Rigged: Job Search and The Unfair Burden of Licensing Requirements

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Non-Technical Summary

Using an estimated model with efficient investments and directed job search, we audit the state licensing requirements: Are licensing requirements fair or are they more harmful to some groups relative to others? Can expected labor market prospects alone explain licensing outcomes?

Since obtaining a license is costly, few workers obtain a license. This implies that conditional on having a license, the job finding rate is higher for a licensed job applicant. The model explains why licensed workers are more likely to be employed than other workers.

Despite higher employment gains from licensing for young workers with no college attainment, workers with no college degrees are less likely to obtain an occupational license than college graduates. This is because licensing costs are higher for non-graduates than for college graduates. In the absence of skill-biased licensing requirements, workers with less schooling have a greater incentive to obtain a license compared to individuals who already possess a degree. When workers differ in their productivities, workers with the lower value outside option get the highest surplus from obtaining a license. This is why workers with no college degrees should be selecting into licensed jobs at a higher rate. The fact that fewer non-graduates relative to graduates are obtaining a license indicates the presence of skill-biased licensing requirements.

Using our estimated model, we learn that young workers (age 25-31) over-invest while middle aged workers (age 32-45) under-invest suggesting that licensing requirements are most harmful to middle-aged workers with no college degrees. Lastly, work-life expectancy decreases the value of a job to a worker, another reason for why selection into a licensed occupation decreases with age. Our paper is the first to provide an estimate of the disproportionate burden of occupational licensing on middle-aged workers, particularly those with no college degrees.

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Abstract

Despite higher employment gains from licensing for workers no college attainment, workers with no college degrees are less likely to obtain an occupational license than college graduates. In addition, the probability of obtaining a licensing declines with age. Using an estimated search-theoretic model of the labor market, we find that the burden of licensing is greater for less skilled workers than for college graduates. In the absence of licensing costs, workers with no college degrees have a greater labor market incentive to obtain a license compared to individuals who already possess a college degree. Middle-aged workers (age 32-45) under-invest, suggesting that non-college graduates in that age range suffer more harm than other groups from arbitrary licensing requirements. Lastly, declining work-life expectancy reduces the surplus and the gains from obtaining a license, which explains why young workers invest at a higher rate. Our results highlight the unfair burden of occupational licensing on workers with no college degree.

I. Introduction

Occupational licensing in the U.S. has gone from covering less than 5% of the working population in the 1950s, to covering about 29% in 2008 (see Kleiner and Krueger, 2013). In an effort to control the quality of workers, policy makers have created the regulatory web that we know today as occupational licensing. However, these requirements have been criticized as causing more harm than good since they are essentially elaborate barriers to entry. States that enact occupational licensing laws often include a "grandparent clause" that allows the workers who are currently employed in the occupation being licensed, to be excused from the new requirement. In other words, current workers are shielded from the costs of attaining a license for their own occupation.

The high costs faced by workers particularly those with less formal schooling coupled with the delay in labor market entry imply that there are positive returns for licensing since individuals are willing to work in licensed occupations. In that sense, obtaining a license or a certificate is similar to an investment in schooling that delays labor market entry but yields large future market rewards. Unlike with college education where a growing demand for college degrees led to higher education costs, the costs imposed on workers for obtaining a license aren't driven by a market demand for licensed workers. Instead, many licensing requirements found in licensing statutes and enforced by licensing boards are there by some arbitrary choice that varies greatly across US states.

In this paper, we investigate the effect of expected labor market on licensing decisions. We compare labor market outcomes for licensed workers with and without a college degree. High skilled workers are more likely to become licensed and yet the employment gains from licensing are highest for young workers with fewer years in formal schooling. Using an estimated model of the labor market with efficient ex-ante investments (see, Acemoglu and Shimer ,1999), we

investigate: Why are workers with no college degree less likely to obtain a license despite having the largest expected market rewards from licensing? Given the expected labor market returns to licensing, we compare efficient licensing outcomes - absent of arbitrary licensing costs - with observed outcomes. The model suggests high barriers of entry when the observed flow of new licensees is lower than the flow predicted by the labor market returns to licensing. In addition, the gap between the predicted flows and the observed flows varies across different groups suggesting a disproportionate impact of licensing requirements.

