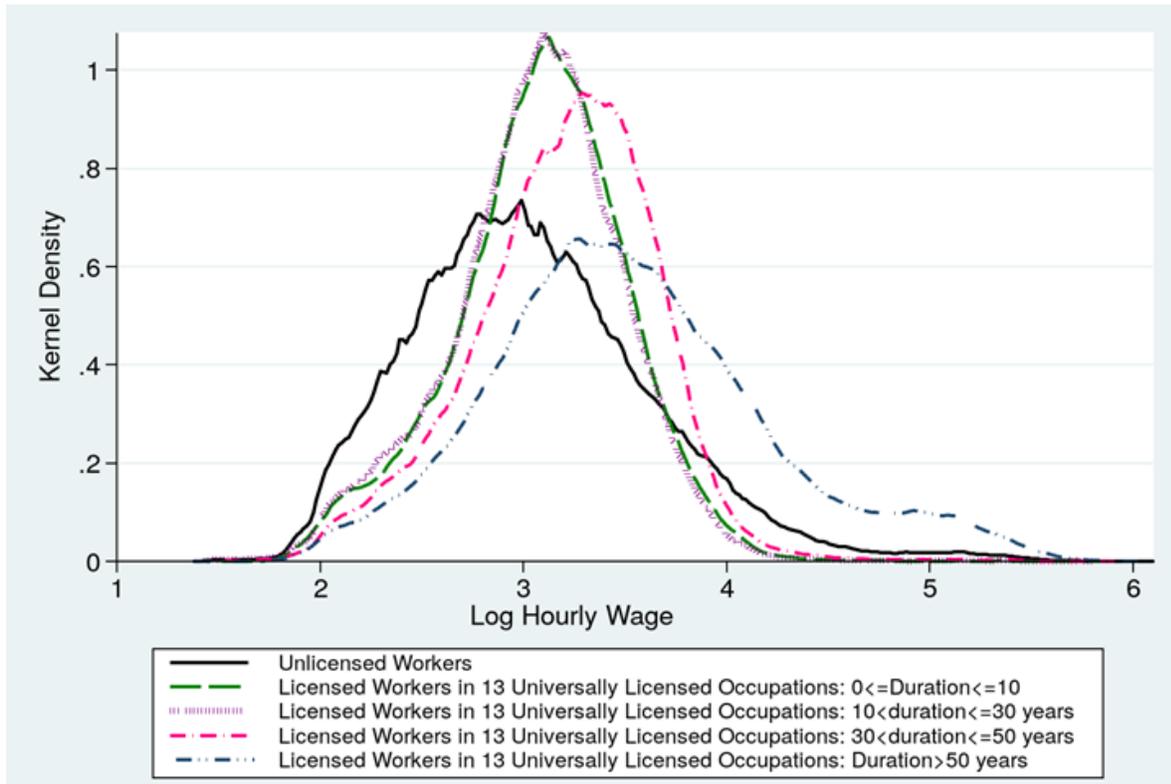
Note: The *x*-axis is the log of hourly wages, and the *y*-axis is the corresponding density. Solid black line: density for the control group of individuals either in occupations that are unlicensed throughout our period of analysis or in the 13 universally licensed occupations prior to states passing licensing statutes. Dashed green line: treatment group of licensed individuals in the 13 universally licensed occupations where states enacted licensing statutes 0-10 years ago. Dotted purple line: treatment group of individuals in the 13 universally licensed occupation for those licensed for 11 to 30 years. Dash-dotted pink line: treatment group of individuals in the 13 universally licensed occupations for those licensed for 31 to 50 years. Dash-dot-dotted blue line: treatment group of individuals in the 13 universally licensed occupation for those licensed for more than 50 years.

Figure 3. Estimated Slopes of Hourly Wages before and after the Implementation of Licensing Statutes
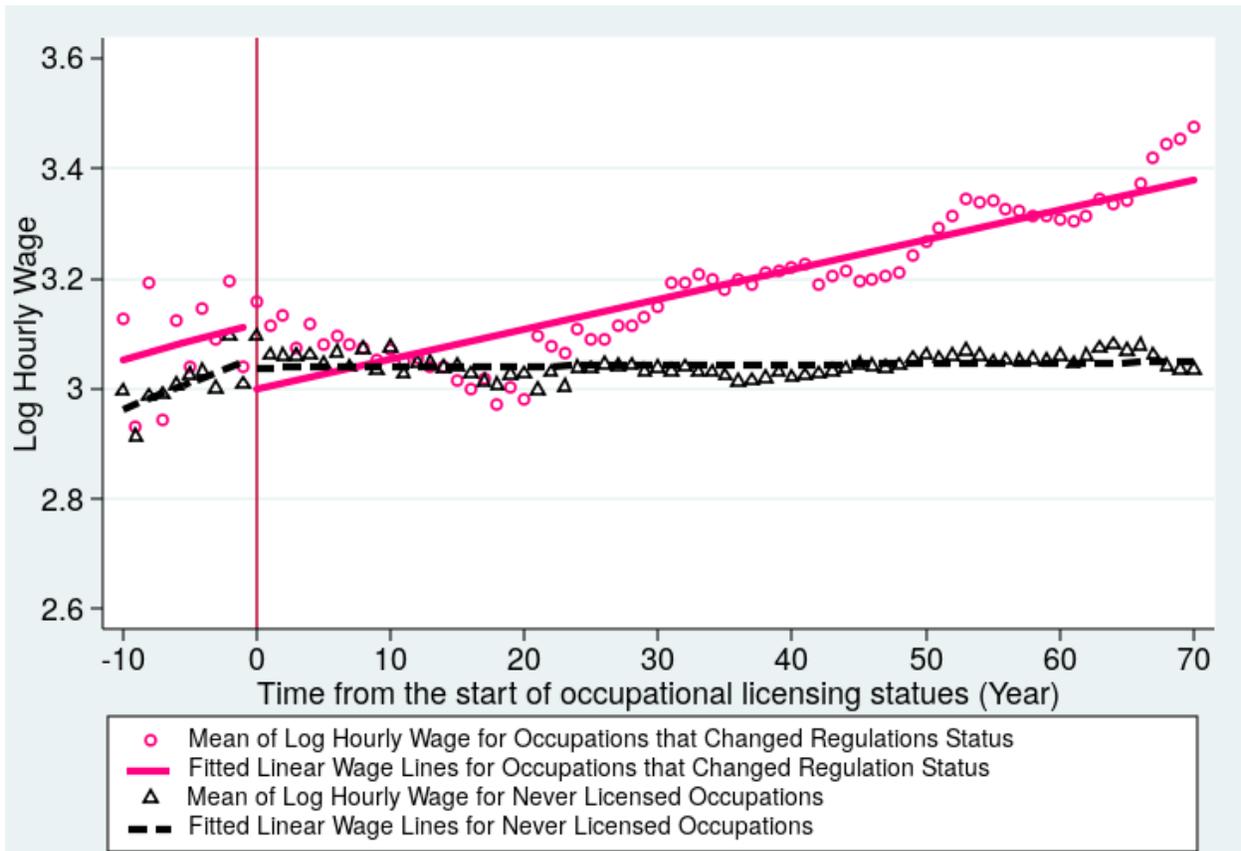
Note: Slopes of the lines are statistically different after the implementation of a licensing statute. We plot the wage lines before and after the licensing legislation for (a) occupations that changed licensing status and (b) occupations that were never licensed. For (a), we fit two linear wage lines, before and after licensing legislation, over the mean log hourly wages across duration of our 8 occupations that changed licensing status. For (b), we again fit over mean log hourly wages across duration as before, but now we consider the wages over duration of never licensed workers with respect to various years of licensure per state for occupations in (a). Specifically, for each occupation in (a), we map the state and year of first licensure information onto the never licensed workers and calculate occupational licensing durations for each wage observation. Next, we take these 8 matched copies of never licensed worker observations with different duration bases and calculate the mean of log hourly wages grouped by duration. Finally, we fit the expanded data for never licensed workers into two linear lines for the before and after licensing legislation.

Figure 4. Estimated Licensing Effects on Log Hourly Wage before, during, and after Licensing Statutes

A. Relative to Individuals in Occupations That Are Unlicensed Throughout Our Period of Analysis
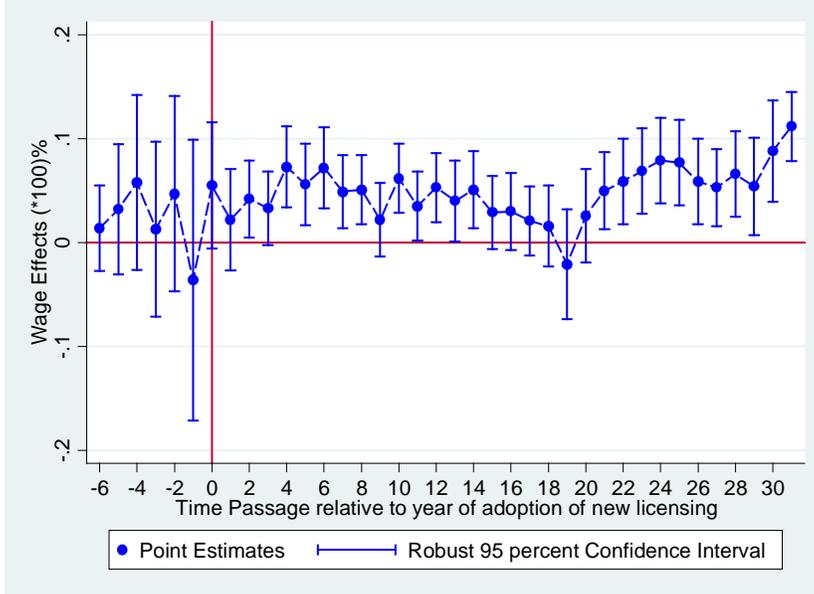
Note: Vertical bands represent ± 1.96 times the standard error of each point estimate.

B. Relative to Individuals in Universally Licensed Occupations Prior to States Passing Licensing Statutes
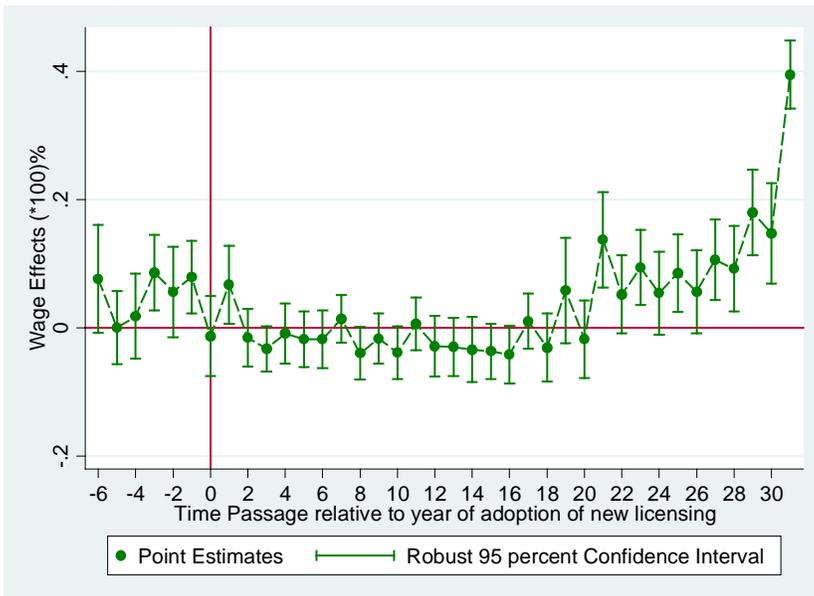
Note: Vertical bands represent ± 1.96 times the standard error of each point estimate.

Figure 5. Estimated Licensing Effects on Annual Hours Worked before, during, and after Licensing Legislation

A. Relative to Individuals in Occupations That Are Unlicensed Throughout Our Period of Analysis
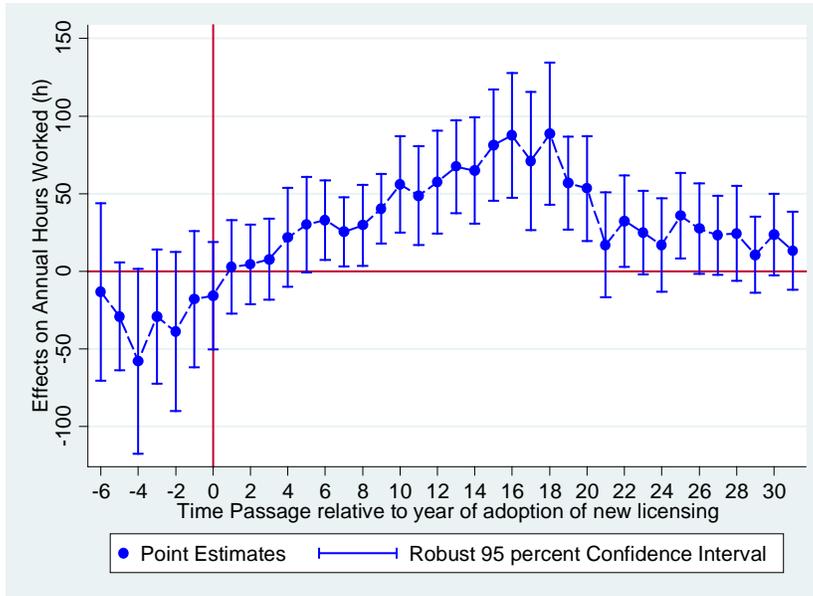
Note: Vertical bands represent ± 1.96 times the standard error of each point estimate.

B. Relative to Individuals in Universally Licensed Occupations Prior to States Passing Licensing Statutes
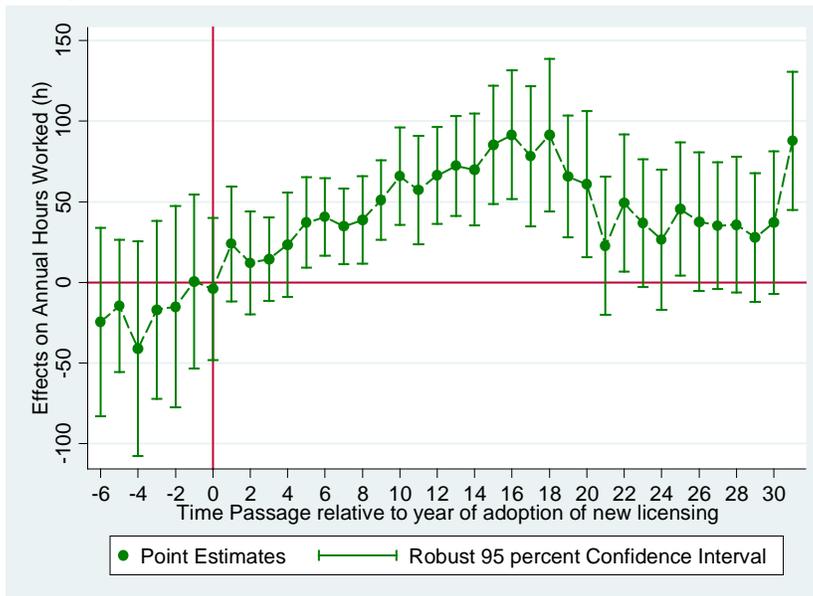
Note: Vertical bands represent ± 1.96 times the standard error of each point estimate.

