ECONOMIC RESEARCH CENTER
at THE BUCKEYE INSTITUTE

Still Forbidden to Succeed

The Negative Effects of Occupational Licensing on Ohio's Workforce

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Executive Summary

Occupational licensing requirements reduce job creation in Ohio, which hinders the state's and employer's efforts to attract and retain skilled employees. Restrictive licensing laws place a particularly onerous burden on low-income, minority, and non-college-educated Ohioans, while simultaneously limiting labor mobility and keeping Ohio-based jobs out of reach.

As The Buckeye Institute's previous report, *Forbidden to Succeed: How Licensure Laws Hold Ohioans Back*, explained, "[h]igh fees and training requirements reduce an occupation's job growth by 20 percent, as prospective workers who cannot afford to enter the occupation remain unemployed or underemployed."[1] Ultimately, government-imposed restrictions on labor and wage-earning exacerbates the employment and wage gaps between those with and those without college degrees.

Building upon our earlier research, we have applied a macroeconomic dynamic scoring model developed by economists at The Buckeye Institute's Economic Research Center to data collected by the U.S. Bureau of Labor Statistics, and have discovered that Ohio's licensing requirements have prevented more than 7,000 people between the ages of 25-45 from pursuing licensed occupations in the state. Our dynamic model demonstrates the disproportionate burden that licensing requirements impose on some job seekers, reveals that high licensing costs keep workers from good paying professions, and suggests that without such costs more workers would find employment.

Occupational licensing schemes erect often insurmountable barriers to entry for Ohioans seeking new job opportunities and career advancement. Removing such barriers from professions that do not endanger public health and safety will expand the labor pool and available employment, enhancing the job prospects and earning potential for *all* Ohioans looking to make a better future for themselves and their families.

[1] Tom Lampman, ***Forbidden to Succeed: How Licensure Laws Hold Ohioans Back***, The Buckeye Institute, November 18, 2015.

Introduction

An occupational license is government permission to engage in a particular occupation. To receive this permission, aspiring workers must forgo time and money to satisfy government mandates before they may legally pursue their chosen profession. Ostensibly to control the quality of workers, policymakers from state-to-state have spun an often confusing, burdensome, and arbitrary regulatory web. Occupational licensing in the United States once governed less than five percent of the working population. As of 2008, occupational licensing schemes covered approximately 29 percent of the workforce (Kleiner and Krueger 2013). Today, the government requires occupations ranging from doctors and lawyers to barbers, florists, and even fortune-tellers to first obtain the government's permission before plying their trade.

In the Institute for Justice's report, *License to Work,* a national study of occupational licensing requirements across the country, nearly all of the 102 low-to-moderate-income occupations examined were found to be practiced somewhere in the United States without a license. Only 15 occupations had license requirements in 40 or more states, with the average occupation having licensing mandates in just 22 states. Even more troubling, researchers discovered that licensing requirements for the same occupations vary drastically from state-to-state, all of which suggests that licenses may have little to do with universally recognized training or health and safety concerns.

Furthermore, there is a disturbing arbitrariness across some occupational licensing requirements that seem disconnected from the demands and rigors of the occupations themselves. For example, in Ohio, aspiring emergency medical technicians may attain their licenses with approximately one month of training, but it takes skin care specialists 140 days, massage therapists 175 days, cosmetologists 350 days, and auctioneers and barbers more than a year to be licensed. Licensing laws often include a "grandparent clause" that exempts current workers in a given field from new requirements that new workers must satisfy. Such inconsistencies—and the notable lack of public health and safety disparities between professions with widely different training requirements—suggest that some licensing schemes depend more on the power of industry lobbyists than a genuine concern for public safety.

Ohio requires licenses for fewer occupations than the average state, but the requirements for occupations that are licensed are substantially more burdensome, with average fees of $137, 341 days of training, and usually at least one exam. These requirements disproportionately affect new workers, workers seeking to re-enter the workforce, small businesses, and low-income workers. Low-income households are especially affected by cumbersome, costly licensing requirements because they have fewer resources to tide them over until the government permits them to start earning. Reducing, or better yet, eliminating many of the licensing requirements would go a long way toward expanding job prospects for workers.

Despite the often stringent licensing requirements and their high compliance costs, workers still choose licensed occupations. Such sustained interest in pursuing licensed professions suggests that licensing offers workers positive market returns, with the license serving as a type of investment that yields future market rewards even though it delays labor market entry. Positive returns on the

license "investment," however, suggests that government-imposed licensing requirements may not be necessary given that the public's demand for licensed workers may stimulate a market for licensure.

Stringent licensing requirements imposed on a state-to-state basis also negatively affects the broader marketplace by impeding the interstate mobility of the labor force. Recent literature shows that workers in government regulated occupations have lower interstate migration rates than those in non-licensed occupations.[2] Thus, licensing schemes create unnecessary inefficiencies in the market. An efficient labor force relies on the free migration of labor as higher wages in one state should attract workers and resources until equilibrium is reached between supply and demand.

Inconsistent and arbitrary licensing standards across various states, however, inhibits the necessary interstate migration.[3] A prime example of such irrational licensing inhibiting mobility is the all-too-common requirement that a worker already licensed in one state must repeat many of the same licensing requirements in order to be licensed in another state.[4] To appreciate the damage such requirements cause, one need only imagine what would happen if a driver's license earned in Ohio was not valid in Pennsylvania, and every Ohio-licensed driver upon reaching the Pennsylvania border must first sit for the Pennsylvania driver's exam before being permitted to drive in the Keystone State. The effect on interstate driving, of course, would be stultifying.