Studies have demonstrated the basic wage premium effect of possessing a license—the supply of available workers goes down and the price of their labor goes up (Gittleman & Kleiner, 2013). The decrease in supply can be attributed to the average upfront costs to getting a license (Carpenter, Knepper, Erickson, & Ross, 2012). Unsurprisingly, these costs make it more difficult for less educated and low-income individuals to actually acquire the licenses for many occupations. In addition, the costs of failing a license exam can be quite large[2] since very often a licensing exam may only be administered a handful of times per year.

In addition to tracking growth in the number of licensees, the kind of workers who are receiving these licenses has also been recorded. More educated workers already tend to work in highly paid occupations that require licenses suggesting that perhaps the cost/benefit for obtaining a license is lower for high skilled workers than for low skilled workers. In addition, licensing is often part of the schooling requirements of highly educated workers who have already self-selected into occupations that require licenses. This contributes to greater prevalence of occupational licenses in the high-skilled population relative to their low-skilled counterparts.

For workers with lower schooling attainments, occupational licenses appear to take the place of formal education, and serve as the main indicator of qualification in the labor market. The high costs of licensing could negatively affect these individuals since they often work in lower paying jobs than high-skilled workers, making licenses relatively costlier for low-skilled workers. These regressive licensing costs could explain why fewer low-skilled workers obtain licenses despite larger rewards from obtaining a license than for workers with more years in formal education. These observations suggest that occupational licensing requirements may have an unfair disproportionate impact on workers with less years of schooling.

Using our estimated model, we find that labor market outcomes – wages and job finding rates – alone cannot explain why college educated workers are more likely to self-select into licensing. Instead, the fact that non-college educated workers are less likely to hold a license despite higher market returns to licensing, is consistent with unfair skill-biased licensing requirements. The

[2] 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).

results are consistent with licensing costs that have a disproportionate harmful effect on less skilled workers within their chosen occupations compared to high skilled workers. In the absence of unfair licensing costs, the returns to obtaining a license are lower for high skilled workers who, without a license, already fare better than their low skilled counterparts in the labor market. Workers with a lower outside option have the highest surplus from obtaining a license and workers with no college degrees should be selecting into licensed jobs at a higher rate. The next section presents some stylized facts about labor market outcomes of licensed individuals. Section III presents the theory. Section IV describes our estimation strategy and results. Section V discusses the implications of our findings and Section VI concludes.

II. Stylized facts

In this section, we summarize labor market statistics for job seekers only. Since our paper aims to explain the role of labor market prospects on the decision to obtain a license, we abstract from discussing the self-employment motive and omit self-employed individuals from our analysis.

Table 1: Employment rates of
wage and salaried working- age (25-45) individuals

Current Population Survey Year 2015-2016	Licensed	Not Licensed	Difference in likelihood of employment
< than College Degree	0.96	0.93	0.03
College degree	0.98	0.97	0.01

Despite larger employment gains for non-college graduates, individuals with more years of formal schooling are more likely to obtain a license (see, figure 1). Figure 2 reveals that the probability that a worker obtains a license declines with work-life expectancy.