Figure 6. Heterogeneity of the Influence of Licensing and Licensing Duration on Hourly Wage Determination

A. Licensing Effects on Hourly Wage
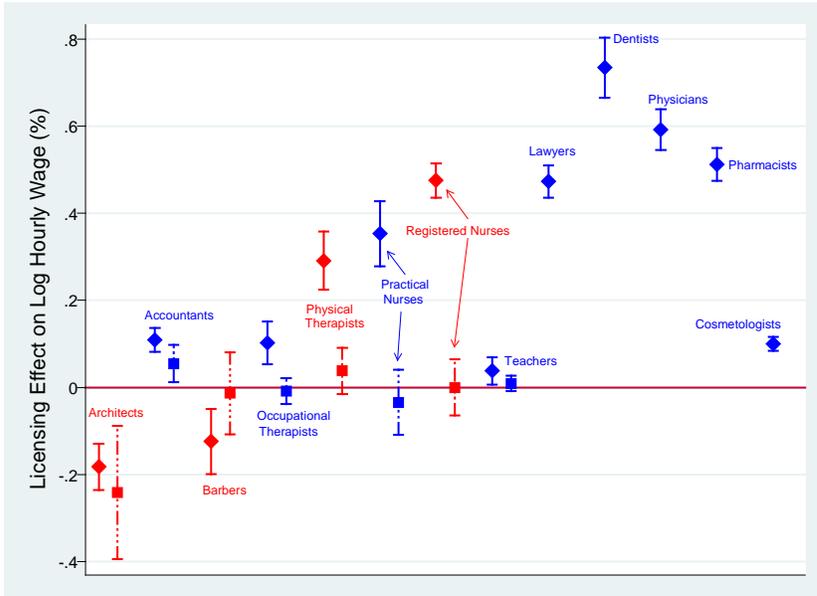
Note: Point estimate ♦ represents the licensing effect relative to hourly wage of individuals in occupations that are unlicensed throughout our period of analysis. Point estimate ■ represents the licensing effect relative to hourly wage of individuals in the same occupation prior to states passing licensing statutes.

B. Duration Effects on Hourly Wage
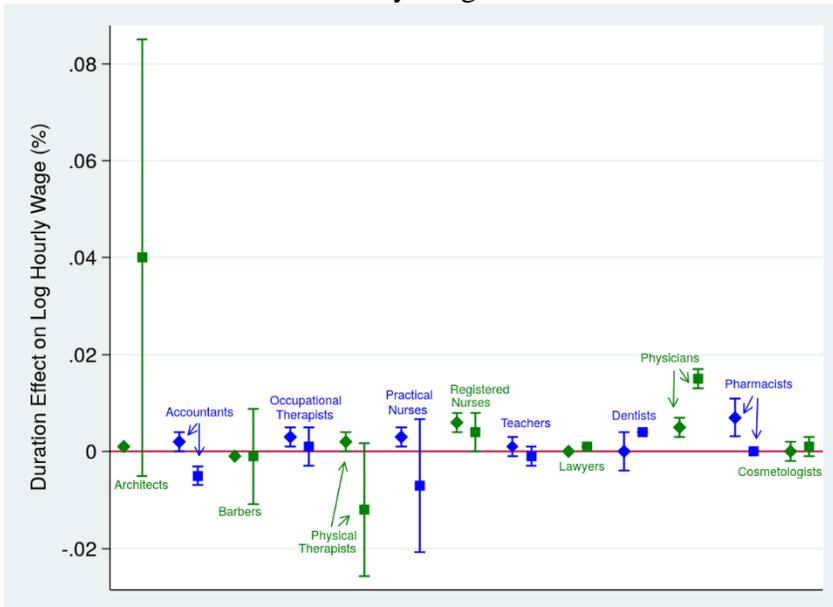
Note: Point estimate ♦ represents the licensing effect relative to hourly wage of individuals in occupations that are unlicensed throughout our period of analysis. Point estimate ■ represents the licensing effect relative to hourly wage of individuals in the same occupation prior to states passing licensing statutes.

Figure 7. Heterogeneity of the Influence of Licensing and Licensing Duration on Hours Worked per Year

A. Licensing Effects on Hours Worked per Year
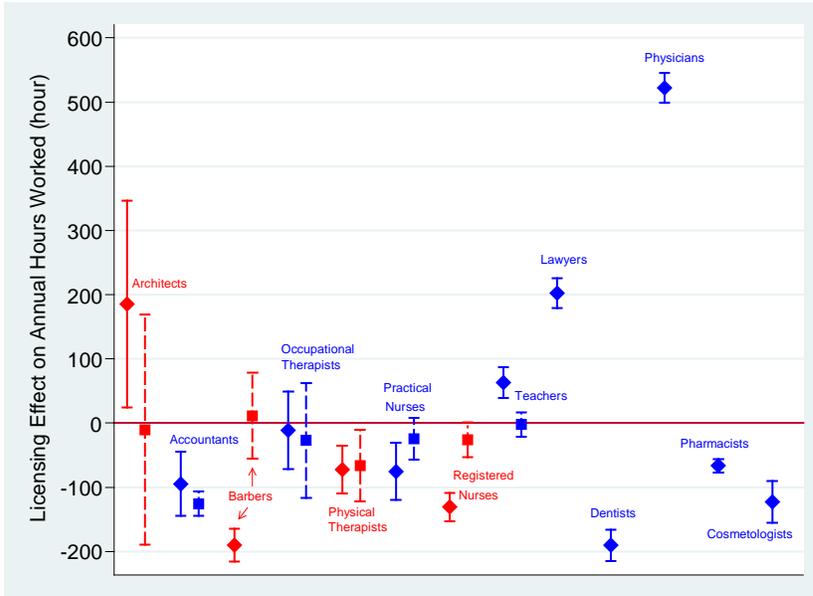
Note: Point estimate ♦ represents the licensing effect relative to hourly wage of individuals in occupations that are unlicensed throughout our period of analysis. Point estimate ■ represents the licensing effect relative to hourly wage of individuals in the same occupation prior to states passing licensing statutes.

B. Licensing Effects on Hours Worked per Year
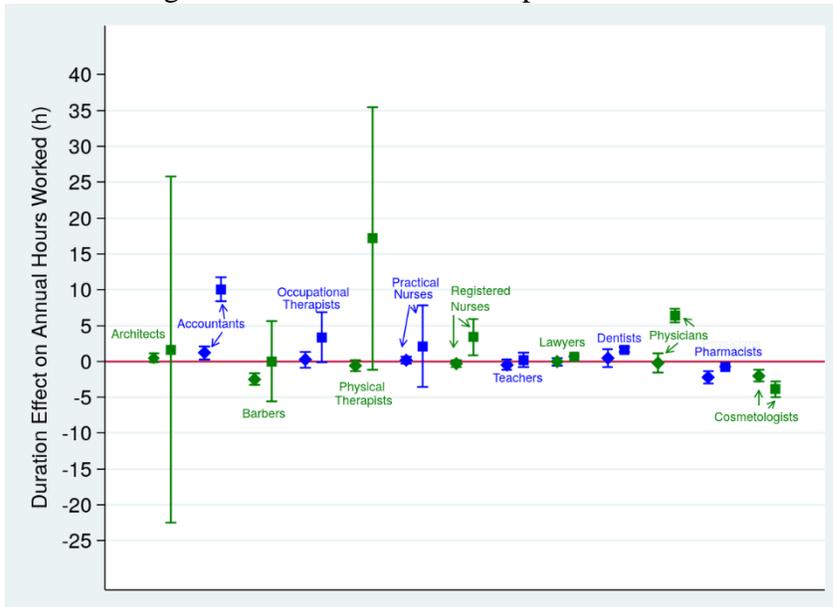
Note: Point estimate ♦ represents the licensing effect relative to hourly wage of individuals in occupations that are unlicensed throughout our period of analysis. Point estimate ■ represents the licensing effect relative to hourly wage of individuals in the same occupation prior to states passing licensing statutes.

Table 1. Control and Treatment Groups: Composition of Occupations

	Treatment Group	Control Group
Sample Construction I	Workers in the 13 universally licensed occupations between 1940 and 2015: architects, accountants, barbers, cosmetologists, dentists, occupational therapists, physical therapists, practical nurses, registered nurses, pharmacists, physicians, lawyers, and teachers	Workers in occupations that were never licensed during the period 1940-2015
Sample Construction II	Licensed workers in the 13 universally licensed occupations between 1940 and 2015: architects, accountants, barbers, cosmetologists, dentists, occupational therapists, physical therapists, practical nurses, registered nurses, pharmacists, physicians, lawyers, and teachers	Unlicensed workers in the same occupations as the treatment group: architects, accountants, barbers, cosmetologists, dentists, occupational therapists, physical therapists, practical nurses, registered nurses, pharmacists, physicians, lawyers, and teachers prior to their becoming licensed
Sample Construction III[1]	Workers in occupations licensed by the states between 1940 and 2015: architects, accountants, barbers, occupational therapists, physical therapists, practical nurses, registered nurses, and teachers	Workers in occupations that were never licensed during the period 1940-2015
Sample Construction IV[2]	Licensed workers in occupations that were licensed between 1940 and 2015: architects, accountants, barbers, occupational therapists, physical therapists, practical nurses, registered nurses, and teachers	Unlicensed workers in the same occupations as the treatment group: architects, accountants, barbers, occupational therapists, physical therapists, practical nurses, registered nurses, and teachers prior to their becoming licensed

Note: 1. Sample construction III drops the universally licensed occupations that did not change regulation status throughout our period of analysis and compares individuals in the 8 universally licensed occupations that changed regulation status with individuals in never licensed occupations.
2. Sample construction IV drops the universally licensed occupations that did not change regulation status throughout our period of analysis and compares individuals in the 8 universally licensed occupations that changed regulation status with individuals in the 8 universally licensed occupations prior to states passing licensing statutes.

Table 2. Means and Standard Deviation of Licensed and Unlicensed Occupations: By Regulation Status

VARIABLES	13 Universally Licensed Occupations		Occupations That Are Unlicensed Throughout Our Period of Analysis
	Licensed Workers	Unlicensed Workers Prior to States Passing Licensing Statutes	
White	0.808	0.891	0.794
	(0.394)	(0.311)	(0.405)
Male	0.337	0.374	0.532
	(0.473)	(0.484)	(0.499)
Potential Experience	20.263	17.266	22.327
	(11.085)	(10.961)	(11.458)
Years of Education	16.022	15.896	13.450
	(1.979)	(2.127)	(2.359)
Marital Status:			
Married	0.639	0.643	0.589
	(0.480)	(0.479)	(0.492)
Married Absent	0.016	0.019	0.020
	(0.126)	(0.137)	(0.142)
Widowed/Divorced/Separated	0.148	0.113	0.165
	(0.355)	(0.316)	(0.372)
Single/Never Married	0.196	0.225	0.225
	(0.397)	(0.418)	(0.418)
Licensure	1.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Duration	64.448	0.000	0.000
	(37.504)	(0.000)	(0.000)
Hourly Wage (2014 CPI)	35.977	22.356	25.792
	(31.744)	(11.157)	(22.683)
Weeks per Year	51.248	51.231	51.325
	(0.828)	(1.135)	(0.814)
Hours per Week	43.660	42.538	42.977
	(8.967)	(7.169)	(7.681)
Hours per Year	2237.563	2179.171	2206.053
	(461.322)	(369.992)	(397.182)
Observations	1,935,552	61,490	9,243,914
Weighted Observations	150,095,251	2,429,584	687,525,536

Note: The 13 universally licensed occupations include architects, accountants, barbers, cosmetologists, dentists, occupational therapists, physical therapists, practical nurses, physicians, pharmacists, registered nurses, lawyers, and teachers. We manually determine whether each occupation was ever licensed by verifying licensing status through the variable occ1990. For the 1940 census data which lacks the occ1990 variable, we made a crosswalk between occ1990 and occ1950. Data are weighted using population weights.

Table 3. Means and Standard Deviation of Licensed and Unlicensed Occupations: By Regulations Status for Those Whose Licensing Status Changed

VARIABLES	13 Universally Licensed Occupations			Occupations That Are Unlicensed Throughout Our Period of Analysis
	Occupations that Did Not Change Their Regulations Status	Occupations that Changed Their Regulation Status		
	Licensed Workers	Licensed Workers	Unlicensed Workers Prior to States Passing Licensing Statutes	
White	0.815	0.806	0.891	0.794
	(0.388)	(0.396)	(0.311)	(0.405)
Male	0.594	0.269	0.374	0.532
	(0.491)	(0.443)	(0.484)	(0.499)
Potential Experience	19.810	20.384	17.266	22.327
	(10.609)	(11.205)	(10.961)	(11.458)
Years of Education	17.078	15.741	15.896	13.450
	(2.011)	(1.874)	(2.127)	(2.359)
Marital Status:				
Married	0.700	0.624	0.643	0.589
	(0.459)	(0.484)	(0.479)	(0.492)
Married Absent	0.017	0.016	0.019	0.020
	(0.128)	(0.126)	(0.137)	(0.142)
Widowed/Divorced/Separated	0.107	0.159	0.113	0.165
	(0.309)	(0.366)	(0.316)	(0.372)
Single/Never Married	0.179	0.201	0.225	0.225
	(0.383)	(0.401)	(0.418)	(0.418)
Licensure	1.000	1.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Duration	111.389	51.992	0.000	0.000
	(26.823)	(29.138)	(0.000)	(0.000)
Hourly Wage	62.538	28.928	22.356	25.792
(2014 CPI)	(52.216)	(17.738)	(11.157)	(22.683)
Weeks per Year	51.220	51.256	51.231	51.325
	(0.873)	(0.815)	(1.135)	(0.814)
Hours per Week	48.498	42.375	42.538	42.977
	(12.273)	(7.342)	(7.169)	(7.681)
Hours per Year	2484.383	2172.065	2179.171	2206.053
	(631.288)	(378.260)	(369.992)	(397.182)
Observations	411,897	1,523,655	61,490	9,243,914
Weighted Observations	31,477,479	118,617,772	2,429,584	687,525,536

Note: Occupations that did not change their regulations status include cosmetologists, dentists, physicians, pharmacists, and lawyers. Occupations that changed their regulation status include architects, accountants, barbers, occupational therapists, physical therapists, practical nurses, registered nurses, and teachers. We manually determine whether each occupation was ever licensed by verifying licensing status through the variable occ1990. For the 1940 census data which lacks the occ1990 variable, we made a crosswalk between occ1990 and occ1950. Data are weighted using population weights.