We employ a macroeconomic dynamic scoring model to study the effects of occupational licensing requirements on job searches and employment opportunities across age groups, income levels, and educational attainment. Applying our model revealed that licensing costs have a disproportionately negative effect on older, low-income, less-educated workers.

[2] Morris M. Kleiner, ***Border Battles: The Influence of Occupational Licensing on State Migration***, W.E. Upjohn Institute, October 2015.
[3] Morris M. Kleiner, ***Reforming Occupational Licensing Policies***, The Brookings Institute's Hamilton Project, March 2015.
[4] *Ibid.*

Occupational Licensing Hurts Low-Income Workers More

Studies have demonstrated that the basic wage premium effect of possessing a license causes the supply of available workers to go down and the price of their labor to go up (Gittleman and Kleiner 2013). The decline in supply can be attributed to the average upfront costs of licensure (Carpenter, et al. 2012). Unsurprisingly, such costs make it harder for "less educated" (those without college degrees) and low-income individuals to acquire licenses for many occupations. In addition, the costs associated with failing a license exam can be significant, since such exams may not be administered frequently, keeping prospective workers out of the labor market.[5] More educated workers (those with college degrees), by contrast, already tend to work in high-paying occupations that require licenses, which suggests that perhaps both the costs and benefits of obtaining a license are lower for high-skilled workers than for low-skilled workers.

Licensing is often an anticipated part of the schooling or professional requirements of highly educated workers who have self-selected into occupations such as law or medicine known to require licenses.[6] This helps explain the greater prevalence of occupational licenses in the high-skilled/college-educated population relative to their low-skilled/low-educated counterparts. Conversely, for workers with less formal schooling, occupational licenses may represent unanticipated costs and burdens that impede entry into the labor force even as they appear to replace formal education and serve as a primary qualification in the labor market. Thus, the higher the licensing burden the greater the negative effect on low-skilled/low-educated individuals who are more likely to work in lower paying jobs. This regressive nature of licensing costs may explain why fewer low-skilled workers obtain licenses despite the larger long-term rewards of licensure.

Table 1 summarizes labor market statistics for job seekers according to the Current Population Survey (CPS) in 2015 and 2016. Focused only on how labor market outcomes affect entry into a licensed occupation, we do not discuss or analyze the self-employment motive or self-employed individuals.

Table 1: Employment Rates of Wage and Salaried Workers Age 25-45

	Percent in a Licensed Occupation	Percent in a Non-Licensed Occupation	Difference in Employment
No College Degree	96%	93%	3%
College Degree	98%	97%	1%
Difference in Employment	-2%	-4%	2%

Source: Current Population Survey 2015-2016

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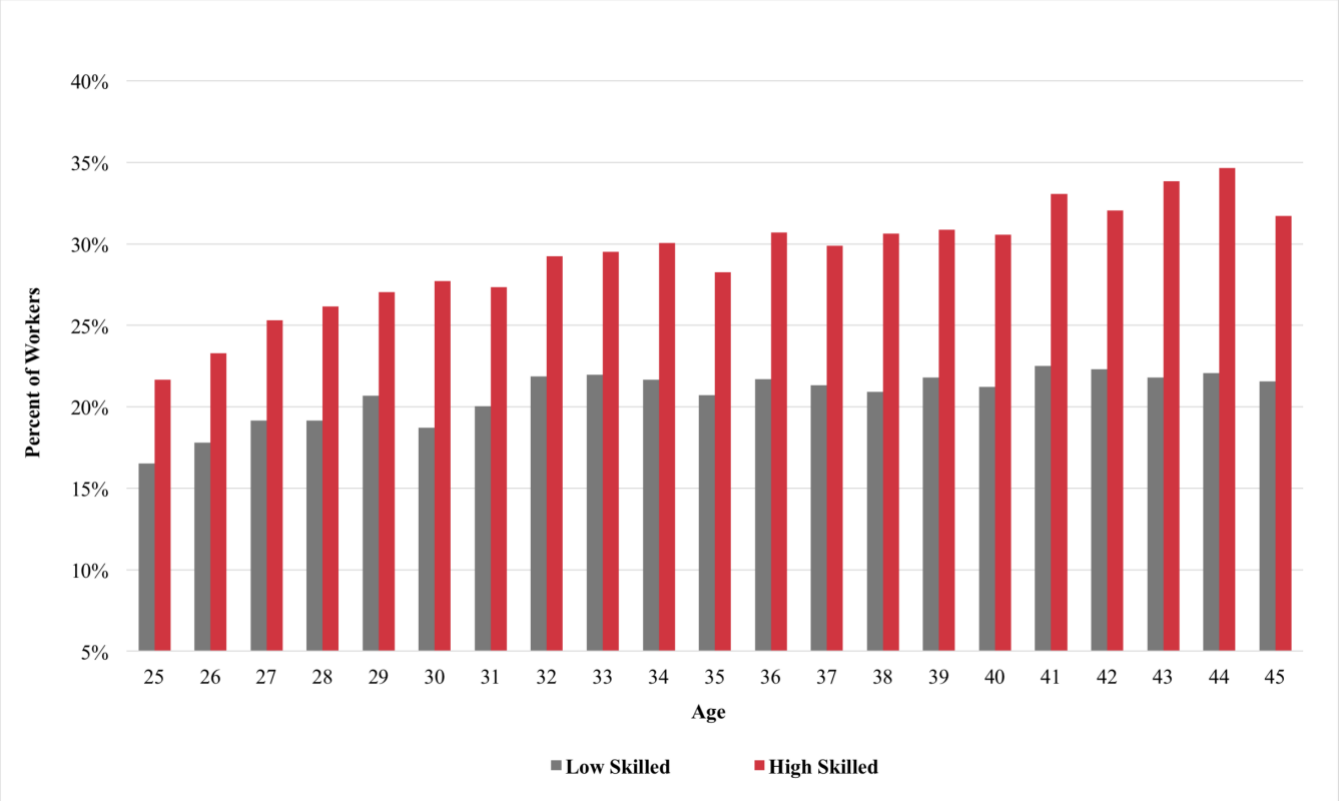
[5] In the case of dentistry, failing a dentistry licensing exam came at a cost of $54,000 in 1997 dollars, due simply to the fact that the exam was only offered twice a year and the individual who failed would be forced to continue to work as an assistant in the interim (Kleiner and Kudrle 2000).