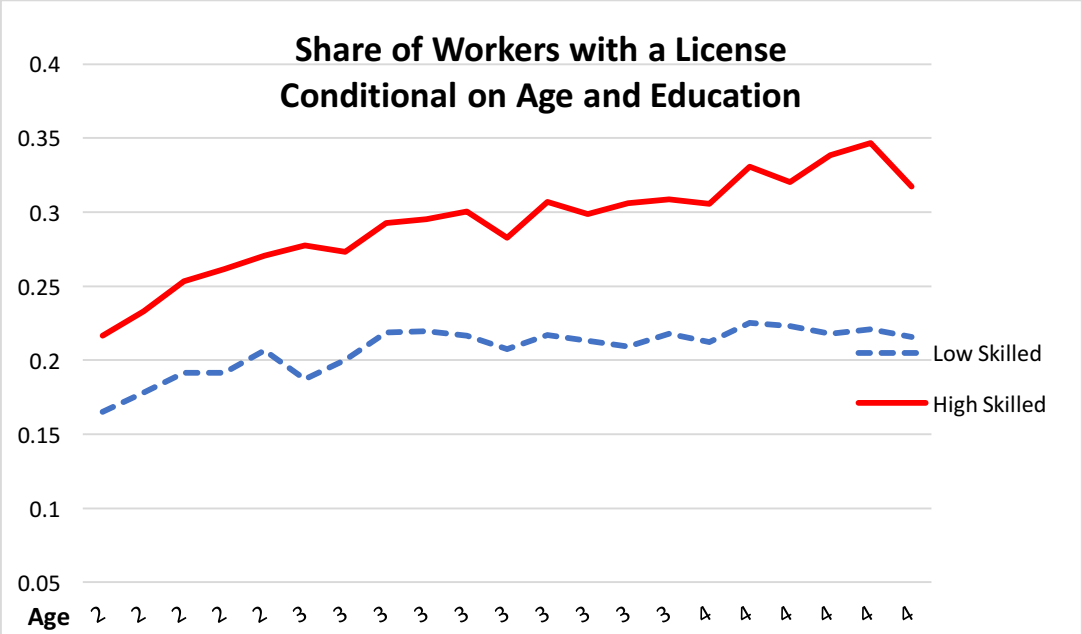

Figure 1: Stock of Licensed labor force participants conditional on age and education