Table 4. Effects of Licensing Duration on Log Hourly Earnings
Panel A. 13 Universally Licensed Occupations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Control Group:	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis						Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes		
Licensure	0.082***	0.075***					0.205***		
	(0.019)	(0.020)					(0.015)		
Duration			0.002***	0.002***				0.005***	
			(0.000)	(0.000)				(0.000)	
Duration Dummies:									
Duration ∈ [0.3]					0.035***	0.031**			0.000
					(0.012)	(0.012)			(0.013)
Duration ∈ [4.10]					0.055***	0.049***			-0.012
					(0.014)	(0.014)			(0.015)
Duration ∈ [11.20]					0.036*	0.027			-0.009
					(0.021)	(0.022)			(0.020)
Duration ∈ [21.30]					0.070***	0.062***			0.114***
					(0.023)	(0.024)			(0.031)
Duration ∈ [31.40]					0.093***	0.086***			0.252***
					(0.023)	(0.024)			(0.035)
Duration ∈ [41.50]					0.094***	0.087***			0.306***
					(0.023)	(0.023)			(0.032)
Duration ∈ [51.100]					0.150***	0.143***			0.362***
					(0.025)	(0.026)			(0.031)
Duration > 100					0.209***	0.201***			0.647***
					(0.028)	(0.029)			(0.038)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	YES	NO	YES	NO	YES	NO	NO	NO	NO
3-digit SOC 2000	NO	YES	NO	YES	NO	YES	NO	NO	NO
H₀: All Duration Dummies=0					0.000	0.000			0.000
R-squared	0.423	0.449	0.424	0.449	0.424	0.449	0.304	0.376	0.381
Observations	11,240,956	11,240,956	11,240,956	11,240,956	11,240,956	11,240,956	1,997,042	1,997,042	1,997,042

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

B. Occupations that Changed Their Regulation Status over the Period of Our Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Control Group:	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis						Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes		
Licensure	0.091***	0.084***					0.147***		
	(0.019)	(0.020)					(0.020)		
Duration			0.002***	0.002***				0.004***	
			(0.000)	(0.000)				(0.000)	
Duration Dummies:									
Duration ∈ [0.3]					0.039***	0.036***			0.008
					(0.013)	(0.012)			(0.012)
Duration ∈ [4.10]					0.062***	0.056***			0.004
					(0.014)	(0.014)			(0.016)
Duration ∈ [11.20]					0.045**	0.035			0.016
					(0.021)	(0.022)			(0.019)
Duration ∈ [21.30]					0.077***	0.069***			0.123***
					(0.023)	(0.024)			(0.030)
Duration ∈ [31.40]					0.101***	0.094***			0.257***
					(0.023)	(0.024)			(0.034)
Duration ∈ [41.50]					0.104***	0.096***			0.321***
					(0.023)	(0.023)			(0.030)
Duration ∈ [51.100]					0.159***	0.152***			0.378***
					(0.025)	(0.026)			(0.030)
Duration > 100					0.203***	0.195***			0.415***
					(0.028)	(0.028)			(0.042)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	YES	NO	YES	NO	YES	NO	NO	NO	NO
3-digit SOC 2000	NO	YES	NO	YES	NO	YES	NO	NO	NO
H0: All Duration Dummies=0					0.000	0.000			0.000
R-squared	0.392	0.421	0.392	0.421	0.392	0.421	0.218	0.254	0.272
Observations	10,829,059	10,829,059	10,829,059	10,829,059	10,829,059	10,829,059	1,585,145	1,585,145	1,585,145

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Table 5. Effects of Licensing Duration on Total Worked Hours per Year
Panel A. 13 Universally Licensed Occupations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Control Group:	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis						Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes		
Licensure	31.225**	36.389**					73.040***		
	(15.066)	(14.369)					(16.359)		
Duration			-0.247	-0.214				1.880***	
			(0.198)	(0.201)				(0.233)	
Duration ∈ [0.3]					8.108	12.633			30.027***
					(8.859)	(8.797)			(9.476)
Duration ∈ [4.10]					39.051***	44.124***			58.978***
					(11.842)	(11.562)			(10.511)
Duration ∈ [11.20]					72.913***	77.685***			89.840***
					(19.383)	(18.848)			(16.825)
Duration ∈ [21.30]					28.455*	32.874**			53.395***
					(16.504)	(15.833)			(17.299)
Duration ∈ [31.40]					23.356	29.059*			40.984**
					(16.427)	(15.748)			(17.586)
Duration ∈ [41.50]					20.871	26.411			33.789**
					(16.989)	(16.238)			(17.093)
Duration ∈ [51.100]					9.768	15.631			66.885***
					(18.841)	(18.161)			(17.080)
Duration > 100					20.635	26.742			259.353***
					(20.769)	(19.969)			(30.508)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	YES	NO	YES	NO	YES	NO	NO	NO	NO
3-digit SOC 2000	NO	YES	NO	YES	NO	YES	NO	NO	NO
H_0: All Duration Dummies=0					0.006	0.005			0.000
R-squared	0.139	0.154	0.139	0.154	0.140	0.154	0.104	0.122	0.130
Observations	11,240,956	11,240,956	11,240,956	11,240,956	11,240,956	11,240,956	1,997,042	1,997,042	1,997,042

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Panel B. Occupations that Changed Regulation Status over the Period of Our Analysis

Control Group:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis						Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes		
Licensure	31.218**	36.494**					13.870		
	(14.915)	(14.198)					(11.653)		
Duration			-0.189	-0.148				0.379**	
			(0.250)	(0.257)				(0.147)	
Duration ∈ [0.3]					8.464	13.072			13.471*
					(8.839)	(8.780)			(7.780)
Duration ∈ [4.10]					39.316***	44.484***			33.383***
					(11.751)	(11.464)			(7.903)
Duration ∈ [11.20]					72.445***	77.302***			52.087***
					(19.244)	(18.693)			(13.245)
Duration ∈ [21.30]					28.330*	32.792**			10.092
					(16.349)	(15.659)			(13.598)
Duration ∈ [31.40]					23.062	28.880*			-12.515
					(16.278)	(15.578)			(14.682)
Duration ∈ [41.50]					21.072	26.733*			-24.330
					(16.853)	(16.073)			(14.792)
Duration ∈ [51.100]					10.562	16.469			0.698
					(18.580)	(17.851)			(14.056)
Duration > 100					37.004*	42.909**			64.980***
					(19.477)	(18.417)			(16.501)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	YES	NO	YES	NO	YES	NO	NO	NO	NO
3-digit SOC 2000	NO	YES	NO	YES	NO	YES	NO	NO	NO
H_0: All Duration Dummies=0					0.000	0.000			0.000
R-squared	0.116	0.132	0.116	0.132	0.116	0.132	0.053	0.054	0.057
Observations	10,829,059	10,829,059	10,829,059	10,829,059	10,829,059	10,829,059	1,585,145	1,585,145	1,585,145

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Table 6. Descriptive Statistics for Grandfathered Workers

VARIABLES	13 Universally Licensed Occupations			Occupations That Are Unlicensed Throughout Our Period of Analysis
	Grandfathered Workers	New Entrants	Unlicensed Workers Prior to States Passing Licensing Statutes	
White	0.831	0.805	0.891	0.794
	(0.375)	(0.396)	(0.311)	(0.405)
Male	0.255	0.348	0.374	0.532
	(0.436)	(0.476)	(0.484)	(0.499)
Pot. Experience	27.424	19.350	17.266	22.327
	(9.467)	(10.943)	(10.961)	(11.458)
Education	15.920	16.034	15.896	13.450
	(2.049)	(1.970)	(2.127)	(2.359)
Marital Status:				
Married	0.675	0.635	0.643	0.589
	(0.468)	(0.481)	(0.479)	(0.492)
Married Absent	0.015	0.016	0.019	0.020
	(0.120)	(0.127)	(0.137)	(0.142)
Widowed/Divorced/Separated	0.203	0.141	0.113	0.165
	(0.402)	(0.348)	(0.316)	(0.372)
Single/Never Married	0.107	0.208	0.225	0.225
	(0.309)	(0.406)	(0.418)	(0.418)
Licensure	1.000	1.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Duration	15.618	70.673	0.000	0.000
	(10.016)	(35.077)	(0.000)	(0.000)
Hourly Wage (2014 CPI)	25.257	37.343	22.356	25.792
	(12.011)	(33.184)	(11.157)	(22.683)
Weeks per Year	51.270	51.245	51.231	51.325
	(0.905)	(0.817)	(1.135)	(0.814)
Hours per Week	43.206	43.717	42.538	42.977
	(7.743)	(9.109)	(7.169)	(7.681)
Hours per Year	2215.182	2240.417	2179.171	2206.053
	(398.917)	(468.603)	(369.992)	(397.182)
Observations	249,759	1,685,793	61,490	9,243,914
Weighted Observations	16,970,178	133,125,073	2,429,584	687,525,536

Note: The 13 universally licensed occupations include architects, accountants, barbers, cosmetologists, dentists, occupational therapists, physical therapists, practical nurses, physicians, pharmacists, registered nurses, lawyers, and teachers. We manually determine whether each occupation was ever licensed by verifying licensing status through the variable occ1990. For the 1940 census data which lacks the occ1990 variable, we made a crosswalk between occ1990 and occ1950. Data are weighted using population weights.

Table 7. Estimates of the Influence of Grandfathering on Hourly Wage

A. 13 Universally Licensed Occupations

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis						Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes		
Licensure	0.045***	0.040**					0.035*		
	(0.016)	(0.016)					(0.018)		
Duration			0.003***	0.003***				0.006***	
			(0.001)	(0.001)				(0.002)	
Duration ∈ [0.3]					0.028***	0.025**			0.024
					(0.010)	(0.010)			(0.014)
Duration ∈ [4.10]					0.038***	0.034***			0.052**
					(0.012)	(0.012)			(0.021)
Duration ∈ [11.20]					0.006	0.001			0.064**
					(0.022)	(0.022)			(0.030)
Duration ∈ [21.30]					0.057**	0.053**			0.117**
					(0.022)	(0.022)			(0.050)
Duration ∈ [31.40]					0.176***	0.169***			0.240***
					(0.028)	(0.029)			(0.074)
Duration ∈ [41.50]					0.333***	0.313***			0.382***
					(0.019)	(0.019)			(0.072)
Duration ∈ [51.100]					0.207***	0.156***			0.085
					(0.023)	(0.022)			(0.055)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	YES	NO	YES	NO	YES	NO	NO	NO	NO
3-digit SOC 2000	NO	YES	NO	YES	NO	YES	NO	NO	NO
H_0: All Duration Dummies=0					0.000	0.000			0.000
R-squared	0.388	0.420	0.388	0.420	0.388	0.420	0.290	0.297	0.298
Observations	9,555,163	9,555,163	9,555,163	9,555,163	9,555,163	9,555,163	311,249	311,249	311,249

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

B. Occupations that Changed Their Regulation Status over the Period of Our Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Control Group:	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis						Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes		
Licensure	0.044**	0.038**					0.034*		
	(0.016)	(0.016)					(0.018)		
Duration			0.003***	0.003***				0.007***	
			(0.001)	(0.001)				(0.002)	
Categorical Dummies:									
Duration ∈ [0.3]					0.028***	0.024**			0.025
					(0.010)	(0.010)			(0.015)
Duration ∈ [4.10]					0.038***	0.033**			0.054**
					(0.012)	(0.013)			(0.021)
Duration ∈ [11.20]					0.006	0.000			0.066**
					(0.022)	(0.022)			(0.031)
Duration ∈ [21.30]					0.057**	0.052**			0.120**
					(0.022)	(0.023)			(0.051)
Duration ∈ [31.40]					0.177***	0.168***			0.243***
					(0.029)	(0.030)			(0.075)
Duration ∈ [41.50]					0.341***	0.318***			0.396***
					(0.019)	(0.020)			(0.074)
Duration ∈ [51.100]					0.207***	0.155***			0.085
					(0.023)	(0.022)			(0.056)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	YES	NO	YES	NO	YES	NO	NO	NO	NO
3-digit SOC 2000	NO	YES	NO	YES	NO	YES	NO	NO	NO
H_0: All Duration Dummies=0					0.000	0.000			0.000
R-squared	0.388	0.420	0.388	0.420	0.388	0.420	0.289	0.297	0.298
Observations	9,554,427	9,554,427	9,554,427	9,554,427	9,554,427	9,554,427	310,513	310,513	310,513

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Table 8. Estimates of the Influence of Grandfathering on Hours Worked per Year

Panel A. 13 Universally Licensed Occupations

Control Group:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis						Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes		
Licensure	39.569***	45.494***					15.012**		
	(13.595)	(13.281)					(6.945)		
Duration			0.769	0.922				-0.520	
			(0.729)	(0.737)				(0.547)	
Duration ∈ [0.3]					7.899	11.596*			12.127*
					(6.375)	(6.687)			(6.525)
Duration ∈ [4.10]					32.591***	38.185***			12.941*
					(10.255)	(10.258)			(7.633)
Duration ∈ [11.20]					65.997***	72.299***			16.012*
					(20.703)	(20.451)			(9.471)
Duration ∈ [21.30]					28.888	35.218*			16.098
					(20.403)	(19.980)			(13.682)
Duration ∈ [31.40]					20.316	27.403*			-12.015
					(16.190)	(15.738)			(16.765)
Duration ∈ [41.50]					20.039	24.479			-37.597
					(17.504)	(17.266)			(22.425)
Duration ∈ [51.100]					-659.056***	-660.297***			-393.168***
					(26.953)	(28.005)			(33.549)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	YES	NO	YES	NO	YES	NO	NO	NO	NO
3-digit SOC 2000	NO	YES	NO	YES	NO	YES	NO	NO	NO
H_0: All Duration Dummies=0					0.000	0.000			0.000
R-squared	0.123	0.141	0.123	0.141	0.123	0.141	0.060	0.060	0.060
Observations	9,555,163	9,555,163	9,555,163	9,555,163	9,555,163	9,555,163	311,249	311,249	311,249

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Panel B. Occupations that Changed Regulation Status over the Period of Our Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Control Group:	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis						Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes		
Licensure	39.192***	46.499***					13.057*		
	(13.819)	(13.299)					(6.942)		
Duration			0.748	0.939				-0.614	
			(0.739)	(0.749)				(0.550)	
Duration ∈ [0.3]					7.471	12.364*			10.397
					(6.366)	(6.418)			(6.492)
Duration ∈ [4.10]					32.192***	38.990***			10.838
					(10.350)	(10.194)			(7.619)
Duration ∈ [11.20]					65.626***	73.239***			13.125
					(20.898)	(20.434)			(9.759)
Duration ∈ [21.30]					28.073	36.034*			11.892
					(20.769)	(20.220)			(14.167)
Duration ∈ [31.40]					19.729	28.722*			-15.985
					(16.502)	(15.836)			(17.123)
Duration ∈ [41.50]					18.413	26.254			-43.612*
					(18.374)	(18.113)			(22.535)
Duration ∈ [51.100]					-659.684***	-659.374***			-393.089***
					(27.116)	(28.442)			(32.945)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	YES	NO	YES	NO	YES	NO	NO	NO	NO
3-digit SOC 2000	NO	YES	NO	YES	NO	YES	NO	NO	NO
H_0: All Duration Dummies=0					0.000	0.000			0.000
R-squared	0.123	0.141	0.123	0.141	0.123	0.141	0.060	0.060	0.060
Observations	9,554,427	9,554,427	9,554,427	9,554,427	9,554,427	9,554,427	310,513	310,513	310,513

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Table 9. Oaxaca Decomposition Analysis of New Entrants Relative to Grandfathered Workers

	(1)	(2)	(3)	(4)
Sample:	The Census 1940-2000 and the ACS 2001-2015		The ACS 2001-2015	
Labor Market Outcome:	Hourly Wage	Hour Worked Per Year	Hourly Wage	Hour Worked Per Year
New Entrants	3.3836***	2,243.3029***	3.4192***	2,232.2318***
	(0.000)	(0.141)	(0.001)	(0.452)
Grandfathered	3.1326***	2,201.1252***	3.1506***	2,223.9153***
	(0.000)	(0.205)	(0.001)	(1.118)
Difference	0.2509***	42.1777***	0.2685***	8.3165***
	(0.001)	(0.249)	(0.001)	(1.206)
Explained	0.2511***	137.4357***	0.2841***	105.2721***
	(0.001)	(0.262)	(0.001)	(1.196)
Unexplained	-0.0001	-95.2580***	-0.0156***	-96.9556***
	(0.000)	(0.122)	(0.002)	(1.568)
Observations	1,935,610	1,935,610	1,175,854	1,175,854

Note: Columns (1) and (2) use all sample from 1940-2015, and columns (3) and (4) use the ACS from 2001 to 2005 in order to provide analysis of individuals in occupations that states recently enacted licensing statutes. Differences between the wages/hours between grandfathered workers and new entrants can be explained by human capital characteristics and individual contributions such as gender, race (white vs. others), marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience, state, year, and three-digit SOC.