[6] Licensing can also be a signal of quality of a worker. College-educated workers would seek more licenses to reflect the higher quality of their work. For more information see Law and Kim (2005).

From the same data, Figure 1 illustrates the share of licensed low-skilled and high-skilled individuals according to age.

Figure 1: Percentages of Low-skilled and High-skilled Licensed Individuals by Age



Source: Current Population Survey 2015-2016

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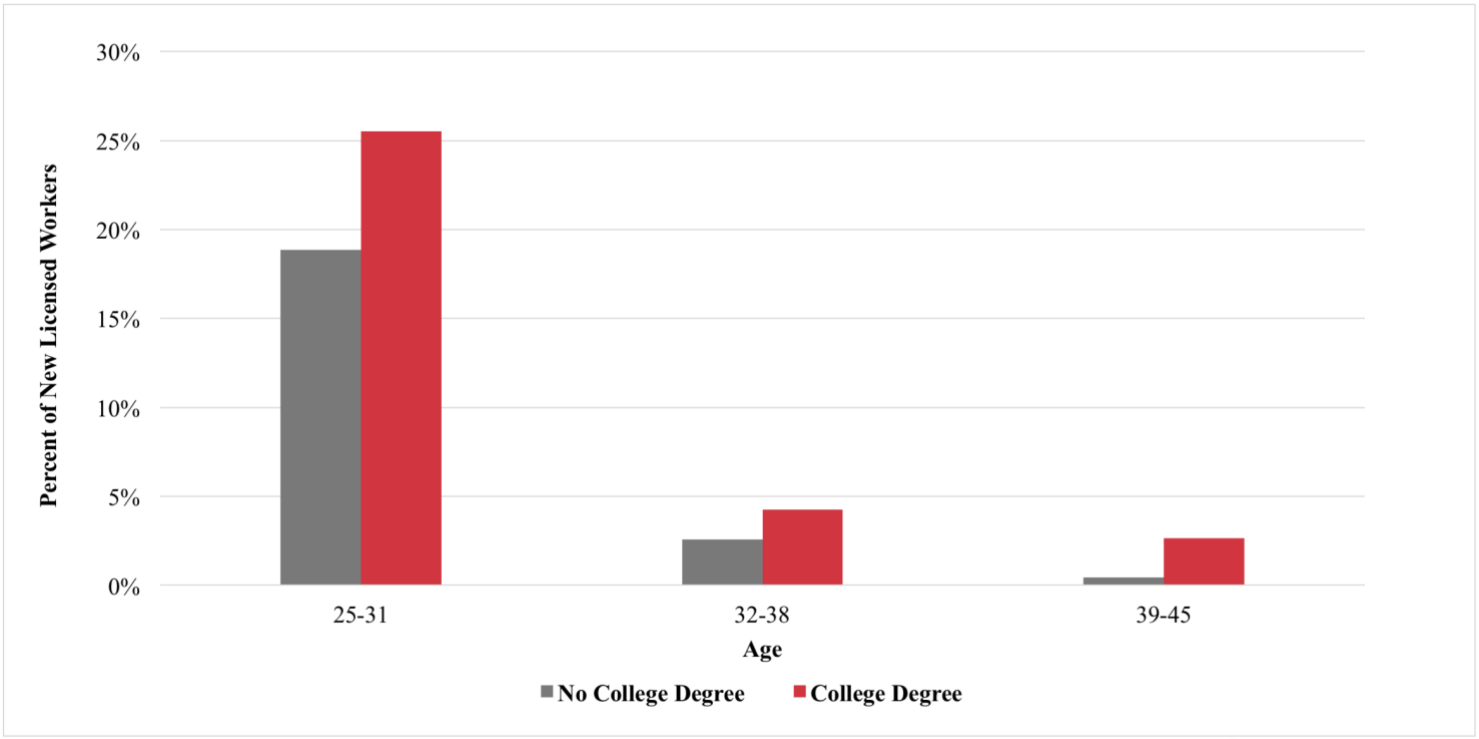
Figure 2 reveals that the flow of workers into licensed occupations declines as work-life expectancy declines.