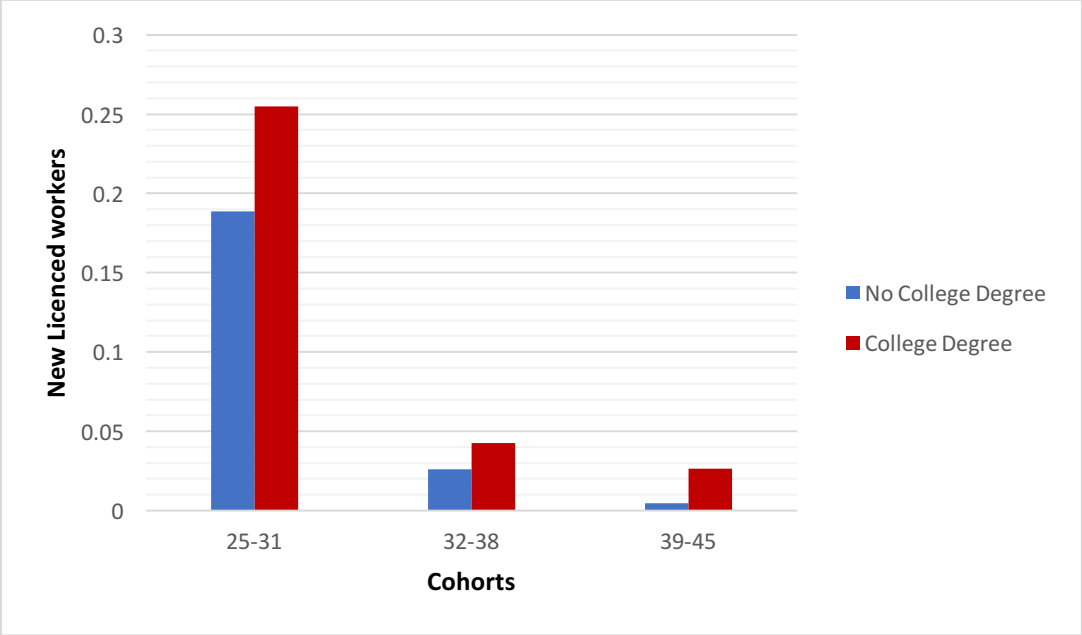

Figure 2: The probability of obtaining a license conditional on age

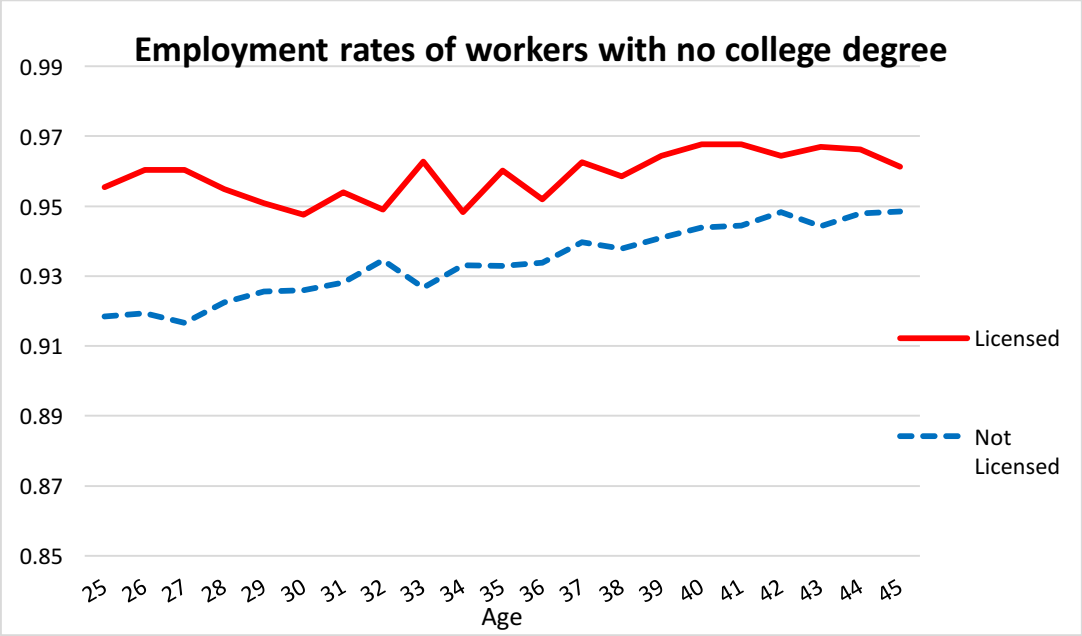

Figure 3: No college completion Employment rates conditional on age and education

The youngest and least skilled workers have the largest employment gain from having a license (see, figures 3 and 4). The employment gains are smaller for workers who possess a college degree than for workers without a college degree.

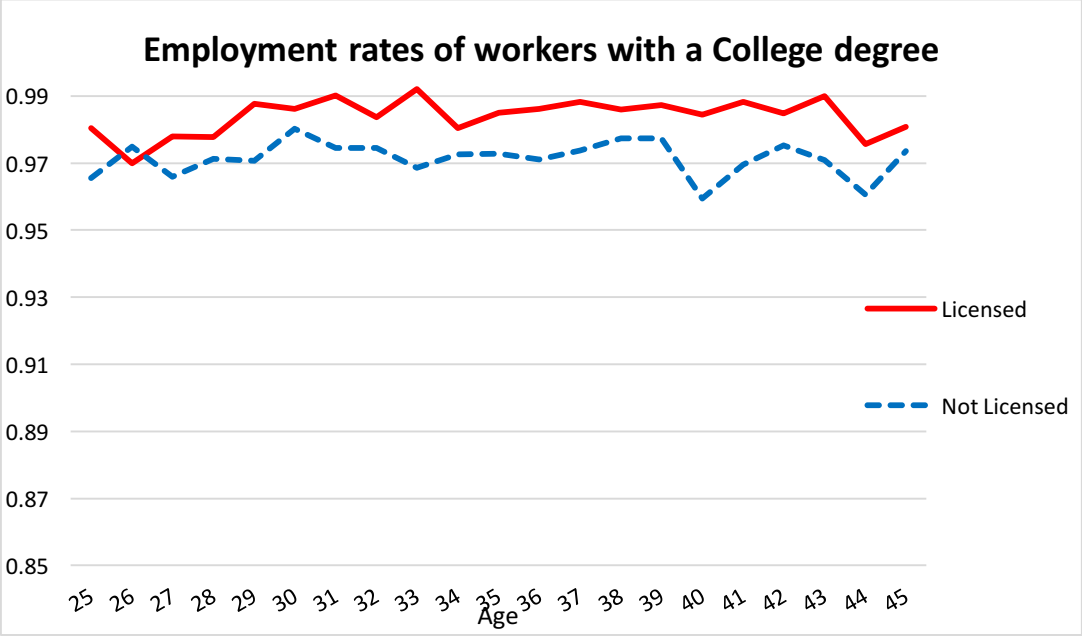

Figure 4: College graduates Employment rates conditional on age and education

The wage premium for having a license conditional on holding a college degree in table 2 are consistent with regression results from Kleiner and Krueger (2013). An occupational license provides a wage increase of 14.57% to workers while a college degree improves wage outcomes by 47.7%.