Table 10. Effects of Licensing Duration on Labor Market Participation
Panel A. 13 Universally Licensed Occupations

	(1)
Duration ∈ [1.4]	-0.013***
	(0.003)
Duration ∈ [5.8]	-0.014***
	(0.003)
Duration ∈ [9.12]	-0.011***
	(0.003)
Duration ∈ [13.16]	-0.008***
	(0.002)
Duration ∈ [17.20]	-0.010***
	(0.003)
Duration ∈ [21.24]	-0.004**
	(0.002)
Duration ∈ [25.28]	-0.004***
	(0.001)
Duration ∈ [29.32]	-0.002
	(0.002)
Duration ∈ [33.36]	0.001
	(0.001)
Duration ∈ [37.40]	-0.000
	(0.001)
Duration ∈ [41.44]	0.001
	(0.001)
Duration ∈ [45.48]	0.004***
	(0.001)
Duration ∈ [49.52]	0.003*
	(0.002)
Duration ∈ [53.56]	0.004**
	(0.002)
Duration ∈ [57.60]	0.006***
	(0.002)
Duration ∈ [61.64]	0.004***
	(0.002)
Individual Covariates	YES
Per Capita Income by State	YES
State FE	YES
Year FE	YES
R-squared	0.938
Observations	32,961,456

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Panel B. Occupations that Changed Regulation Status over the Period of Our Analysis

|	(1)
Duration ∈ [1.4]	-0.016***
	(0.004)
Duration ∈ [5.8]	-0.016***
	(0.003)
Duration ∈ [9.12]	-0.014***
	(0.003)
Duration ∈ [13.16]	-0.010***
	(0.003)
Duration ∈ [17.20]	-0.012***
	(0.003)
Duration ∈ [21.24]	-0.006***
	(0.002)
Duration ∈ [25.28]	-0.006***
	(0.002)
Duration ∈ [29.32]	-0.004**
	(0.002)
Duration ∈ [33.36]	-0.001
	(0.002)
Duration ∈ [37.40]	-0.002
	(0.002)
Duration ∈ [41.44]	-0.001
	(0.002)
Duration ∈ [45.48]	0.002
	(0.002)
Duration ∈ [49.52]	0.001
	(0.002)
Duration ∈ [53.56]	0.003
	(0.002)
Duration ∈ [57.60]	0.004**
	(0.002)
Duration ∈ [61.64]	0.002
	(0.002)
Individual Covariates	YES
Per Capita Income by State	YES
State FE	YES
Year FE	YES
R-squared	0.924
Observations	32,961,456

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Appendix Figure 1. Potential Influence of the Grandfathering of New Regulations
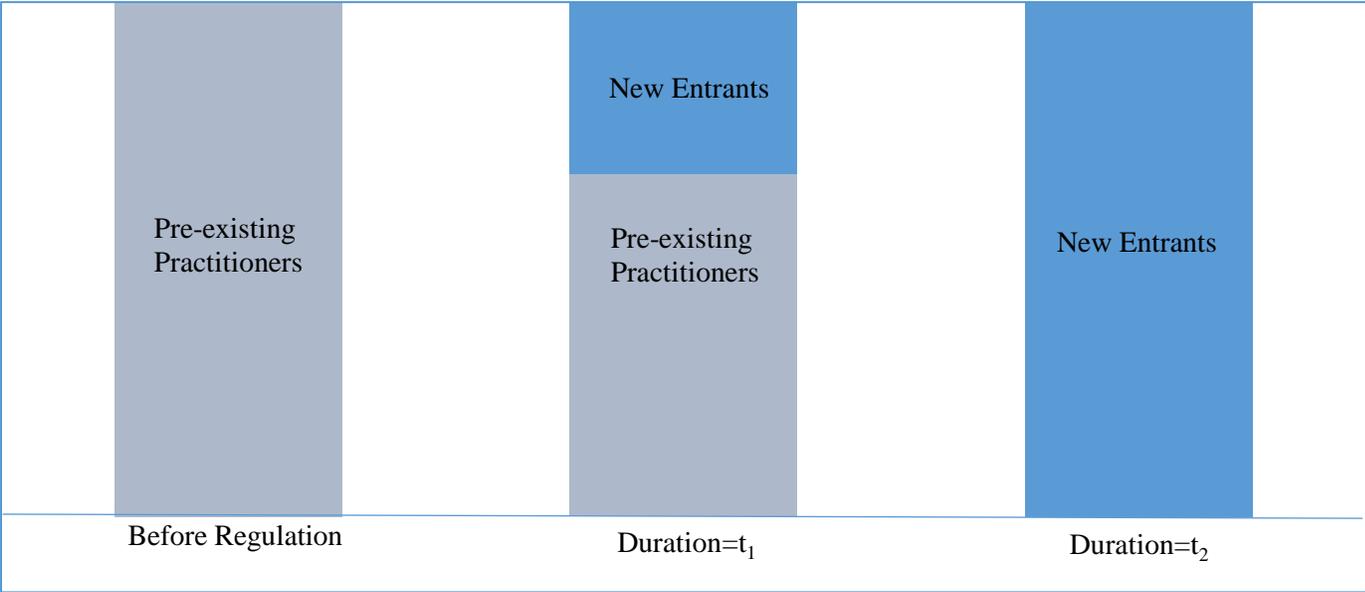
Appendix Figure 2. Estimated Licensing Effects on Log Hourly Wage before, during, and after Licensing Legislation: for Occupations that Changed Their Regulation Status

A. Relative to Individuals in Occupations That Are Unlicensed Throughout Our Period of Analysis
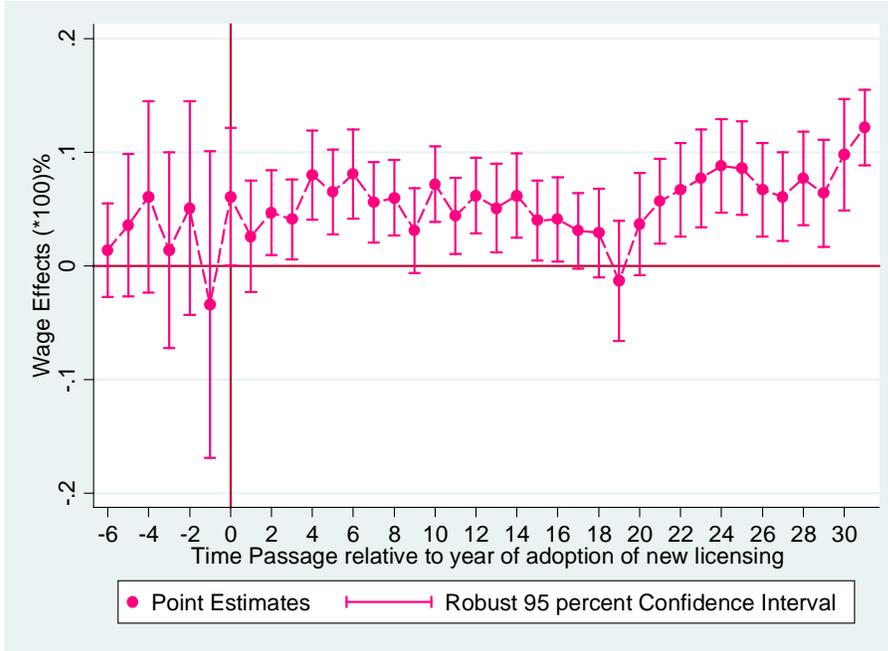
Note: Vertical bands represents ± 1.96 times the standard error of each point estimate.

B. Relative to Individuals in Universally Licensed Occupations Prior to States Passing Licensing Statutes
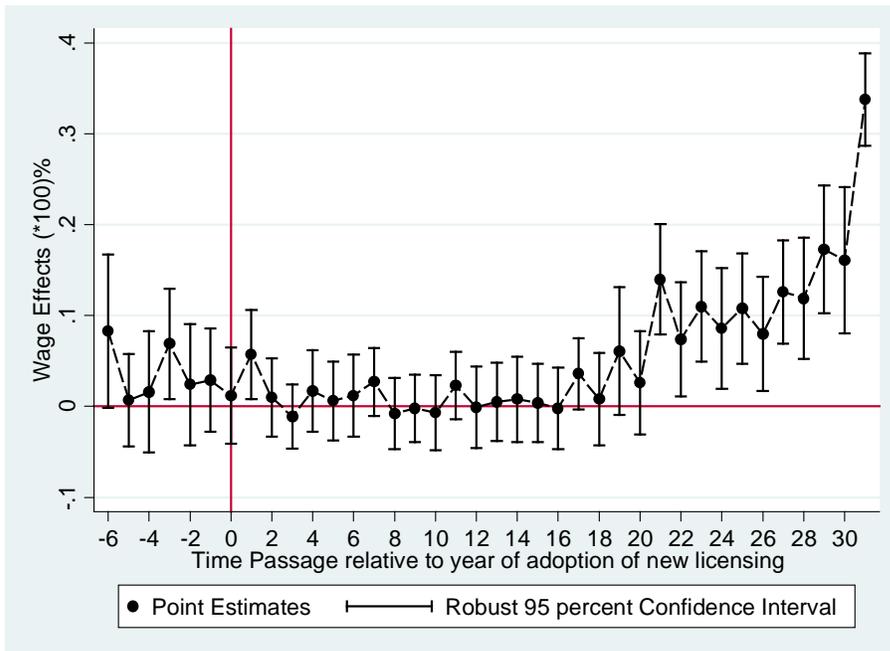
Note: Vertical bands represent ± 1.96 times the standard error of each point estimate.

Appendix Figure 3. Estimated Licensing Effects on Annual Hours Worked before, during, and after Licensing Legislation: for Occupations that Changed Their Regulation Status

A. Relative to Individuals in Occupations That Are Unlicensed Throughout Our Period of Analysis

Note: Vertical bands represent ± 1.96 times the standard error of each point estimate.

B. Relative to Individuals in Universally Licensed Occupations Prior to States Passing Licensing Statutes

Note: Vertical bands represent ± 1.96 times the standard error of each point estimate.

Appendix Table 1: Number of Observations by year and Occupations with Regulation Status

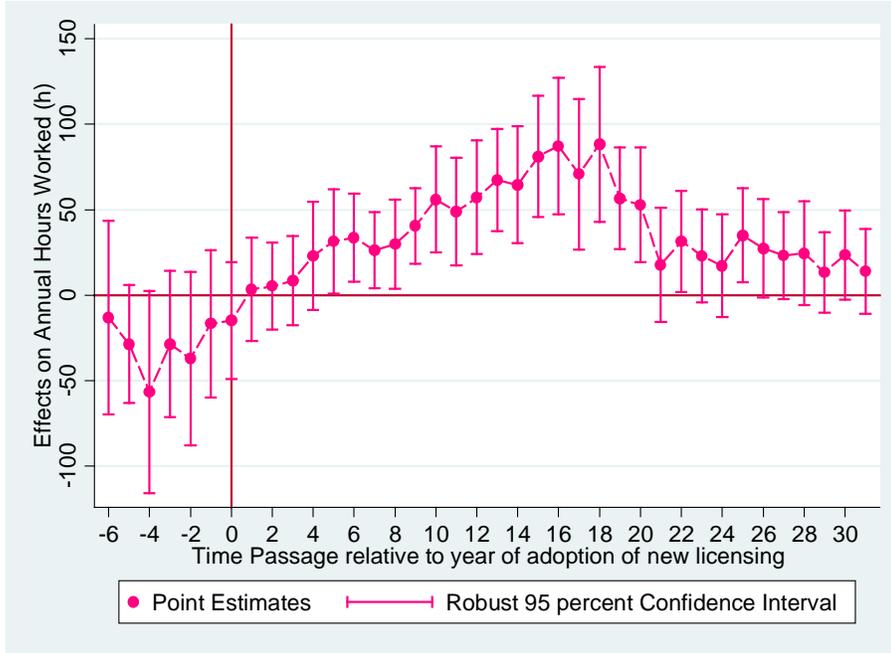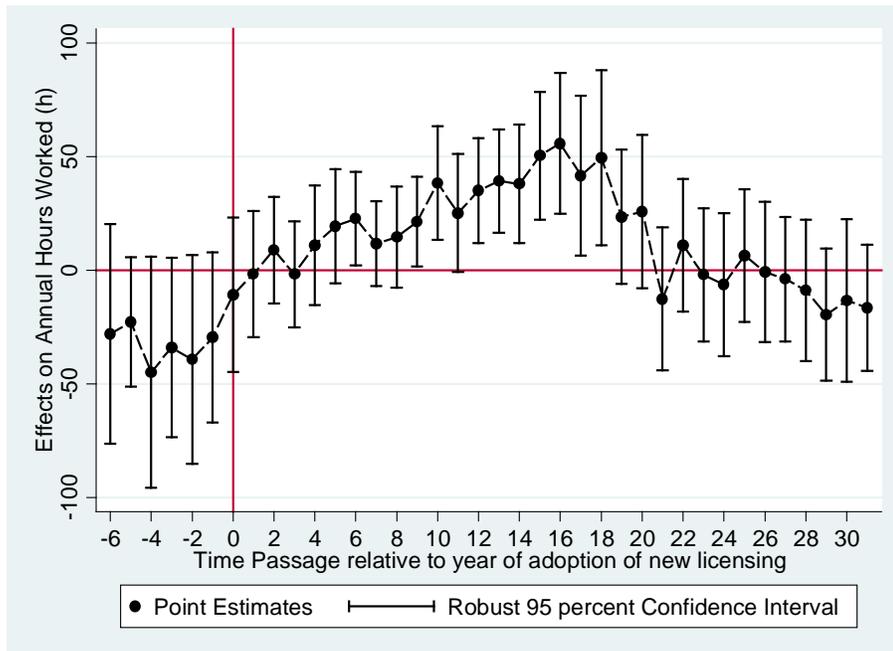|	13 Universally Licensed Occupations				Never Licensed Occupations	Total Observations
	Occupations that changed regulation status		Occupations that did not change regulation status			
Year	Unlicensed	Licensed	Unlicensed	Licensed		
1940	245,847	543,174	0	110,331	6,036,688	6,936,040
1950	147,717	128,720	0	42,459	3,382,879	3,701,775
1960	387,498	640,927	0	237,288	10,552,008	11,817,721
1970	409,050	1,149,550	0	362,150	14,281,550	16,202,300
1980	389,000	2,246,660	0	742,940	20,465,580	23,844,180
1990	406,432	3,745,187	0	1,229,389	28,861,852	34,242,860
2000	77,934	5,301,425	0	1,483,711	36,308,923	43,171,993
2001	90,029	5,371,093	0	1,508,659	37,471,570	44,441,351
2002	70,557	5,553,650	0	1,523,655	37,202,834	44,350,696
2003	89,518	5,872,651	0	1,602,930	36,910,947	44,476,046
2004	80,272	5,868,216	0	1,662,698	37,171,050	44,782,236
2005	12,200	6,116,520	0	1,742,930	37,426,947	45,298,597
2006	9,973	6,242,580	0	1,746,885	38,177,556	46,176,994
2007	3,931	6,519,520	0	1,805,055	38,545,224	46,873,730
2008	5,049	7,860,826	0	1,910,641	40,437,441	50,213,957
2009	2,273	7,841,977	0	1,927,770	38,491,924	48,263,944
2010	2,304	7,742,350	0	1,881,423	37,087,251	46,713,328
2011	0	7,780,422	0	1,927,001	36,558,896	46,266,319
2012	0	7,925,974	0	1,969,993	37,268,301	47,164,268
2013	0	7,903,366	0	2,008,417	37,718,347	47,630,130
2014	0	8,090,669	0	1,987,798	38,147,423	48,225,890
2015	0	8,172,315	0	2,063,356	39,020,345	49,256,016

Note: Occupations that changed their regulation status include architects, accountants, barbers, occupational therapists, physical therapists, practical nurses, registered nurses, and teachers. Occupations that did not change their regulations status include cosmetologists, dentists, physicians, pharmacists, and lawyers. We manually determine whether each occupation was ever licensed by verifying licensing status through the variable occ1990. For the 1940 census data which lacks the occ1990 variable, we made a crosswalk between occ1990 and occ1950. Data are weighted using population weights.