Figure 2: Percentage of People Entering Licensed Occupations



Source: Current Population Survey 2015-2016

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The wage premium for having a license is drawn from evidence provided by Kleiner and Krueger (2013). According to Kleiner and Krueger (2013), an occupational license increases worker wages by 14.57 percent, and a college degree raises wages by 47.7 percent.

Table 2: Wage Differentials

Consistent with Kleiner and Krueger (2013)	Licensed	Not Licensed
No College Degree	1.15	1
College Degree or Higher	1.63	1.48

Source: Kleiner and Krueger (2013)

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Modeling the Job Search

The directed search model of the labor market described below is taken from Menzio, Telyukova and Visschers (2016) (MTV). The model belongs to the economics "literature on directed search pioneered by Montgomery (1991), Moen (1997), Shimer (1996), Burdett, Shi and Wright (2001)"[7], and, more recently, Shi (2009), and Menzio and Shi (2011). Our model divides workers in each age group studied into four categories or "states": college-educated without a license; college-educated with a license; no college education without a license; and no college education with a license.

Our version of the model incorporates efficient ex-ante investments—namely, obtaining an occupational license—that change the state of a worker in our model forever. Acemoglu and Shimer (1999) examine the potential for hold-up problems in frictional markets and investigate the manner in which markets can internalize the resulting externalities. We use a directed search model with wage posting because features of this model guarantee efficiency (see, Acemoglu and Shimer, 1999).

Our model is simpler than MTV's (2016) insofar as our model does not include "on-the-job" searches and only the unemployed search for job opportunities and receive wage offers. This reasonable assumption comports with our aim to understand how occupational licensing affects the labor prospects of unemployed workers, which in turn define the gains from obtaining a license.

Time is discrete and lasts forever. The economy is populated by J overlapping generations of workers. In every period, a new generation of workers is born into the economy with ability/skill $s \in \mathbb{R}_+$ and lives for J periods, where $J \geq 2$ is an integer. Each worker is endowed with one indivisible unit of labor. Each worker maximizes the expected sum of periodical consumption discounted at the patience factor $\beta\omega$, with $\beta \in (0,1)$ and $\omega \in (0,1)$ as a survival rate. The number of individuals from each cohort born at the start of each period equals the fraction of retirees so that there is no population growth.

The labor market is organized in a continuum of submarkets indexed by $(y_{s,l,j}, s, l)$. Submarkets differ as to the terms of trade offered by the firms with respect to the supply and demand conditions. Specifically, in submarket $(y_{s,l,j}, s, l)$ firms hire workers of skill $s \in \{0,1\}$, with or without an occupational license $l \in \{0,1\}$, age $j \in \{25, J\}$ and offer them an employment contract worth $y_{s,l,j}$ in lifetime utility. We refer to (s, l, j) as the type of the worker. Moreover, in submarket $(y_{s,l,j}, s, l)$ the ratio of firms searching for workers to workers searching for firms is $\theta_t(y_{s,l,j}, s, l)$. Following Pissarides (1985), we refer to $\theta_t(y_{s,l,j}, s, l)$ as the tightness in submarket $(y_{s,l,j}, s, l)$.

The economy is also populated by a continuum of firms with positive measure. Each firm operates a constant return to scale technology that turns one unit of labor into $x_t(s, l)$ units of output.

[7] Guido Menzio, Irina Telyukova, and Ludo Visschers, "**Directed Search over the Life Cycle**," *Review of Economic Dynamics*, vol. 19 (January 2016) pages 38-62.

At the beginning of each period, the aggregate state of the economy can be summarized by $\psi = (u_{s,l,j}, e_{s,l,j})$. The first component denotes the measure of unemployed workers. The second component denotes the measure of employed workers. The subscript s represents skill or schooling attainment while $l \in \{0,1\}$ represents workers with no license and those with an occupational license respectively.

Every period is divided into five stages: the decision to obtain an occupational license; separation; search; matching; and production. We assume that a worker who chooses to obtain a license has also chosen to search for licensed jobs only. Licensed jobs and occupations are used interchangeably throughout the analysis. At the first stage, an unemployed worker of skill s and age j who has never obtained an occupational license can pay the licensing cost to select into a job search for licensed jobs. Unfortunately, that worker must also sit out the period, delaying the opportunity to accept job offers and to work for wages.

"At the separation stage, an employed worker becomes unemployed with probability $d \in [\delta, 1]$, where d is a probability determined by the worker's employment contract and $\delta \in [0,1]$ is the probability that the worker [must] leave his job for exogenous reasons."[8]

At the search stage, an unemployed worker at the beginning of the separation stage has the opportunity to search. "And if a worker lost his job during the separation stage, he cannot search in the current period. Whenever a worker has the opportunity to search, he chooses which submarket to visit. Also, during the search stage, a firm chooses how many vacancies to create in each submarket. The cost [incurred for] maintaining a vacancy for one period is $\kappa > 0$."[9]

At the matching stage, the vacancies and the workers searching in the same submarket come together through a frictional matching process. In particular, a worker searching submarket $(y_{s,l,j}, s, l)$ meets a vacancy with probability $p\,(\theta_t(y_{s,l,j}, s, l))$ where $p: \mathbb{R}_+ \rightarrow [0,1]$ is a twice differentiable, strictly increasing and strictly concave function with boundary conditions $p(0) = 0$ and $p(\infty) = 1$. Similarly, a vacancy searching in submarket $(y_{s,l,j}, s, l)$ meets a worker with probability $q\,(\theta_t(y_{s,l,j}, s, l))$, where $q: \mathbb{R}_+ \rightarrow [0,1]$ is a twice differentiable, strictly decreasing function such that $q(\theta) = p\,(\theta)/\theta$, $q(0) = 1$ and $q(\infty) = 0$. When a firm and a worker of type (s, l, j) meet in submarket $(y_{s,l,j}, s, l)$, the firm offers the worker an employment contract that is worth $y_{s,l,j}$ in lifetime utility. If the worker rejects the offer, he returns to the pool of unemployed workers. If the worker accepts the offer, he leaves unemployment and enters a productive match.