Table 2: Wage Differentials

Kleiner and Krueger (2013)	Licensed	Not Licensed
< than College Degree	1.1457	1
College degree or higher	1.6922	1.477

III. The Model

The directed search model of the labor market described below is taken directly from Menzio, Telyukova and Visschers (2016)[i] (MTV). The model belongs to the literature on directed search pionnered by Montgomery (1991), Moen (1997), Shimer (1996), Burdett, Shi and Wright (2001), and more recently Shi (2009) and Menzio and Shi (2011). Our version of the model incorporates efficient ex-ante investments – obtaining an occupational license – that changes the state of the worker 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 they guarantee efficiency (see, Acemoglu and Shimer, 1999).

One simplifying assumption in our model relative to MTV (2016) is that our model does not include on the job search and only the unemployed receive wage offers. This is a reasonable assumption since our paper aims to understand how occupational licensing affect the labor market 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 $\omega \in (0,1)$ is a survival rate. The number of individuals from each cohort born at the start of each period is equal to the fraction of retirees so that there is no population growth.

The labor market is organized in a continuum of submarkets indexed by $(y_{s,l,j}, s, l)$. Different submarkets differ with respect 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.

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 workers who are unemployed. The second component denotes the measure of workers who are employed. The subscript s represents skill or schooling attainment while the 1 or 0 represents workers with a license and those without an occupational license.

Every period is divided into four stages: the decision to obtain an occupational license, separation, search, matching and production. 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 obtain a license. Unfortunately, that workers must sit out the period, delaying the opportunity 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 has to leave his job for exogenous reasons.

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 of maintaining a vacancy for one period is $\kappa > 0$.

At the matching stage, the vacancies and the workers who are 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 to 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 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.

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:

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

where b is the value of an unemployed worker's current period consumption.

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

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

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

The cost for obtaining a license is C_s. The fraction of workers who obtain an occupational license $\gamma_s \in (0,1]$ is the probability that the benefit of obtaining a license exceeds its cost C_s. The threshold is defined as:

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

For 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 next period, the worker becomes unemployed with probability d. For the research question being investigated in this paper, we assume an exogenous separation rate δ.

Finally, the tightness of the submarket is such that

$$\kappa_s \geq q(\theta_t(s, l, \psi))\big[V_t(s, l, j\ , \psi) - y_{s,l,j}\big]$$

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:

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

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 has to incur in order 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 the worker's current employment state: $\vartheta = U_t(s,l,j)$ if unemployed. Substituting for an unemployed worker we obtain:

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

The above expression states that an unemployed worker chooses the tightness of the submarket where to look for a job so 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 $\kappa_s\big(\theta_t(s,l)\big)$.

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

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

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 Menzio, Telyukova and Visschers, (2016) for the full definition of a Block Recursive Equilibrium, proof of existence, uniqueness and efficiency.

As already demonstrated by MTV (2016), in equilibrium, worker's characteristics affect the trade-off between the probability of finding a vacancy and the value offered by the vacancy.

Since obtaining a license is costly, few workers obtain a license. We find that for workers with the same characteristics *(the same schooling attainment and age for example)*, investing in a costly license improves the probability of finding a job because queues of applicants for licensed jobs are shorter than for jobs that do not require a license. The queue of applicants – ratio of workers to vacancies – refers to the inverse of the labor market tightness θ. Less congested queues of licensed applicants imply that the job finding rate is higher for a licensed job applicant. This result is consistent with the observed employment premium for obtaining an occupational license.