Appendix Table 2: Mean of Hourly Wage and Duration by year and Regulation Status for Those Whose Licensing Status Changed

	13 Universally Licensed Occupations					Never Licensed Occupations
	Occupations that did not change regulation status		Occupations that changed regulation status			
	Licensed		Licensed		Unlicensed	
Year	Wage	Duration	Wage	Duration	Wage	Wage
1940	20.427 (11.182)	51.678 (18.750)	12.411 (6.831)	31.481 (6.824)	13.597 (8.020)	11.969 (6.316)
1950	20.621 (11.622)	60.566 (18.637)	18.396 (7.741)	33.848 (16.447)	14.150 (5.644)	13.781 (6.489)
1960	30.573 (20.859)	61.686 (26.440)	23.242 (10.629)	34.568 (21.094)	19.886 (7.612)	20.120 (9.709)
1970	40.838 (29.280)	71.606 (26.015)	28.621 (13.087)	35.604 (24.406)	25.550 (10.029)	25.496 (14.325)
1980	42.468 (28.282)	84.557 (24.518)	25.594 (11.432)	36.404 (25.897)	22.237 (8.785)	23.984 (13.584)
1990	51.218 (42.007)	94.318 (25.258)	27.182 (14.225)	45.101 (27.026)	23.243 (10.820)	23.517 (16.906)
2000	61.778 (55.067)	105.818 (24.710)	28.104 (17.739)	48.188 (28.888)	29.389 (17.638)	26.354 (24.254)
2001	61.518 (55.313)	107.163 (24.441)	27.763 (16.270)	47.827 (29.011)	27.609 (11.961)	26.252 (24.026)
2002	63.730 (56.457)	107.159 (24.470)	28.836 (17.539)	48.725 (28.925)	29.030 (13.367)	26.152 (23.295)
2003	62.238 (51.703)	109.240 (24.447)	29.129 (17.103)	49.993 (29.155)	27.473 (12.130)	26.081 (22.188)
2004	56.837 (38.381)	109.718 (24.710)	29.591 (16.546)	50.809 (29.174)	29.417 (15.570)	26.233 (21.066)
2005	64.341 (53.449)	110.866 (24.609)	29.435 (17.796)	51.493 (29.491)	25.465 (10.429)	26.284 (23.806)
2006	64.199 (53.023)	111.873 (24.734)	29.437 (18.370)	52.728 (29.493)	22.875 (8.728)	25.911 (23.475)
2007	64.002 (54.241)	112.913 (25.074)	29.676 (19.231)	53.422 (29.538)	30.011 (9.214)	26.031 (24.094)
2008	66.522 (57.043)	113.860 (25.062)	29.783 (19.241)	51.786 (29.367)	31.987 (8.123)	26.358 (24.696)
2009	65.015 (53.568)	115.348 (25.013)	29.440 (18.098)	52.648 (29.139)	29.885 (7.520)	25.900 (23.366)
2010	65.454 (50.904)	116.077 (24.202)	29.952 (17.951)	53.155 (29.148)	41.967 (32.761)	26.262 (22.619)
2011	66.136 (51.411)	117.662 (24.392)	30.070 (18.354)	54.349 (29.119)	0.000 (0.000)	26.709 (23.085)
2012	64.853 (50.805)	118.534 (24.529)	29.282 (17.981)	55.571 (29.094)	0.000 (0.000)	26.241 (22.878)
2013	66.030 (54.038)	119.393 (24.772)	28.869 (18.168)	56.213 (28.983)	0.000 (0.000)	26.316 (23.941)
2014	66.187 (55.093)	120.204 (24.994)	28.566 (17.812)	56.349 (28.247)	0.000 (0.000)	26.599 (24.388)
2015	66.982 (56.665)	120.869 (24.973)	28.478 (18.474)	57.488 (28.259)	0.000 (0.000)	26.699 (25.126)

Note: Occupations that did not change their regulations status include cosmetologists, dentists, physicians, pharmacists, and lawyers. Occupations that changed their regulation status include architects, accountants, barbers, occupational therapists, physical therapists, practical nurses, registered nurses, and teachers. We manually determine whether each occupation was ever licensed by verifying licensing status through the variable occ1990. For the 1940 census data which lacks the occ1990 variable, we made a crosswalk between occ1990 and occ1950. Data are weighted using population weights.

Appendix Table 3: Number of Observations by year and Median Duration

Year	13 Universally Licensed Occupations			Never Licensed Occupations	Total Observations
	Unlicensed Workers	Licensed Workers			
		≤ Median Duration	> Median Duration		
1940	245,847	604,091	49,414	6,036,688	6,936,040
1950	147,717	141,814	29,365	3,382,879	3,701,775
1960	387,498	580,344	297,871	10,552,008	11,817,721
1970	409,050	836,900	674,800	14,281,550	16,202,300
1980	389,000	1,654,840	1,334,760	20,465,580	23,844,180
1990	406,432	2,582,478	2,392,098	28,861,852	34,242,860
2000	77,934	3,680,617	3,104,519	36,308,923	43,171,993
2001	90,029	3,811,879	3,067,873	37,471,570	44,441,351
2002	70,557	3,919,010	3,158,295	37,202,834	44,350,696
2003	89,518	4,087,000	3,388,581	36,910,947	44,476,046
2004	80,272	3,877,395	3,653,519	37,171,050	44,782,236
2005	12,200	4,044,346	3,815,104	37,426,947	45,298,597
2006	9,973	3,827,345	4,162,120	38,177,556	46,176,994
2007	3,931	4,019,217	4,305,358	38,545,224	46,873,730
2008	5,049	4,566,130	5,205,337	40,437,441	50,213,957
2009	2,273	4,394,329	5,375,418	38,491,924	48,263,944
2010	2,304	4,251,916	5,371,857	37,087,251	46,713,328
2011	0	4,255,877	5,451,546	36,558,896	46,266,319
2012	0	4,176,030	5,719,937	37,268,301	47,164,268
2013	0	4,177,551	5,734,232	37,718,347	47,630,130
2014	0	4,262,317	5,816,150	38,147,423	48,225,890
2015	0	4,284,865	5,950,806	39,020,345	49,256,016

Note: The 13 universally licensed occupations include architects, accountants, barbers, cosmetologists, dentists, occupational therapists, physical therapists, practical nurses, physicians, pharmacists, registered nurses, lawyers, and teachers. We manually determine whether each occupation was ever licensed by verifying licensing status through the variable occ1990. For the 1940 census data which lacks the occ1990 variable, we made a crosswalk between occ1990 and occ1950. Data are weighted using population weights.

Appendix Table 4. Means and Standard Deviation of Licensed and Unlicensed Occupations: By Median Duration

VARIABLES	13 Universally Licensed Occupations			Never Licensed Occupations
	Licensed Workers		Unlicensed Workers	
	< Median Duration	≥ Median Duration		
White	0.824	0.793	0.891	0.794
	(0.381)	(0.405)	(0.311)	(0.405)
Male	0.216	0.449	0.374	0.532
	(0.412)	(0.497)	(0.484)	(0.499)
Pot. Experience	20.348	20.185	17.266	22.327
	(11.089)	(11.081)	(10.961)	(11.458)
Education	15.717	16.303	15.896	13.450
	(1.940)	(1.974)	(2.127)	(2.359)
Marital Status: Married	0.629	0.649	0.643	0.589
	(0.483)	(0.477)	(0.479)	(0.492)
Married Absent	0.015	0.017	0.019	0.020
	(0.123)	(0.129)	(0.137)	(0.142)
Widowed/Divorced/Seperated	0.168	0.130	0.113	0.165
	(0.373)	(0.336)	(0.316)	(0.372)
Single/Never Married	0.188	0.204	0.225	0.225
	(0.391)	(0.403)	(0.418)	(0.418)
Licensure	1.000	1.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Duration	32.575	93.862	0.000	0.000
	(14.616)	(26.548)	(0.000)	(0.000)
Hourly Wage (2014 CPI)	26.132	45.062	22.356	25.792
	(13.135)	(40.080)	(11.157)	(22.683)
Weeks per Year	51.268	51.230	51.231	51.325
	(0.876)	(0.780)	(1.135)	(0.814)
Hours per Week	42.256	44.955	42.538	42.977
	(7.446)	(9.997)	(7.169)	(7.681)
Hours per Year	2166.376	2303.258	2179.171	2206.053
	(383.394)	(514.367)	(369.992)	(397.182)
Accountants	0.023	0.329	0.004	0.000
	(0.148)	(0.470)	(0.060)	(0.000)
Architects	0.002	0.028	0.0003	0.000
	(0.040)	(0.165)	(0.019)	(0.000)
Barbers	0.002	0.005	0.002	0.000
	(0.043)	(0.073)	(0.047)	(0.000)
Cosmetologists	0.006	0.051	0.000	0.000
	(0.075)	(0.219)	(0.000)	(0.000)
Lawyers	0.001	0.150	0.000	0.000
	(0.028)	(0.357)	(0.000)	(0.000)
Occupational Therapists	0.011	0.000	0.026	0.000
	(0.106)	(0.000)	(0.159)	(0.000)
Physical Therapists	0.023	0.006	0.0001	0.000
	(0.151)	(0.074)	(0.010)	(0.000)
Practical Nurses	0.060	0.011	0.012	0.000
	(0.237)	(0.106)	(0.110)	(0.000)
Registered Nurses	0.309	0.120	0.106	0.000
	(0.462)	(0.325)	(0.308)	(0.000)
Dentists	0.0001	0.020	0.000	0.000
	(0.011)	(0.139)	(0.000)	(0.000)
Physicians	0.0003	0.135	0.000	0.000
	(0.019)	(0.341)	(0.000)	(0.000)
Pharmacists	0.0005	0.041	0.000	0.000
	(0.022)	(0.199)	(0.000)	(0.000)
Teachers	0.563	0.104	0.849	0.000
	(0.496)	(0.305)	(0.358)	(0.000)
Observations	963,756	971,796	61,490	9,243,914
Weighted Observations	7,203,6291	7,8058,960	2,429,584	687,525,536

Note: The 13 universally licensed occupations include architects, accountants, barbers, cosmetologists, dentists, occupational therapists, physical therapists, practical nurses, physicians, pharmacists, registered nurses, lawyers, and teachers. We manually determine whether each occupation was ever licensed by verifying licensing status through the variable occ1990. For the 1940 census data which lacks the occ1990 variable, we made a crosswalk between occ1990 and occ1950. Data are weighted using population weights.

Appendix Table 5: Mean of Hourly Wage and Duration by year and Median Duration

Year	13 Universally Licensed Occupations					Never Licensed Occupations
	Licensed < Median Duration		Licensed ≥ Median Duration		Unlicensed	
	Wage	Duration	Wage	Duration	Wage	Wage
1940	13.106 (7.641)	32.410 (7.975)	21.812 (11.290)	65.222 (16.764)	13.597 (8.020)	11.969 (6.316)
1950	18.736 (8.375)	34.654 (16.123)	19.972 (11.107)	68.585 (15.956)	14.150 (5.644)	13.781 (6.489)
1960	22.277 (11.463)	28.369 (18.339)	30.962 (17.751)	68.248 (15.345)	19.886 (7.612)	20.120 (9.709)
1970	25.716 (11.513)	22.100 (15.831)	38.780 (23.535)	71.674 (15.343)	25.550 (10.029)	25.496 (14.325)
1980	23.515 (9.807)	22.068 (13.329)	37.564 (23.575)	80.981 (17.083)	22.237 (8.785)	23.984 (13.584)
1990	25.933 (12.056)	28.355 (12.697)	40.884 (34.267)	88.474 (18.930)	23.243 (10.820)	23.517 (16.906)
2000	26.340 (14.137)	31.538 (15.240)	46.289 (44.240)	95.470 (21.552)	29.389 (17.638)	26.354 (24.254)
2001	25.962 (12.267)	31.777 (15.510)	46.599 (44.524)	96.948 (21.604)	27.609 (11.961)	26.252 (24.026)
2002	26.861 (13.653)	32.654 (15.448)	48.120 (45.364)	96.857 (21.774)	29.030 (13.367)	26.152 (23.295)
2003	27.292 (13.971)	33.422 (15.593)	47.006 (41.604)	98.006 (22.058)	27.473 (12.130)	26.081 (22.188)
2004	27.354 (13.163)	33.074 (15.023)	44.364 (32.256)	96.441 (23.846)	29.417 (15.570)	26.233 (21.066)
2005	27.388 (13.695)	33.671 (15.574)	47.552 (42.871)	97.511 (23.875)	25.465 (10.429)	26.284 (23.806)
2006	26.921 (13.501)	33.272 (14.966)	46.341 (41.642)	95.442 (25.516)	22.875 (8.728)	25.911 (23.475)
2007	26.996 (13.984)	34.076 (15.071)	46.569 (42.578)	96.424 (25.650)	30.011 (9.214)	26.031 (24.094)
2008	26.876 (13.523)	31.528 (14.501)	45.818 (42.707)	92.341 (27.532)	31.987 (8.123)	26.358 (24.696)
2009	26.460 (12.739)	31.782 (14.051)	44.634 (39.875)	92.191 (28.142)	29.885 (7.520)	25.900 (23.366)
2010	26.658 (12.760)	31.855 (13.748)	44.994 (38.074)	92.052 (28.189)	41.967 (32.761)	26.262 (22.619)
2011	26.860 (13.402)	32.971 (13.707)	45.324 (38.651)	93.418 (28.417)	0.000 (0.000)	26.709 (23.085)
2012	25.694 (12.375)	33.471 (13.447)	44.153 (37.820)	93.390 (28.750)	0.000 (0.000)	26.241 (22.878)
2013	25.128 (12.853)	34.264 (13.329)	44.610 (39.788)	94.3322 (28.938)	0.000 (0.000)	26.316 (23.941)
2014	24.835 (12.607)	35.118 (13.185)	44.158 (39.908)	93.731 (29.357)	0.000 (0.000)	26.599 (24.388)
2015	24.660 (12.917)	36.155 (13.114)	44.578 (41.307)	94.826 (29.329)	0.000 (0.000)	26.699 (25.126)

Note: The 13 universally licensed occupations include architects, accountants, barbers, cosmetologists, dentists, occupational therapists, physical therapists, practical nurses, physicians, pharmacists, registered nurses, lawyers, and teachers. We manually determine whether each occupation was ever licensed by verifying licensing status through the variable occ1990. For the 1940 census data which lacks the occ1990 variable, we made a crosswalk between occ1990 and occ1950. Data are weighted using population weights.