At the production stage, an unemployed worker of type (s, l, j) produces and consumes b units of output. A worker of type (s, l, j) who is employed produces $x\,(s, l)$ units of output where $x\,(s, 1) = \eta + x(s, 0)$. Assuming that $\eta > 0$ implies that licensing increases productivity. This assumption is consistent with the wage premium enjoyed by workers with a license relative to those without a license. Lastly, employed workers consume $w\,(s, l, j)$ of them, where $w\,(s, l, j)$ is the wage specified by the employment contract. We assume that employment contracts are

[8] Guido Menzio, Irina Telyukova, and Ludo Visschers, "**Directed Search over the Life Cycle**," *Review of Economic Dynamics*, vol. 19 (January 2016) pages 38-62.
[9] *Ibid.*

complete in the sense that they specify the wage paid by the firm to the worker and the probability that the worker and the firm break up at the separation stage.[10]

[10] Guido Menzio, Irina Telyukova, and Ludo Visschers, "**Directed Search over the Life Cycle**," *Review of Economic Dynamics*, vol. 19 (January 2016) pages 38-62.

The Directed Search Equilibrium

First consider a worker of type $(s, 0, j)$ who is unemployed at the beginning of the production stage and who does not possess an occupational license. The worker's lifetime utility $U_t(s, 0, j, \psi)$ is such that:

$$U_t(s,0,j,\psi) = b + \beta\omega_j\{\max \mathbb{E}_{\psi'|\psi}\{[U_{t+1}(s,0,j,\psi') + R_{t+1}(s,0,j,\psi')], U_{t+1}(s,1,j,\psi') - C - \xi\}\}$$

where b is the value of an unemployed worker's current period consumption. The utility cost for obtaining a license is $C + \xi$, where C is the deterministic component and ξ is a random idiosyncratic component of the cost incurred to obtain a license.

$$R_{t+1}(s,0,j,\psi') = \max_{y_{s,0,j}} p\big(\theta_{t+1}(s,0,\psi')\big)\big[y_{s,0,j} - U_{t+1}(s,0,j,\psi')\big]$$

A worker obtains a license if (and only if) the benefit from waiting one period and paying the deterministic cost of a license exceeds the value of participating in the market in the current period:

$$U_{t+1}(s,1,j,\psi) - C - \xi \geq U_{t+1}(s,0,j,\psi') + \max_{y_{s,0,j}} p\big(\theta_{t+1}(s,0,\psi')\big)\big[y_{s,0,j} - U_{t+1}(s,0,j,\psi')\big]$$

The workers who obtain an occupational license $\gamma_s \in (0,1]$ are those for whom the realization of the idiosyncratic cost is such that the benefit of obtaining a license exceeds its total cost $C + \xi$. The threshold cost is defined as:

$$\xi^* \equiv U_{t+1}(s,1,j,\psi') - C - U_{t+1}(s,0,j,\psi') - \max_{y_{s,0,j}} p\big(\theta_{t+1}(s,0,\psi')\big)\big[y_{s,0,j} - U_{t+1}(s,0,j,\psi')\big]$$

For unemployed workers who already possess an occupational license, the lifetime utility $U_t(s, 1, j\ \psi)$ is such that:

$$U_t(s,1,j,\psi) = b + \beta\omega\left\{\mathbb{E}_{\psi'|\psi}\left[U_{t+1}(s,1,j,\psi') + \max_{y_{s,1,j}} p\big(\theta_{t+1}(s,1,\psi')\big)\big[y_{s,1,j} - U_{t+1}(s,1,j,\psi')\big]\right]\right\}$$

Second, consider a firm and a worker of type (s, l, j) who are in a match at the beginning of the production stage. The sum of the worker's lifetime utility and the firm's lifetime profits:

$$V_t(s,l,j,\psi) = x_t(s,l) + \beta\omega\mathbb{E}_{\psi'|\psi} \max_{d\in[\delta,1]}\{dU_{t+1}(s,l,j,\psi') + (1-d)[V_{t+1}(s,l,j,\psi')]\}$$

In the current period, the sum of the worker's utility and the firm's profit is $x_t(s, l)$. At the separation stage of the next period, the worker becomes unemployed with probability d. For simplicity and focus, we assume an exogenous separation rate δ.