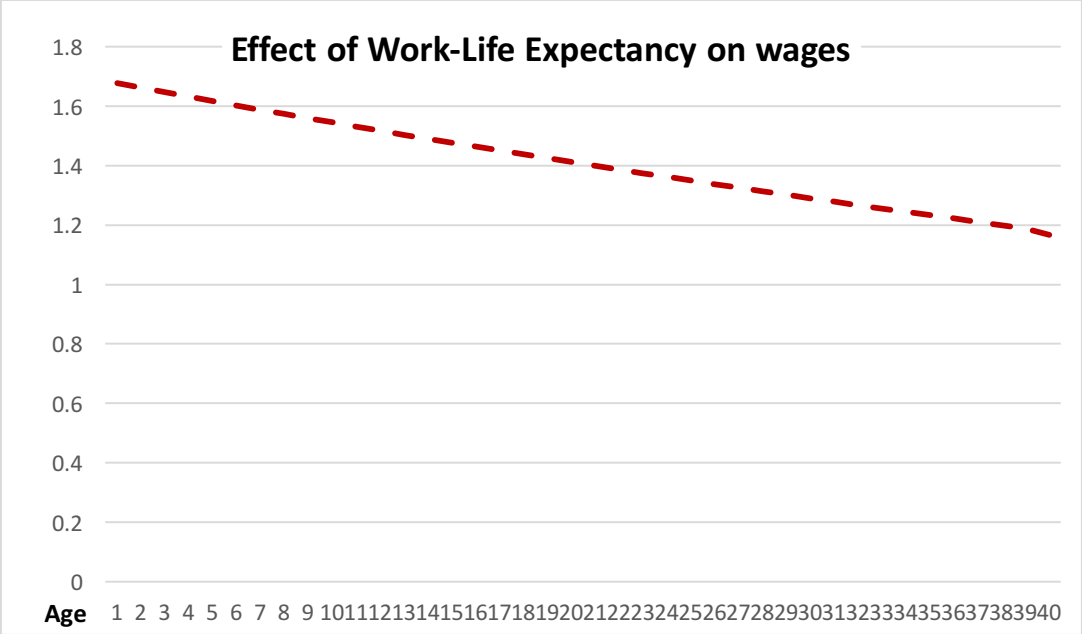

Figure 5: The effect of work-life expectancy

Aging – declining work-life expectancy - decreases the value of a job to a worker (see, figure 5).

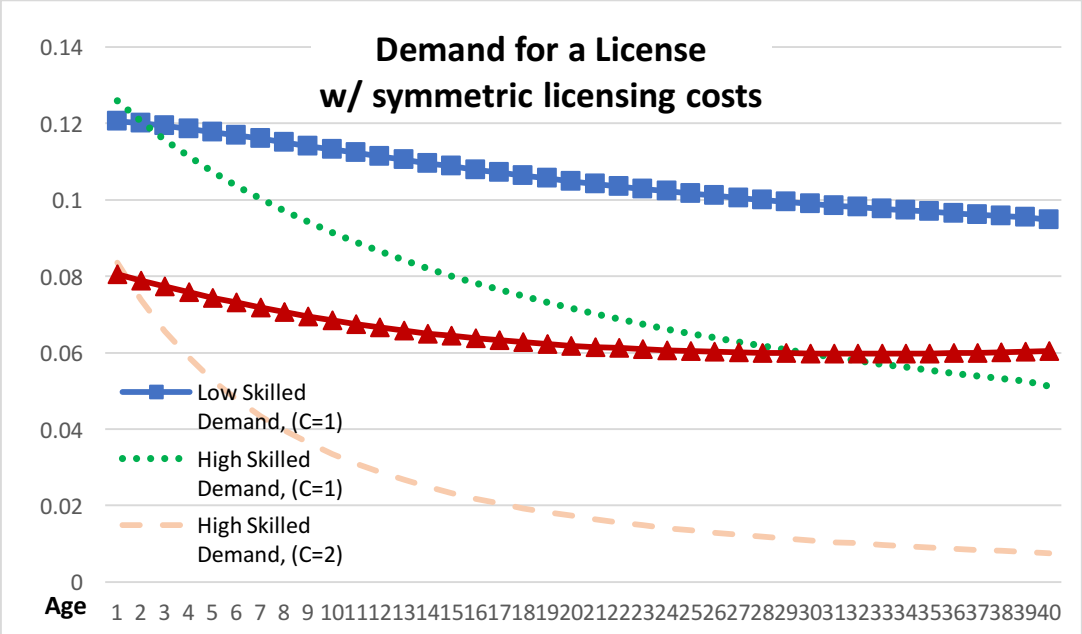

Figure 6a: The Demand for Licensing conditional on Age and Education

An increase in licensing costs causes a leftward shift in the demand for licensing. In the absence of unfair licensing costs, workers with less skills have a greater incentive to obtain a license compared to high ability individuals (see figure 6a). Higher licensing costs for low skilled workers relative to high skilled workers are a potential explanation for why low skilled workers are less likely to become licensed than high skilled workers (see figure 6b).