Appendix Table 6. The Estimated Impact of Occupational Licensing on Hourly Wage

Panel A.13 Universally Licensed occupations

Control Group	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Relative to Individuals in Never Licensed Occupations Throughout Our period of Analysis					Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes	
Leads and Lags:							
Licensure $_{t+6}$	-0.222***	0.008	0.015	0.015	0.014	0.076*	0.003
	(0.039)	(0.023)	(0.022)	(0.022)	(0.021)	(0.043)	(0.024)
Licensure $_{t+5}$	-0.212***	0.046	0.042	0.039	0.032	-0.000	-0.042*
	(0.023)	(0.029)	(0.030)	(0.030)	(0.032)	(0.029)	(0.022)
Licensure $_{t+4}$	-0.199***	0.062	0.061	0.059	0.058	0.018	-0.037
	(0.035)	(0.038)	(0.041)	(0.041)	(0.043)	(0.034)	(0.031)
Licensure $_{t+3}$	-0.186***	0.011	0.011	0.010	0.013	0.086***	-0.022
	(0.027)	(0.040)	(0.042)	(0.042)	(0.043)	(0.030)	(0.028)
Licensure $_{t+2}$	-0.137***	0.069	0.059	0.056	0.047	0.056	-0.080**
	(0.030)	(0.044)	(0.045)	(0.046)	(0.048)	(0.036)	(0.035)
Licensure $_{t+1}$	-0.146***	-0.018	-0.028	-0.030	-0.036	0.079***	-0.113**
	(0.024)	(0.063)	(0.067)	(0.067)	(0.069)	(0.029)	(0.047)
Licensure $_{t+0}$	-0.216***	0.055*	0.060*	0.059*	0.055*	-0.013	-0.061***
	(0.035)	(0.033)	(0.031)	(0.031)	(0.031)	(0.032)	(0.023)
Licensure $_{t-1}$	-0.157***	0.035	0.032	0.029	0.022	0.067**	-0.064***
	(0.030)	(0.024)	(0.024)	(0.024)	(0.025)	(0.031)	(0.022)
Licensure $_{t-2}$	-0.229***	0.039*	0.044**	0.043**	0.042**	-0.016	-0.058***
	(0.022)	(0.021)	(0.020)	(0.020)	(0.019)	(0.023)	(0.018)
Licensure $_{t-3}$	-0.221***	0.040**	0.041**	0.039**	0.033*	-0.033*	-0.098***
	(0.020)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.016)
Licensure $_{t-4}$	-0.200***	0.077***	0.079***	0.077***	0.073***	-0.009	-0.060***
	(0.022)	(0.020)	(0.020)	(0.020)	(0.020)	(0.024)	(0.018)
Licensure $_{t-5}$	-0.200***	0.066***	0.065***	0.062***	0.056***	-0.018	-0.085***
	(0.019)	(0.018)	(0.018)	(0.019)	(0.020)	(0.022)	(0.018)
Licensure $_{t-6}$	-0.192***	0.083***	0.082***	0.079***	0.072***	-0.018	-0.077***
	(0.019)	(0.018)	(0.019)	(0.019)	(0.020)	(0.023)	(0.019)
Licensure $_{t-7}$	-0.185***	0.061***	0.058***	0.056***	0.049***	0.014	-0.075***
	(0.018)	(0.016)	(0.017)	(0.017)	(0.018)	(0.019)	(0.015)
Licensure $_{t-8}$	-0.204***	0.063***	0.061***	0.058***	0.051***	-0.040*	-0.113***
	(0.020)	(0.017)	(0.017)	(0.017)	(0.017)	(0.021)	(0.015)
Licensure $_{t-9}$	-0.198***	0.036**	0.033*	0.030*	0.022	-0.017	-0.125***
	(0.020)	(0.017)	(0.018)	(0.018)	(0.018)	(0.020)	(0.016)
Licensure $_{t-10}$	-0.202***	0.077***	0.074***	0.072***	0.062***	-0.039*	-0.111***
	(0.018)	(0.016)	(0.016)	(0.017)	(0.017)	(0.021)	(0.016)
Licensure $_{t-11}$	-0.176***	0.051***	0.047***	0.043***	0.035**	0.006	-0.114***
	(0.021)	(0.016)	(0.016)	(0.016)	(0.017)	(0.021)	(0.017)
Licensure $_{t-12}$	-0.202***	0.068***	0.066***	0.064***	0.053***	-0.029	-0.111***
	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)	(0.024)	(0.017)
Licensure $_{t-13}$	-0.202***	0.054***	0.053***	0.050**	0.040**	-0.030	-0.128***
	(0.017)	(0.020)	(0.019)	(0.020)	(0.020)	(0.023)	(0.019)
Licensure $_{t-14}$	-0.216***	0.064***	0.063***	0.061***	0.051***	-0.034	-0.113***
	(0.017)	(0.019)	(0.019)	(0.019)	(0.019)	(0.026)	(0.019)
Licensure $_{t-15}$	-0.220***	0.042**	0.042**	0.039**	0.029	-0.037*	-0.133***
	(0.016)	(0.017)	(0.017)	(0.018)	(0.018)	(0.022)	(0.018)

Licensure$_{t-16}$	-0.221***	0.047***	0.044**	0.041**	0.030	-0.042*	-0.137***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)	(0.023)	(0.018)
Licensure$_{t-17}$	-0.197***	0.037**	0.034**	0.031*	0.021	0.010	-0.118***
	(0.022)	(0.016)	(0.016)	(0.017)	(0.017)	(0.022)	(0.016)
Licensure$_{t-18}$	-0.210***	0.038*	0.032	0.029	0.016	-0.031	-0.149***
	(0.024)	(0.020)	(0.019)	(0.020)	(0.020)	(0.027)	(0.020)
Licensure$_{t-19}$	-0.151***	0.001	-0.004	-0.010	-0.021	0.058	-0.148***
	(0.040)	(0.026)	(0.027)	(0.027)	(0.027)	(0.042)	(0.025)
Licensure$_{t-20}$	-0.211***	0.051**	0.043*	0.040*	0.026	-0.018	-0.130***
	(0.021)	(0.024)	(0.023)	(0.023)	(0.023)	(0.031)	(0.023)
Licensure$_{t-21}$	-0.082**	0.065***	0.064***	0.060***	0.050***	0.137***	-0.080***
	(0.037)	(0.019)	(0.019)	(0.019)	(0.019)	(0.038)	(0.023)
Licensure$_{t-22}$	-0.167***	0.073***	0.071***	0.067***	0.059***	0.052*	-0.092***
	(0.019)	(0.021)	(0.021)	(0.021)	(0.021)	(0.031)	(0.021)
Licensure$_{t-23}$	-0.127***	0.076***	0.085***	0.072***	0.069***	0.094***	-0.074***
	(0.020)	(0.022)	(0.020)	(0.021)	(0.021)	(0.030)	(0.021)
Licensure$_{t-24}$	-0.163***	0.097***	0.091***	0.089***	0.079***	0.054	-0.076***
	(0.018)	(0.021)	(0.020)	(0.021)	(0.021)	(0.033)	(0.022)
Licensure$_{t-25}$	-0.134***	0.090***	0.092***	0.084***	0.077***	0.085***	-0.075***
	(0.018)	(0.021)	(0.020)	(0.021)	(0.021)	(0.031)	(0.021)
Licensure$_{t-26}$	-0.163***	0.079***	0.072***	0.069***	0.059***	0.056*	-0.099***
	(0.020)	(0.022)	(0.021)	(0.021)	(0.021)	(0.033)	(0.022)
Licensure$_{t-27}$	-0.128***	0.068***	0.064***	0.062***	0.053***	0.106***	-0.086***
	(0.022)	(0.020)	(0.019)	(0.020)	(0.019)	(0.032)	(0.020)
Licensure$_{t-28}$	-0.121***	0.079***	0.078***	0.075***	0.066***	0.092***	-0.104***
	(0.026)	(0.022)	(0.021)	(0.021)	(0.021)	(0.034)	(0.022)
Licensure$_{t-29}$	-0.047*	0.065***	0.068***	0.059**	0.054**	0.180***	-0.091***
	(0.027)	(0.024)	(0.023)	(0.023)	(0.024)	(0.034)	(0.023)
Licensure$_{t-30}$	-0.059*	0.098***	0.102***	0.094***	0.088***	0.147***	-0.092***
	(0.032)	(0.025)	(0.024)	(0.025)	(0.025)	(0.040)	(0.024)
Licensure$_{t-31f}$	0.160***	0.123***	0.121***	0.120***	0.112***	0.395***	-0.071***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.027)	(0.022)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES
OCC FE	NO	YES	YES	YES	YES	NO	YES
1-digit SOC 2000	NO	NO	YES	NO	NO	NO	NO
2-digit SOC 2000	NO	NO	NO	YES	NO	NO	NO
3-digit SOC 2000	NO	NO	NO	NO	YES	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES
H_0: adoption$_{(t0 \sim t+31f)} = 0$	0	0	0	0	0	0	0
H_0: adoption$_{(t+1 \sim t+6)} = 0$	0	0.310	0.382	0.424	0.521	0.00787	0.149
R-squared	0.347	0.366	0.411	0.423	0.449	0.347	0.455
Observations	11,240,956	11,240,956	11,240,956	11,240,956	11,240,956	1,997,042	1,997,042

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Panel B. Occupations that Changed Their Regulation Status over the Period of Our Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Control Group	Relative to Individuals in Never Licensed Occupations Throughout Our period of Analysis					Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes	
Leads and Lags:							
Licensure $_{t+6}$	-0.216***	0.008	0.015	0.015	0.014	0.083*	0.005
	(0.039)	(0.023)	(0.022)	(0.021)	(0.021)	(0.043)	(0.020)
Licensure $_{t+5}$	-0.205***	0.049*	0.045	0.043	0.036	0.007	-0.012
	(0.024)	(0.029)	(0.030)	(0.030)	(0.032)	(0.026)	(0.020)
Licensure $_{t+4}$	-0.194***	0.064*	0.063	0.062	0.061	0.016	-0.016
	(0.036)	(0.039)	(0.041)	(0.041)	(0.043)	(0.034)	(0.029)
Licensure $_{t+3}$	-0.180***	0.012	0.012	0.011	0.014	0.069**	-0.015
	(0.027)	(0.041)	(0.043)	(0.043)	(0.044)	(0.031)	(0.029)
Licensure $_{t+2}$	-0.134***	0.072	0.063	0.060	0.051	0.024	-0.057*
	(0.031)	(0.044)	(0.045)	(0.046)	(0.048)	(0.034)	(0.033)
Licensure $_{t+1}$	-0.145***	-0.016	-0.026	-0.029	-0.034	0.029	-0.109**
	(0.025)	(0.063)	(0.067)	(0.067)	(0.069)	(0.029)	(0.050)
Licensure $_{t+0}$	-0.207***	0.060*	0.065**	0.065**	0.061**	0.012	-0.018
	(0.034)	(0.033)	(0.031)	(0.031)	(0.031)	(0.027)	(0.019)
Licensure $_{t-1}$	-0.152***	0.039*	0.037	0.034	0.026	0.057**	-0.032
	(0.029)	(0.024)	(0.024)	(0.025)	(0.025)	(0.025)	(0.020)
Licensure $_{t-2}$	-0.220***	0.043**	0.048**	0.048**	0.047**	0.010	-0.021
	(0.022)	(0.021)	(0.020)	(0.020)	(0.019)	(0.022)	(0.017)
Licensure $_{t-3}$	-0.212***	0.047**	0.048***	0.046**	0.041**	-0.011	-0.050***
	(0.020)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.015)
Licensure $_{t-4}$	-0.191***	0.084***	0.086***	0.084***	0.080***	0.017	-0.014
	(0.022)	(0.020)	(0.020)	(0.020)	(0.020)	(0.023)	(0.017)
Licensure $_{t-5}$	-0.190***	0.074***	0.074***	0.070***	0.065***	0.006	-0.033**
	(0.020)	(0.018)	(0.018)	(0.019)	(0.019)	(0.022)	(0.017)
Licensure $_{t-6}$	-0.182***	0.092***	0.090***	0.087***	0.081***	0.012	-0.024
	(0.020)	(0.018)	(0.019)	(0.019)	(0.020)	(0.023)	(0.016)
Licensure $_{t-7}$	-0.176***	0.068***	0.065***	0.063***	0.056***	0.027	-0.031**
	(0.018)	(0.016)	(0.017)	(0.017)	(0.018)	(0.019)	(0.014)
Licensure $_{t-8}$	-0.193***	0.072***	0.070***	0.068***	0.060***	-0.008	-0.053***
	(0.020)	(0.017)	(0.017)	(0.017)	(0.017)	(0.020)	(0.013)
Licensure $_{t-9}$	-0.189***	0.045**	0.041**	0.039**	0.031*	-0.002	-0.073***
	(0.020)	(0.018)	(0.018)	(0.018)	(0.019)	(0.019)	(0.016)
Licensure $_{t-10}$	-0.191***	0.087***	0.084***	0.082***	0.072***	-0.007	-0.051***
	(0.018)	(0.016)	(0.016)	(0.017)	(0.017)	(0.021)	(0.014)
Licensure $_{t-11}$	-0.167***	0.060***	0.055***	0.052***	0.044***	0.023	-0.060***
	(0.021)	(0.016)	(0.016)	(0.016)	(0.017)	(0.019)	(0.014)
Licensure $_{t-12}$	-0.192***	0.077***	0.075***	0.073***	0.062***	-0.001	-0.054***
	(0.019)	(0.017)	(0.017)	(0.017)	(0.017)	(0.023)	(0.015)
Licensure $_{t-13}$	-0.191***	0.065***	0.064***	0.061***	0.051**	0.005	-0.063***
	(0.017)	(0.020)	(0.019)	(0.020)	(0.020)	(0.022)	(0.017)
Licensure $_{t-14}$	-0.204***	0.074***	0.074***	0.071***	0.062***	0.008	-0.045***
	(0.018)	(0.018)	(0.018)	(0.019)	(0.019)	(0.024)	(0.017)
Licensure $_{t-15}$	-0.209***	0.054***	0.053***	0.051***	0.040**	0.004	-0.062***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)	(0.022)	(0.016)
Licensure $_{t-16}$	-0.209***	0.059***	0.055***	0.052***	0.041**	-0.002	-0.067***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)	(0.023)	(0.017)

Licensure$_{t-17}$	-0.187***	0.047***	0.043***	0.040**	0.031*	0.036*	-0.057***
	(0.021)	(0.016)	(0.016)	(0.017)	(0.017)	(0.020)	(0.015)
Licensure$_{t-18}$	-0.199***	0.050**	0.044**	0.041**	0.029	0.008	-0.073***
	(0.024)	(0.020)	(0.019)	(0.020)	(0.020)	(0.026)	(0.019)
Licensure$_{t-19}$	-0.143***	0.010	0.004	-0.002	-0.013	0.061*	-0.096***
	(0.040)	(0.027)	(0.027)	(0.027)	(0.027)	(0.036)	(0.026)
Licensure$_{t-20}$	-0.200***	0.062***	0.054**	0.050**	0.037	0.026	-0.061***
	(0.021)	(0.023)	(0.022)	(0.023)	(0.023)	(0.029)	(0.020)
Licensure$_{t-21}$	-0.075**	0.071***	0.070***	0.066***	0.057***	0.140***	-0.035*
	(0.035)	(0.019)	(0.019)	(0.019)	(0.019)	(0.031)	(0.020)
Licensure$_{t-22}$	-0.159***	0.080***	0.078***	0.074***	0.067***	0.074**	-0.039*
	(0.019)	(0.021)	(0.021)	(0.021)	(0.021)	(0.032)	(0.021)
Licensure$_{t-23}$	-0.119***	0.083***	0.092***	0.079***	0.077***	0.110***	-0.026
	(0.020)	(0.022)	(0.021)	(0.022)	(0.022)	(0.031)	(0.022)
Licensure$_{t-24}$	-0.153***	0.106***	0.100***	0.098***	0.088***	0.086**	-0.019
	(0.018)	(0.021)	(0.020)	(0.021)	(0.021)	(0.034)	(0.022)
Licensure$_{t-25}$	-0.125***	0.098***	0.101***	0.092***	0.086***	0.108***	-0.021
	(0.019)	(0.021)	(0.020)	(0.021)	(0.021)	(0.031)	(0.020)
Licensure$_{t-26}$	-0.154***	0.087***	0.081***	0.078***	0.067***	0.080**	-0.044**
	(0.019)	(0.022)	(0.021)	(0.021)	(0.021)	(0.032)	(0.021)
Licensure$_{t-27}$	-0.121***	0.075***	0.072***	0.069***	0.061***	0.126***	-0.031
	(0.021)	(0.021)	(0.020)	(0.020)	(0.020)	(0.029)	(0.019)
Licensure$_{t-28}$	-0.111***	0.090***	0.089***	0.086***	0.077***	0.119***	-0.039*
	(0.025)	(0.022)	(0.021)	(0.021)	(0.021)	(0.034)	(0.022)
Licensure$_{t-29}$	-0.042	0.075***	0.079***	0.070***	0.064***	0.173***	-0.040
	(0.027)	(0.024)	(0.023)	(0.024)	(0.024)	(0.036)	(0.025)
Licensure$_{t-30}$	-0.051	0.108***	0.112***	0.104***	0.098***	0.161***	-0.031
	(0.032)	(0.025)	(0.024)	(0.025)	(0.025)	(0.041)	(0.023)
Licensure$_{t-31f}$	0.100***	0.134***	0.132***	0.131***	0.122***	0.338***	-0.003
	(0.020)	(0.017)	(0.017)	(0.017)	(0.017)	(0.026)	(0.020)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES
OCC FE	NO	YES	YES	YES	YES	NO	YES
1-digit SOC 2000	NO	NO	YES	NO	NO	NO	NO
2-digit SOC 2000	NO	NO	NO	YES	NO	NO	NO
3-digit SOC 2000	NO	NO	NO	NO	YES	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES
H_0: adoption$_{(t0 \sim t+31f)} = 0$	0	0	0	0	0	0	0
H_0: adoption$_{(t+1 \sim t+6)} = 0$	0	0.271	0.338	0.380	0.484	0.122	0.341
R-squared	0.316	0.327	0.378	0.392	0.421	0.265	0.349
Observations	10,829,059	10,829,059	10,829,059	10,829,059	10,829,059	1,585,145	1,585,145