Finally, the tightness of the submarket is such that:

$$\kappa \geq q(\theta_t(s,l,\psi))\left[V_t(s,l,j,\psi) - y_{s,l,j}\right]$$

and $\theta_t(s,l,\psi) \geq 0$ with complementary slackness. The above condition guarantees that the tightness function θ_t is consistent with the firm's incentive to create vacancies. The cost to a firm from opening a vacancy is given by κ. The benefit to a firm from opening a vacancy is given by the product between the probability that the firm fills the vacancy $q\ (\theta_t(s,l,\psi))$, and the value to the firm from filling the vacancy $V_t(s,l,j,\psi) - y_{s,l,j}$. From the above equation, it follows that a worker of type (s,l,j) can choose to search in submarkets where the value offered by vacancies to applicants $y_{s,l,j}$ and the ratio of vacancies to applicants $\theta_t(s,l)$ are such that:

$$y_{s,l,j} = V_t(s,l,j) - \frac{\kappa}{q(\theta_t(s,l))}$$

The above equation states that in a submarket with tightness $\theta_t(s,l)$, a worker of type (s,l,j) is offered a value $y_{s,l,j}$, which is equal to the difference between the value of a match and the vacancy cost that a firm must incur to create a match with a worker. The equation implies that the worker faces a trade-off between the likelihood of receiving a job offer and the value of a job offer.

It follows that the preferences over $y_{s,l,j}$ and $\theta_t(s,l)$ for a worker who is searching for a job are given by:

$$p(\theta_t(s,l))(y_{s,l,j} - \vartheta)$$

where ϑ denotes the value of unemployment to a worker: $\vartheta = U_t(s,l,j)$. Substituting for an unemployed worker we obtain:

$$\max_{(\theta_t(s,l))\geq 0} p\big(\theta_t(s,l)\big)\big(V_t(s,l,j) - U_t(s,l,j)\big) - \kappa\big(\theta_t(s,l)\big)$$

This expression states that an unemployed worker chooses the tightness of the submarket where to look for a job so as to maximize the value of job search—the probability that the worker finds a job $p\big(\theta_t(s,l)\big)$times the surplus $\big(V_t(s,l,j) - U_t(s,l,j)\big)$, net the cost of creating vacancies $\kappa\big(\theta_t(s,l)\big)$.

Taking the first order condition with respect to $\theta_t(s,l)$, we obtain:

$$p_{(\theta_t(s,l))}\big(\theta_t(s,l)\big)\big(V_t(s,l,j) - U_t(s,l,j)\big) \leq \kappa$$

and $\theta_t(s,l) \geq 0$ with complementary slackness. This optimal search strategy implies that the labor market tightness depends on the surplus $\big(V_t(s,l,j) - U_t(s,l,j)\big)$, which in turn depends on the worker's skill set, whether or not the worker has an occupational license and work-life expectancy but not the aggregate state of the economy. See MTV (2016) for the full definition of the equilibrium, proof of existence, uniqueness, and efficiency.

As already demonstrated by MTV (2016), in equilibrium a worker's characteristics affect the trade-off between the probability of finding a vacancy and the value offered by the vacancy. In this model with efficient licensing decisions, higher wages for licensed jobs ought to attract more workers to those jobs, but applicant queues become more congested, decreasing the probability of getting a job in licensed occupations such that, in equilibrium, workers are indifferent between licensed and unlicensed jobs.

When obtaining a license is costly, however, few workers select into licensed job queues. Our model reveals that for workers with the same characteristics *(the same schooling attainment and age, for example)*, the fact that a license is costly improves the probability of finding a job because queues of applicants for licensed jobs are shorter than for jobs without a license requirement.

The queue of applicants—ratio of workers to vacancies—is the inverse of the labor market tightness θ. Less congested queues of licensed applicants lead to a higher job-finding rate for licensed applicants. The presence of licensing costs is consistent with the observed employment premium for obtaining an occupational license. Lastly, aging—declining work-life expectancy—decreases the value of a job to a worker, which is also consistent with MTV (2016).

Estimation and Application of the Theory

In this section, the model uses observed labor market outcomes from the Current Population Survey (CPS) 2015 and 2016 data to investigate how much labor market outcomes can explain flows into licensed job searches accounting for age and education.

The chosen model period is one year. We selected the discount factor β so that the annual real interest rate in the model is four percent. The survival rates ω_j are such that (conditional on age) workers have 35-year work-life expectancy. The fraction of college-educated workers: 0.28 is taken from the CPS data.

The ratio of wages to home production—that Hall and Milgrom (2008) estimate to be 0.7—is used to pin down the parameter b.

We assume the output of a job that employs a worker with no college degree to be $x\ (0, l) = 1$. Per-period production for workers without a college degree $x\ (0, l)$ counts as normalization because it is relative surplus - the ratio $\frac{S\ (1,l)}{S\ (0,l)}$ - that pins down the schooling wage premium.

The matching process is described by the vacancy cost κ, the job separation rate δ and the matching probability that we restrict to be of the form $p(\theta_t) = q(\theta_t)\theta_t$ where $q(\theta_t) = 1 - \exp(-\frac{1}{\theta_t})$ as in Shimer (2005). Following Shimer (2005), a firm hires a worker of type (s, l) if it receives at least one application from a worker of type (s, l) implying the hiring rate: $q\big(\theta_t(s, l)\big) = 1 - \exp\big(-1/\theta_t(s, l)\big)$.

We use minimum distance estimation (an inference method) to estimate the rest of the parameters, and we estimate four parameters to match four data targets: the schooling wage premium; the licensing wage premium; the job finding rate of licensed college-educated workers relative to those without a license; and the job finding rate of licensed non-college-educated relative to those without a license.