The negative effect of work-life expectancy on the surplus explains why the demand for licensing decreases with work-life expectancy. The effect of work-life expectancy on the surplus is consistent with MTV (2016).

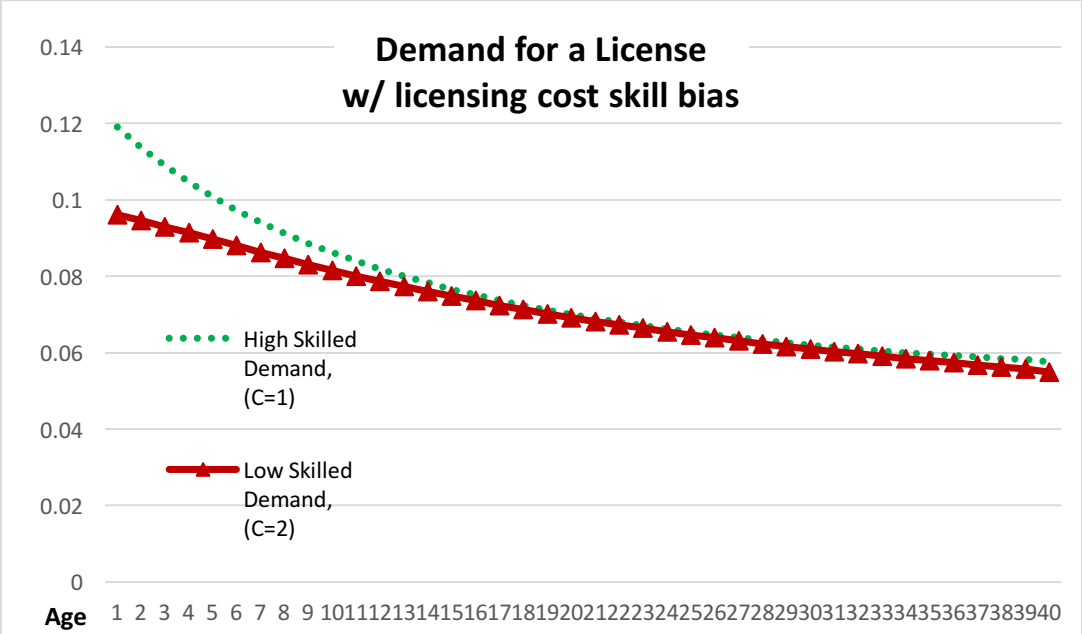

Figure 6b: The Demand for Licensing conditional on Age and Education

IV. Estimation and application of the theory

In this section, we estimate the model to replicate observed outcomes from the Current Population Survey (CPS) 2015 and 2016 data. We ask: how much can labor market outcomes explain the share of workers with a new license conditional on age and education?

The estimation procedure assumes symmetric licensing costs to test whether expected labor market outcomes – the schooling premium and the licensing premium – alone can explain occupational licensing outcomes.

Some model parameters are taken directly from the data. Preferences are described by the discount factor β, survival rates ω_j, and the value of non-labor income b. The model period is set to be one year and so β is calibrated so that the annual real interest rate in the model is 4 percent. ω_j is set such that conditional on age, workers have a 35-year work-life expectancy. The value of a worker's non-labor income b is set to match the ratio of home production to wages – which Hall and Milgrom (2008) estimate to be 0.7. The fraction of college educated workers: 0.28 is taken from the CPS. The matching process is described by the vacancy cost κ, the job separation rate δ and the exponential matching function $q(\theta) = 1 - e^{-(1/\theta)}$ and $p(\theta) = q(\theta)\,\theta$ as in Shimer (2005). The yearly separation rate for 2015 and 2016 is $\delta = 0.035$ taken directly from the Bureau of Labor Statistics Job Openings and Labor Turnover Survey (BLS/JOLTS).