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Appendix 7. The Estimated Impact of Occupational Licensing on Annual Hours Worked

Panel A. 13 Universally Licensed Occupations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Control Group:	Relative to Individuals in Never Licensed Occupations Throughout Our period of Analysis					Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes	
Leads and Lags:							
Licensure $_{t+6}$	-78.539***	-14.814	-12.870	-12.604	-13.291	-24.598	-21.296
	(28.185)	(29.103)	(28.876)	(28.985)	(29.095)	(29.767)	(23.831)
Licensure $_{t+5}$	-88.132***	-36.101*	-37.220**	-33.975*	-29.096	-14.732	-40.373***
	(22.293)	(19.184)	(18.441)	(18.361)	(17.746)	(20.932)	(14.703)
Licensure $_{t+4}$	-116.651***	-64.410**	-64.557**	-63.536**	-57.868*	-41.037	-68.416**
	(34.658)	(31.860)	(30.998)	(31.489)	(30.354)	(33.963)	(26.538)
Licensure $_{t+3}$	-89.828***	-31.998	-31.843	-30.776	-29.222	-16.989	-39.267*
	(26.993)	(24.590)	(23.932)	(23.622)	(22.067)	(28.147)	(22.890)
Licensure $_{t+2}$	-100.886***	-42.312	-44.502	-42.134	-38.677	-15.118	-54.519**
	(28.067)	(27.837)	(27.125)	(28.178)	(26.132)	(31.876)	(24.220)
Licensure $_{t+1}$	-84.449***	-17.284	-19.533	-18.462	-17.952	0.583	-27.738
	(24.814)	(25.231)	(24.284)	(24.117)	(22.385)	(27.520)	(24.690)
Licensure $_{t+0}$	-75.601***	-24.085	-22.607	-21.566	-15.749	-4.112	-31.637*
	(20.644)	(18.067)	(18.503)	(17.880)	(17.588)	(22.456)	(16.636)
Licensure $_{t-1}$	-57.801***	1.099	0.485	0.514	2.879	23.813	-7.342
	(19.143)	(15.781)	(15.744)	(15.485)	(15.359)	(18.144)	(15.523)
Licensure $_{t-2}$	-56.157***	-4.314	-2.718	-1.684	4.492	12.078	-10.960
	(13.874)	(13.223)	(13.461)	(13.107)	(13.016)	(16.285)	(12.655)
Licensure $_{t-3}$	-51.816***	-1.265	-0.795	1.589	7.769	14.414	-18.237
	(15.026)	(13.542)	(13.694)	(13.374)	(13.308)	(13.212)	(13.199)
Licensure $_{t-4}$	-36.065**	12.854	13.760	15.517	21.842	23.300	-10.223
	(18.243)	(16.939)	(16.853)	(16.370)	(16.214)	(16.548)	(15.252)
Licensure $_{t-5}$	-26.959	21.712	21.820	23.694	29.997*	37.140***	-0.660
	(17.317)	(15.682)	(15.739)	(15.602)	(15.696)	(14.309)	(14.810)
Licensure $_{t-6}$	-24.455	23.479*	23.378*	26.162**	32.963**	40.570***	2.729
	(15.332)	(13.393)	(13.431)	(13.116)	(13.099)	(12.274)	(11.963)
Licensure $_{t-7}$	-31.157***	18.950	18.376	20.584*	25.519**	34.787***	-3.681
	(11.154)	(11.546)	(11.614)	(11.337)	(11.367)	(11.943)	(11.104)
Licensure $_{t-8}$	-27.375**	20.717	20.562	23.050*	29.639**	38.741***	-1.226
	(13.916)	(13.848)	(13.865)	(13.465)	(13.358)	(13.886)	(13.666)
Licensure $_{t-9}$	-17.726	33.877***	33.323***	35.360***	40.340***	51.066***	10.266
	(11.907)	(11.385)	(11.468)	(11.358)	(11.394)	(12.647)	(12.117)
Licensure $_{t-10}$	1.779	47.775***	47.597***	50.089***	55.974***	65.943***	21.961
	(16.760)	(16.432)	(16.356)	(16.045)	(15.831)	(15.392)	(15.442)
Licensure $_{t-11}$	-8.859	43.150***	42.486***	43.632***	48.736***	57.300***	16.244
	(16.192)	(16.573)	(16.454)	(16.362)	(16.295)	(17.194)	(16.417)
Licensure $_{t-12}$	2.495	49.234***	49.098***	51.956***	57.576***	66.418***	21.245
	(16.501)	(17.419)	(17.525)	(17.245)	(16.899)	(15.371)	(14.586)
Licensure $_{t-13}$	10.928	59.383***	59.473***	61.639***	67.411***	72.245***	29.416**
	(13.993)	(15.955)	(15.928)	(15.565)	(15.271)	(15.822)	(14.195)
Licensure $_{t-14}$	11.111	56.295***	56.516***	58.610***	64.830***	70.003***	25.286
	(16.189)	(18.410)	(18.315)	(17.900)	(17.487)	(17.718)	(16.242)
Licensure $_{t-15}$	25.927	73.009***	73.113***	75.292***	81.244***	85.344***	40.755**
	(17.076)	(18.879)	(18.951)	(18.599)	(18.270)	(18.683)	(17.352)

Licensure$_{t-16}$	32.487	79.122***	78.629***	81.443***	87.559***	91.631***	46.110**
	(19.773)	(21.407)	(21.599)	(20.823)	(20.501)	(20.393)	(18.451)
Licensure$_{t-17}$	14.249	64.138***	63.563***	65.846***	70.946***	78.153***	33.880*
	(22.067)	(22.771)	(22.963)	(22.745)	(22.683)	(22.160)	(20.451)
Licensure$_{t-18}$	31.566	80.707***	79.558***	82.723***	88.718***	91.393***	44.833**
	(23.222)	(23.950)	(24.473)	(23.651)	(23.359)	(24.185)	(21.269)
Licensure$_{t-19}$	-9.409	51.810***	50.474***	53.189***	56.888***	65.682***	27.976*
	(12.723)	(14.961)	(15.155)	(15.038)	(15.269)	(19.309)	(15.249)
Licensure$_{t-20}$	-4.501	45.207**	43.519**	47.269***	53.284***	60.855***	19.660
	(14.736)	(17.743)	(18.111)	(17.285)	(17.167)	(23.124)	(17.556)
Licensure$_{t-21}$	-52.190***	10.066	10.124	12.241	17.007	22.747	-10.013
	(14.554)	(17.227)	(17.044)	(17.030)	(17.243)	(21.853)	(18.780)
Licensure$_{t-22}$	-27.545**	23.718	23.544	26.790*	32.307**	49.160**	4.112
	(12.521)	(15.551)	(15.734)	(15.382)	(15.045)	(21.717)	(15.247)
Licensure$_{t-23}$	-39.002***	14.528	16.713	20.334	24.958*	36.773*	-4.608
	(10.595)	(14.226)	(14.345)	(14.049)	(13.774)	(20.262)	(15.161)
Licensure$_{t-24}$	-42.327***	8.045	6.961	10.976	16.951	26.399	-16.354
	(11.929)	(15.825)	(16.152)	(15.590)	(15.388)	(22.231)	(16.229)
Licensure$_{t-25}$	-25.711**	26.161*	27.006*	30.862**	35.824**	45.508**	1.663
	(11.448)	(14.716)	(14.701)	(14.529)	(14.113)	(21.146)	(15.571)
Licensure$_{t-26}$	-31.917***	19.584	18.471	22.020	27.394*	37.670*	-8.116
	(11.312)	(15.149)	(15.520)	(15.025)	(14.853)	(21.992)	(16.273)
Licensure$_{t-27}$	-39.915***	15.018	14.614	17.970	23.258*	35.195*	-8.295
	(10.024)	(13.573)	(13.716)	(13.376)	(12.984)	(20.020)	(14.770)
Licensure$_{t-28}$	-40.357***	14.273	14.464	18.704	24.442	35.799*	-10.079
	(13.182)	(16.135)	(16.325)	(15.939)	(15.623)	(21.476)	(16.763)
Licensure$_{t-29}$	-58.043***	2.311	3.494	6.884	10.709	27.839	-19.824
	(8.888)	(12.995)	(13.027)	(12.737)	(12.415)	(20.424)	(15.517)
Licensure$_{t-30}$	-44.443***	12.533	13.966	18.408	23.742*	37.093	-12.741
	(11.724)	(14.277)	(14.191)	(13.833)	(13.359)	(22.539)	(16.546)
Licensure$_{t-31f}$	5.982	2.392	2.596	6.686	13.236	87.710***	-27.659
	(10.893)	(13.834)	(13.599)	(13.167)	(12.755)	(21.859)	(18.644)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES
OCC FE	NO	YES	YES	YES	YES	NO	YES
1-digit SOC 2000	NO	NO	YES	NO	NO	NO	NO
2-digit SOC 2000	NO	NO	NO	YES	NO	NO	NO
3-digit SOC 2000	NO	NO	NO	NO	YES	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES
H_0: adoption$_{(t0\sim t+31f)} = 0$	0	0	0	0	0	8.58e-09	0
H_0: adoption$_{(t+1\sim t+6)} = 0$	0.000548	0.474	0.434	0.515	0.641	0.832	0.128
R-squared	0.088	0.110	0.116	0.140	0.154	0.105	0.194
Observations	11,240,956	11,240,956	11,240,956	11,240,956	11,240,956	1,997,042	1,997,042

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Panel B. Occupations that Changed Regulation Status over the Period of Our Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Control Group:	Relative to Individuals in Never Licensed Occupations Throughout Our period of Analysis					Relative to Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes	
Leads and Lags:							
Licensure $_{t+6}$	-66.840**	-14.712	-12.769	-12.458	-13.147	-27.978	-20.635
	(27.872)	(28.954)	(28.744)	(28.799)	(28.897)	(24.647)	(22.750)
Licensure $_{t+5}$	-78.598***	-35.910*	-36.994**	-33.663*	-28.626	-22.763	-35.023**
	(22.137)	(19.173)	(18.424)	(18.284)	(17.651)	(14.582)	(14.179)
Licensure $_{t+4}$	-106.821***	-63.436**	-63.522**	-62.458**	-56.651*	-44.929*	-57.172**
	(34.141)	(31.793)	(30.934)	(31.339)	(30.162)	(25.910)	(25.582)
Licensure $_{t+3}$	-80.062***	-31.518	-31.353	-30.237	-28.643	-33.999*	-35.979*
	(26.451)	(24.499)	(23.829)	(23.465)	(21.866)	(20.187)	(21.442)
Licensure $_{t+2}$	-93.698***	-40.956	-43.058	-40.666	-37.109	-39.313*	-43.548*
	(27.155)	(27.762)	(27.059)	(28.010)	(25.892)	(23.446)	(24.161)
Licensure $_{t+1}$	-77.315***	-16.132	-18.345	-17.255	-16.748	-29.574	-21.120
	(23.701)	(25.001)	(24.055)	(23.821)	(22.040)	(19.079)	(22.605)
Licensure $_{t+0}$	-65.751***	-23.430	-21.832	-20.804	-14.844	-10.732	-24.926
	(20.703)	(18.063)	(18.513)	(17.818)	(17.506)	(17.359)	(16.266)
Licensure $_{t-1}$	-50.144***	1.442	0.894	0.910	3.341	-1.633	-4.862
	(18.950)	(15.850)	(15.819)	(15.520)	(15.385)	(14.152)	(15.755)
Licensure $_{t-2}$	-45.206***	-3.794	-2.135	-1.079	5.248	8.933	-5.470
	(13.731)	(13.248)	(13.490)	(13.111)	(13.011)	(11.964)	(12.326)
Licensure $_{t-3}$	-42.824***	-0.896	-0.342	2.100	8.442	-1.764	-16.160
	(15.167)	(13.537)	(13.689)	(13.356)	(13.285)	(11.941)	(12.901)
Licensure $_{t-4}$	-26.376	13.721	14.708	16.501	22.979	11.108	-6.653
	(18.212)	(16.893)	(16.807)	(16.304)	(16.141)	(13.444)	(14.467)
Licensure $_{t-5}$	-18.008	22.894	23.075	24.983	31.457**	19.375	1.443
	(17.364)	(15.587)	(15.644)	(15.499)	(15.593)	(12.781)	(14.207)
Licensure $_{t-6}$	-15.841	23.808*	23.777*	26.622**	33.603**	22.702**	3.278
	(15.463)	(13.463)	(13.501)	(13.171)	(13.156)	(10.494)	(11.780)
Licensure $_{t-7}$	-22.768**	19.489*	18.964	21.217*	26.277**	11.685	-3.240
	(11.321)	(11.594)	(11.659)	(11.369)	(11.397)	(9.566)	(10.892)
Licensure $_{t-8}$	-19.789	20.617	20.535	23.068*	29.823**	14.594	-4.207
	(14.006)	(13.828)	(13.841)	(13.427)	(13.315)	(11.305)	(13.296)
Licensure $_{t-9}$	-10.631	33.934***	33.434***	35.508***	40.605***	21.403**	7.340
	(11.997)	(11.280)	(11.363)	(11.234)	(11.268)	(10.098)	(11.389)
Licensure $_{t-10}$	8.921	47.574***	47.468***	49.992***	56.019***	38.396***	17.102
	(16.842)	(16.441)	(16.362)	(16.041)	(15.821)	(12.742)	(15.045)
Licensure $_{t-11}$	-1.846	43.153***	42.524***	43.684***	48.900***	25.254*	11.626
	(15.950)	(16.393)	(16.277)	(16.174)	(16.102)	(13.232)	(15.224)
Licensure $_{t-12}$	9.520	48.562***	48.569***	51.488***	57.299***	35.080***	14.953
	(16.632)	(17.566)	(17.664)	(17.366)	(17.000)	(11.756)	(13.676)
Licensure $_{t-13}$	17.649	59.037***	59.188***	61.395***	67.299***	39.261***	21.671
	(13.963)	(15.957)	(15.927)	(15.552)	(15.245)	(11.596)	(13.602)
Licensure $_{t-14}$	17.887	55.792***	56.080***	58.217***	64.582***	37.997***	16.779
	(15.999)	(18.381)	(18.282)	(17.851)	(17.424)	(13.306)	(15.399)
Licensure $_{t-15}$	32.375*	72.679***	72.850***	75.058***	81.149***	50.489***	31.469*
	(16.942)	(18.757)	(18.826)	(18.462)	(18.119)	(14.360)	(16.205)
Licensure $_{t-16}$	38.819**	78.549***	78.108***	80.976***	87.236***	55.889***	36.284**
	(19.581)	(21.348)	(21.541)	(20.741)	(20.403)	(15.794)	(17.263)