The parameters to be estimated are per-period productivity of college-educated workers, marginal productivity of licensed workers, the vacancy cost, and the deterministic cost for obtaining a license: x_1, η, κ, c. The selected model parameters are such that the model results match the college wage premium (1.48) and the license wage premium (1.15) consistent with the worker's relative job finding rates. The job finding rates of licensed workers are 0.01 and 0.03 greater than those of non-licensed workers for college-educated and workers with no degree, respectively.

Table 3: Estimation Results

Estimated Parameters $x_1 = 1.0074\ \eta = 0.1454$ $\kappa = 0.4162\ c = 1.2795$	Estimated Model	Data Targets
Targeted Moments		
Licensing Employment Gains for Workers with No College Degree	0.03	0.03
Licensing Employment Gains for Workers with a Four-Year Degree	0.01	0.01
License Wage Premium	1.15	1.15
College Wage Premium	1.48	1.48

Source: Current Population Survey 2015-2016
The Buckeye Institute's Macroeconomic Model

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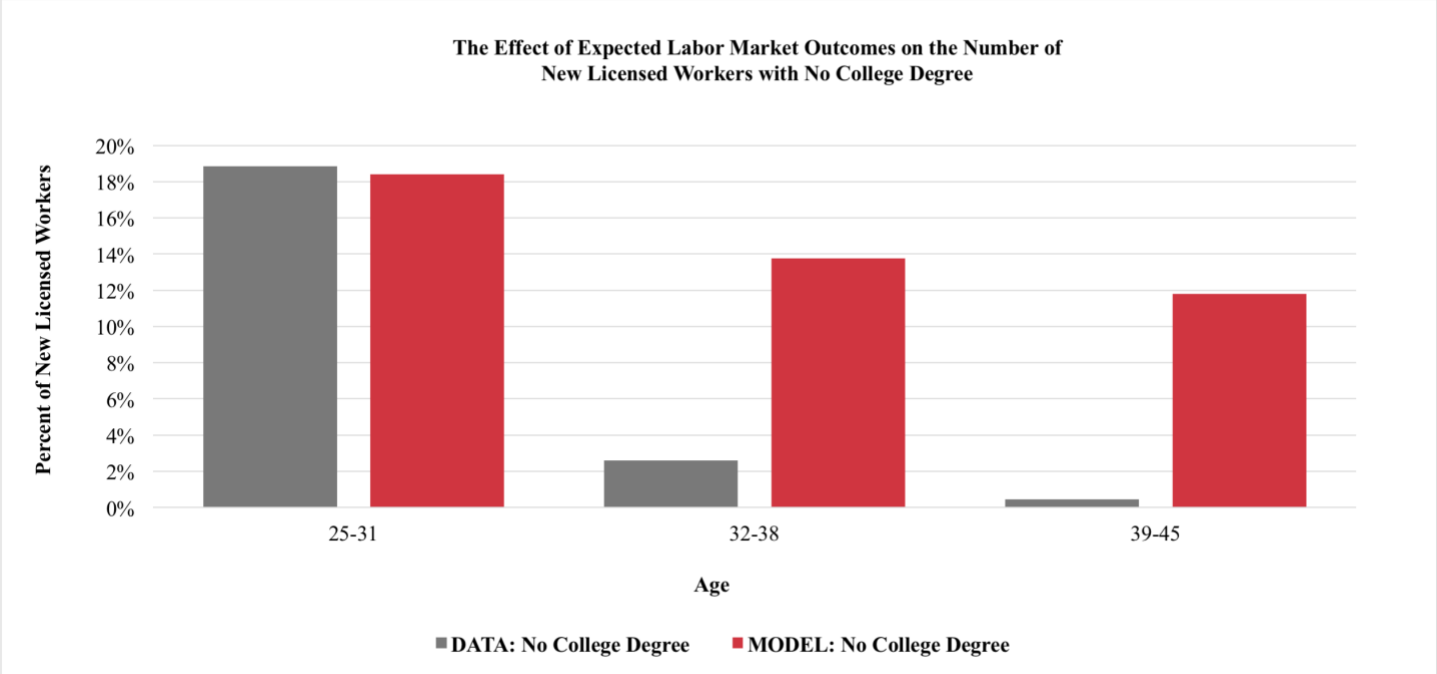
The estimated model is consistent with the effect of work-life expectancy on the probability of becoming licensed. The model predicts that younger workers are more likely to choose licensing. Our model underestimates the benefits of a license because it only measures the effect of expected labor market outcomes and does not address other possible benefits that may be incurred from having a license such as signaling the labor quality of the worker.

Younger workers choosing licensed occupations implies that raising the burden of licensing would greatly harm younger workers. But the model also suggests that given the observed labor market value of a license, middle-aged workers should be selecting licensed occupations at a higher rate (see Figures 3 and 4).