Licensure$_{t-17}$	20.599	63.806***	63.271***	65.611***	70.841***	41.696**	26.741
	(21.818)	(22.589)	(22.786)	(22.554)	(22.482)	(17.968)	(18.696)
Licensure$_{t-18}$	37.262	79.964***	78.877***	82.119***	88.269***	49.625**	33.379*
	(23.024)	(23.801)	(24.327)	(23.477)	(23.161)	(19.664)	(19.622)
Licensure$_{t-19}$	-4.090	51.325***	50.022***	52.813***	56.635***	23.480	23.351
	(12.736)	(14.938)	(15.135)	(14.985)	(15.212)	(15.092)	(14.661)
Licensure$_{t-20}$	1.989	44.444**	42.813**	46.653***	52.847***	25.888	11.042
	(14.736)	(17.767)	(18.135)	(17.273)	(17.139)	(17.223)	(17.265)
Licensure$_{t-21}$	-45.219***	10.473	10.565	12.748	17.672	-12.662	-10.780
	(14.365)	(17.052)	(16.875)	(16.821)	(17.026)	(16.074)	(18.187)
Licensure$_{t-22}$	-21.354*	22.343	22.303	25.688*	31.521**	10.925	-0.750
	(12.852)	(15.665)	(15.857)	(15.452)	(15.115)	(14.902)	(15.011)
Licensure$_{t-23}$	-34.238***	11.921	14.244	18.018	22.971*	-1.996	-10.432
	(10.842)	(14.398)	(14.512)	(14.146)	(13.881)	(14.947)	(15.604)
Licensure$_{t-24}$	-34.917***	7.911	6.891	11.011	17.152	-6.291	-19.471
	(12.056)	(15.839)	(16.169)	(15.561)	(15.352)	(16.046)	(16.182)
Licensure$_{t-25}$	-20.289*	24.777*	25.749*	29.753**	34.986**	6.463	-4.577
	(11.441)	(14.731)	(14.713)	(14.488)	(14.062)	(14.952)	(15.420)
Licensure$_{t-26}$	-25.343**	19.316	18.268	21.910	27.434*	-0.734	-12.729
	(11.373)	(15.106)	(15.474)	(14.936)	(14.753)	(15.742)	(16.040)
Licensure$_{t-27}$	-33.794***	14.603	14.250	17.679	23.117*	-3.941	-12.209
	(10.080)	(13.586)	(13.729)	(13.341)	(12.928)	(13.952)	(14.857)
Licensure$_{t-28}$	-34.739***	14.082	14.337	18.662	24.559	-8.935	-16.954
	(13.395)	(16.088)	(16.278)	(15.857)	(15.522)	(15.884)	(16.451)
Licensure$_{t-29}$	-52.662***	4.697	5.969	9.367	13.403	-19.596	-19.737
	(8.869)	(12.679)	(12.703)	(12.377)	(11.999)	(14.857)	(14.749)
Licensure$_{t-30}$	-40.106***	11.999	13.484	18.031	23.565*	-13.380	-19.552
	(11.896)	(14.258)	(14.171)	(13.776)	(13.285)	(18.250)	(16.560)
Licensure$_{t-31f}$	-47.965***	2.795	3.016	7.191	13.846	-16.525	-30.347
	(6.223)	(13.790)	(13.568)	(13.067)	(12.626)	(14.179)	(18.975)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES
OCC FE	NO	YES	YES	YES	YES	NO	YES
1-digit SOC 2000	NO	NO	YES	NO	NO	NO	NO
2-digit SOC 2000	NO	NO	NO	YES	NO	NO	NO
3-digit SOC 2000	NO	NO	NO	NO	YES	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES
H_0: adoption$_{(t0 \sim t+31f)} = 0$	0	0	6.99e-11	0	0	1.03e-07	2.79e-08
H_0: adoption$_{(t+1 \sim t+6)} = 0$	0.00304	0.477	0.441	0.519	0.654	0.469	0.262
R-squared	0.082	0.083	0.090	0.116	0.132	0.055	0.065
Observations	10,829,059	10,829,059	10,829,059	10,829,059	10,829,059	1,585,145	1,585,145

Note: All models include indicators for gender, race (white vs. others), dummies for marital status (married, married but absent, separated/divorced/widowed vs. unmarried), years of education, potential experience and a quadratic function in potential experience; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Appendix 8. Table. Matching Summary-Licensure Effects

Panel A. 13 Universally Licensed Occupations

Control Group	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis		Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes	
Number of Strata	88		88	
Number of Matched Strata	87		85	
	Control	Treated	Control	Treated
All	9,305,866	1,935,610	61,491	1,935,610
Matched	9,305,866	1,935,610	61,491	1,935,559
Unmatched	0	0	0	51

Note: The models perform coarsened exact matching on experience and marital status,
and perform exact matching on race (white vs. others) and gender.

Panel B. Occupations that Changed Regulation Status over the Period of Our Analysis

Control Group	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis		Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes	
Number of Strata	88		88	
Number of Matched Strata	87		85	
	Control	Treated	Control	Treated
All	9,305,866	1,523,706	61,491	1,523,706
Matched	9,305,866	1,523,706	61,491	1523,659
Unmatched	0	0	0	47

Note: The models perform coarsened exact matching on experience and marital status,
and perform exact matching on race (white vs. others) and gender.

Panel C. Grandfathering

Control Group	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis		Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes	
Number of Strata	232		232	
Number of Matched Strata	231		226	
	Control	Treated	Control	Treated
All	9,305,866	249,768	61,491	249,768
Matched	9,303,185	249,786	61,490	249,735
Unmatched	2,681	0	1	33

Note: The models perform coarsened exact matching on education, experience, and marital status, and perform exact matching on race (white vs. others) and gender.

Appendix Table 9. Matching Summary-Duration Effects

Panel A. 13 Universally Licensed Occupations

Control Group	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis								
Number of Strata	88								
Number of Matched Strata	78								
	Control	[0,3]	[4,10]	[11,20]	[21,30]	[31,40]	[41,50]	[51,100]	≥101
All	9,305,866	40,175	62,133	145,543	167,228	238,115	233,172	689,107	360,137
Matched	9,292,106	40,169	62,125	145,529	167,212	238,088	233,157	689,010	360,119
Unmatched	13,760	6	8	14	16	27	15	97	18

Note: The models perform coarsened exact matching on experience and marital status, and perform exact matching on race (white vs. others) and gender.

Control Group	Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes								
Number of Strata	88								
Number of Matched Strata	78								
	Control	[0,3]	[4,10]	[11,20]	[21,30]	[31,40]	[41,50]	[51,100]	≥101
All	61,491	40,175	62,133	145,543	167,228	238,115	233,172	689,107	360,137
Matched	61,477	40,169	62,125	145,529	167,212	238,088	233,157	689,010	360,119
Unmatched	14	6	8	14	16	27	15	97	18

Note: The models perform coarsened exact matching on experience and marital status, and perform exact matching on race (white vs. others) and gender.

Panel B. Occupations that Changed Regulation Status over the Period of Our Analysis

Control Group	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis								
Number of Strata	88								
Number of Matched Strata	78								
	Control	[0,3]	[4,10]	[11,20]	[21,30]	[31,40]	[41,50]	[51,100]	≥101
All	9,305,866	40,173	62,112	145,412	166,502	236,089	227,181	550,689	955,548
Matched	9,292,106	40,167	62,104	145,398	166,486	236,064	227,166	550,615	955,31
Unmatched	13,760	6	8	14	16	25	15	74	17

Note: The models perform coarsened exact matching on experience and marital status, and perform exact matching on race (white vs. others) and gender.

Control Group	Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes								
Number of Strata	88								
Number of Matched Strata	78								
	Control	[0,3]	[4,10]	[11,20]	[21,30]	[31,40]	[41,50]	[51,100]	≥101
All	61,491	40,173	62,112	145,412	166,502	236,089	227,181	550,689	95,548
Matched	61,477	40,167	62,104	145,398	166,486	236,064	227,166	550,615	95.531
Unmatched	14	6	8	14	16	25	15	74	17

Note: The models perform coarsened exact matching on experience and marital status, and perform exact matching on race (white vs. others) and gender.

Panel C. Grandfathering

Control Group	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis						
Number of Strata	232						
Number of Matched Strata	29						
	Control	[0,3]	[4,10]	[11,20]	[21,30]	[31,40]	[41,50]
All	9,305,866	38,594	49,607	86,158	50,495	23,425	1,489
Matched	594,285	544	1,098	3,169	3,533	6,434	1,429
Unmatched	8,711,581	38,050	48,509	82,989	46,962	16,991	60

Note: The models perform coarsened exact matching on education, experience, and marital status, and perform exact matching on race (white vs. others) and gender.

Control Group	Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes						
Number of Strata	232						
Number of Matched Strata	29						
	Control	[0,3]	[4,10]	[11,20]	[21,30]	[31,40]	[41,50]
All	61,491	38,594	49,607	86,158	50,495	23,425	1,489
Matched	917	544	1,098	3,169	3,533	6,434	1,429
Unmatched	60,574	38,050	48,509	82,989	46,962	16,991	60

Note: The models perform coarsened exact matching on education, experience, and marital status, and perform exact matching on race (white vs. others) and gender.

Appendix Table 10. Difference-in-Differences Coarsened Exact Matching Estimate of Effects of Occupational Licensing Duration

Panel A. 13 Universally Licensed Occupations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control Group:	Relative to Individuals in Never Licensed Occupations Throughout Our period of Analysis				Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes			
VARIABLES	Wage		Hour		Wage		Hour	
Licensure	0.0844***		51.7443***		0.2638***		111.0705***	
	(0.021)		(14.198)		(0.019)		(18.124)	
Duration ∈ [0.3]		0.0460***		34.4784***		0.0308**		52.0785***
		(0.013)		(8.947)		(0.014)		(9.423)
Duration ∈ [4.10]		0.0438***		51.0785***		0.0078		75.2631***
		(0.015)		(12.012)		(0.015)		(10.150)
Duration ∈ [11.20]		0.0270		81.8412***		0.0116		106.2512***
		(0.022)		(18.588)		(0.023)		(16.921)
Duration ∈ [21.30]		0.0554**		41.3530***		0.1384***		72.8255***
		(0.023)		(15.408)		(0.034)		(17.995)
Duration ∈ [31.40]		0.0804***		39.6132**		0.2791***		55.9759***
		(0.024)		(15.625)		(0.036)		(18.535)
Duration ∈ [41.50]		0.0818***		36.2460**		0.3348***		47.9744***
		(0.024)		(15.950)		(0.034)		(17.392)
Duration ∈ [51.100]		0.1333***		23.0874		0.4056***		96.6841***
		(0.026)		(17.664)		(0.033)		(18.372)
Duration > 100		0.1731***		27.9744		0.7204***		310.8649***
		(0.029)		(20.012)		(0.041)		(30.480)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	NO	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO
3-digit SOC 2000	YES	YES	YES	YES	NO	NO	NO	NO
H_0: All Duration Dummies=0		0		0.00163		0		0
R-squared	0.441	0.435	0.134	0.133	0.272	0.359	0.068	0.100
Observations	11,240,956	11,226,995	11,240,956	11,226,995	1,996,991	1,996,827	1,996,991	1,996,827

Note: All models perform coarsened exact matching on experience and marital status, and perform exact matching on race (white vs. others) and gender. Since some imbalances may still exist because we used only a few variables in the exact matching, we try to adjust for the remaining imbalances by controlling for actual values of the covariates in a regression.; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Panel B. Occupations that Changed Regulation Status over the Period of Our Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control Group:	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis				Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes			
VARIABLES	Wage		Hour		Wage		Hour	
Licensure	0.0991***		56.6552***		0.1861***		45.5282***	
							(12.783)	
Duration ∈ [0.3]		0.0517***		33.4418***		0.0258**		34.3240***
		(0.013)		(8.953)		(0.013)		(8.076)
Duration ∈ [4.10]		0.0495***		51.0037***		0.0131		46.2568***
		(0.015)		(11.931)		(0.016)		(8.395)
Duration ∈ [11.20]		0.0344		80.7907***		0.0226		65.1455***
		(0.022)		(18.413)		(0.020)		(14.058)
Duration ∈ [21.30]		0.0611***		40.6297***		0.1315***		25.4766*
		(0.023)		(15.226)		(0.031)		(14.925)
Duration ∈ [31.40]		0.0874***		38.6739**		0.2679***		-0.5822
		(0.024)		(15.456)		(0.035)		(16.073)
Duration ∈ [41.50]		0.0896***		35.5176**		0.3331***		-13.4604
		(0.024)		(15.803)		(0.031)		(15.999)
Duration ∈ [51.100]		0.1413***		23.1270		0.3984***		22.4302
		(0.026)		(17.341)		(0.030)		(16.221)
Duration > 100		0.1718***		45.5719**		0.4354***		97.5605***
		(0.028)		(18.571)		(0.044)		(18.506)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	NO	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO
3-digit SOC 2000	YES	YES	YES	YES	NO	NO	NO	NO
H_0: All Duration Dummies=0		0		0.000159		0		0
R-squared	0.405	0.411	0.100	0.103	0.205	0.254	0.030	0.035
Observations	10,829,059	10,815,124	10,829,059	10,815,124	1,585,098	1,584,956	1,585,098	1,584,956

Note: All models perform coarsened exact matching on experience and marital status, and perform exact matching on race (white vs. others) and gender. Since some imbalances may still exist because we used only a few variables in the exact matching, we try to adjust for the remaining imbalances by controlling for the actual values of the covariates in a regression.; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.

Appendix Table 11. Difference-in-Differences Coarsened Exact Matching Estimate of Grandfathering

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control Group:	Relative to Individuals in Never Licensed Occupations Throughout Our Period of Analysis				Relative to Unlicensed Workers in Universally Licensed Occupations Prior to States Passing Licensing Statutes			
VARIABLES	Wage		Hour		Wage		Hour	
Licensure	-0.0076		80.6397***		0.0737***		26.3230***	
	(0.020)		(14.620)		(0.018)		(8.999)	
Duration ∈ [0.3]		-0.0508		14.4563		0.0941***		5.7891
		(0.039)		(24.190)		(0.031)		(22.981)
Duration ∈ [4.10]		0.0544		69.4117*		0.0863**		31.9827
		(0.036)		(40.273)		(0.036)		(25.450)
Duration ∈ [11.20]		0.0047		75.1245***		0.0722**		27.1114
		(0.031)		(26.706)		(0.030)		(23.043)
Duration ∈ [21.30]		0.0509		91.8508***		0.2270***		27.6861
		(0.040)		(29.912)		(0.042)		(22.189)
Duration ∈ [31.40]		0.0848**		70.8180***		0.3765***		-16.5489
		(0.038)		(27.047)		(0.053)		(23.056)
Duration ∈ [41.50]		0.0710*		21.3039		0.4544***		-49.9530*
		(0.041)		(54.526)		(0.055)		(26.666)
Individual Covariates	YES	YES	YES	YES	YES	YES	YES	YES
OCC FE	YES	YES	YES	YES	NO	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES
1-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO
2-digit SOC 2000	NO	NO	NO	NO	NO	NO	NO	NO
3-digit SOC 2000	YES	YES	YES	YES	NO	NO	NO	NO
H_0: All Duration Dummies=0		0.00221		0.0160		0		2.23e-05
R-squared	0.364	0.319	0.111	0.091	0.269	0.216	0.044	0.045
Observations	9,552,482	610,470	9,552,482	610,470	311,215	17,123	311,215	17,123

Note: All models perform coarsened exact matching on education, experience, and marital status, and perform exact matching on race (white vs. others) and gender. Since some imbalances may still exist because we used only a few variables in the exact matching, we try to adjust for the remaining imbalances by controlling for the actual values of the covariates in a regression.; *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level; standard errors are constructed using the heteroscedasticity robust covariance matrix that allows for clustering at the state-occupation level.