Figure 3: Occupational Licensing of Workers with No College Degree



Source: Current Population Survey 2015-2016
The Buckeye Institute's Macroeconomic Model

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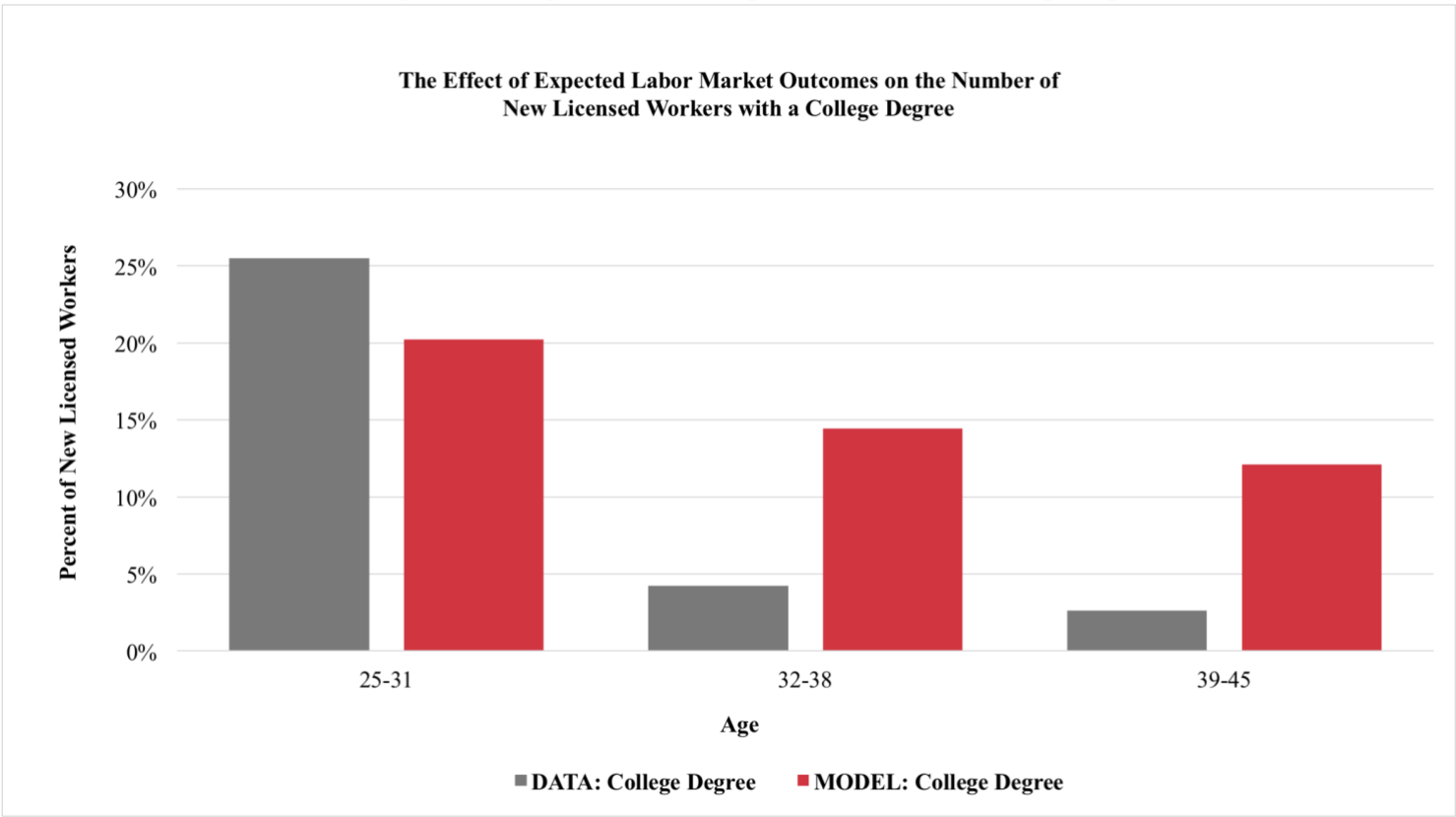
Figure 4: Occupational Licensing of Workers with a College Degree



Source: Current Population Survey 2015-2016
The Buckeye Institute's Macroeconomic Model

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These findings suggest that disproportionately higher licensing costs for workers in the 32-38 and 39-45 age groups could explain why so few middle-aged workers obtain a license. The gap between the efficient flows and the observed flows into licensed occupations varies greatly across different groups, which suggests that the burden of licensing requirements is not uniform across all groups of job seekers.

Conclusion

Licensing requirements impose disproportionate burdens on job seekers. High licensing costs prevent workers from entering licensed occupations, resulting in licensed workers finding jobs more easily than unemployed unlicensed workers. Our model suggests that without licensing costs, more workers would pursue a license. Even if a license guarantees higher wages, however, an increase in the number of licensed workers without an equal increase in the demand for licensed workers will make it less likely that a licensed worker finds a job, thus reducing the employment gains enjoyed by licensed workers. Consequently, some workers will choose not to get a license, opting for the more attainable lower-wage jobs.

A job's value diminishes with declining work-life expectancy, and thus the value of a license also declines with age. For middle-aged unemployed workers who want a license, the cost of delaying labor market entry and the financial burdens associated with licensure may prevent them from obtaining the license. Occupational licensing requirements thus also have a disproportionate and an unfair negative impact on middle-aged unemployed individuals with no college degrees—a group more negatively affected by the current licensing burden than other groups.

We estimate that Ohio's licensing requirements have prevented more than 7,000 working-age individuals between 25-45 years of age from pursuing licensed occupations. Most of these individuals lack a college degree, resulting in a larger employment and wage gap between them and their college-educated counterparts. Thus, the occupational licensing burden contributes to Ohio's economic inequality.

Conversely, reducing or removing licensing requirements that are not essential to protecting the public's health and safety will eliminate arbitrary barriers to labor, increase interstate migration, and widen the range of professions available to more workers. Lowering government-imposed barriers to labor markets will enhance job opportunities for *all* Ohioans and rebalance the state's employment prospects.

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