Per-period production for low skilled workers x_0 counts as a normalization since the level of output does not affect our results. On the other hand, it is the ratio $\frac{x_0}{x_1}$ that pins down the schooling wage premium.

We use minimum distance estimation, an inference method to estimate the rest of the parameters. We estimate four parameters to match four data targets: the schooling wage premium, the licensing wage premium, the employment rates of college educated unemployed workers and those of non-college educated unemployed workers. The parameters to be estimated are per-period production by choosing x_1 and η such that the surplus of college graduates relative to non-graduates is consistent with the college wage premium 1.478 and so that the wage premium for having obtained a license is 1.146 as in Kleiner and Krueger (2013). The per-vacancy costs κ_0 and κ_1 are chosen to match the education specific employment rates observed in the data. The mean of the cost distribution for choosing licensing is assumed to be symmetric for low skilled and high skilled workers ($C_1 = C_0 = C = 1$) since we want to learn how much wage differentials alone can explain differences in licensing outcomes.

Table 2: Estimation Results

Estimated Parameters	**Estimated Model**	**Data**
$x_1 = 3.0359$ $\eta = 0.1329$ $\kappa_0 = 0.0583$ $\kappa_1 = 0.0450$		
Targeted Moments		
Employment: No College Degree	0.946	0.945
Employment: 4-year College Degree	0.977	0.977
License Wage Premium	1.146	1.146
College Wage Premium	1.478	1.478
Non-Targeted Moments		
Employment: No College Degree with license	0.95	0.96
Employment: No College Degree without license	0.94	0.93
Employment: 4-year College Degree with a license	0.98	0.98
Employment: 4-year College Degree without license	0.97	0.97

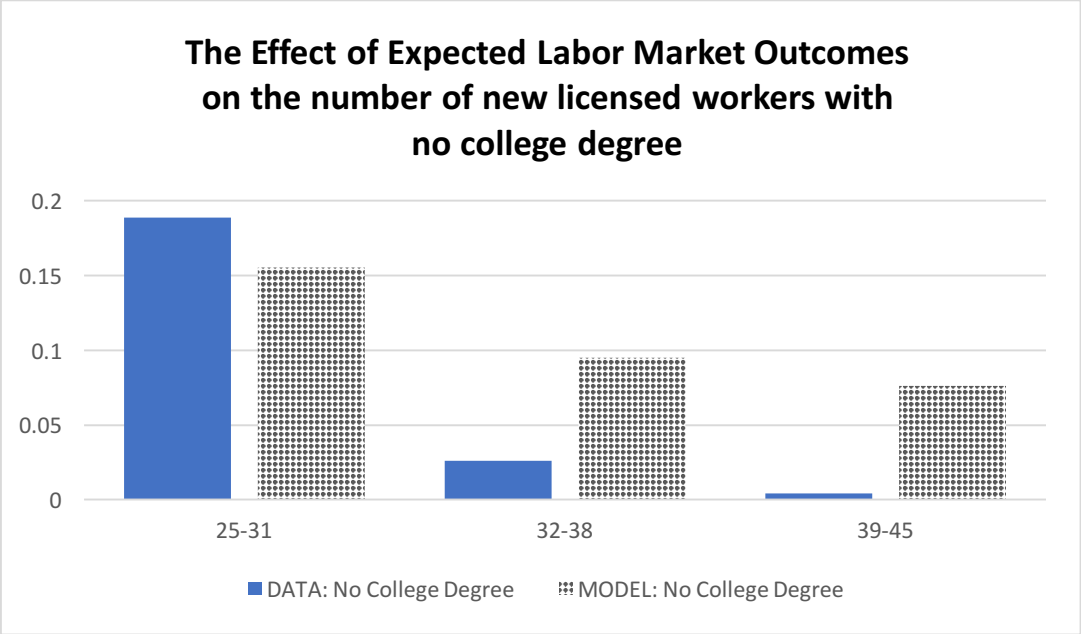

Figure 7: Occupational Licensing of workers with no college degrees

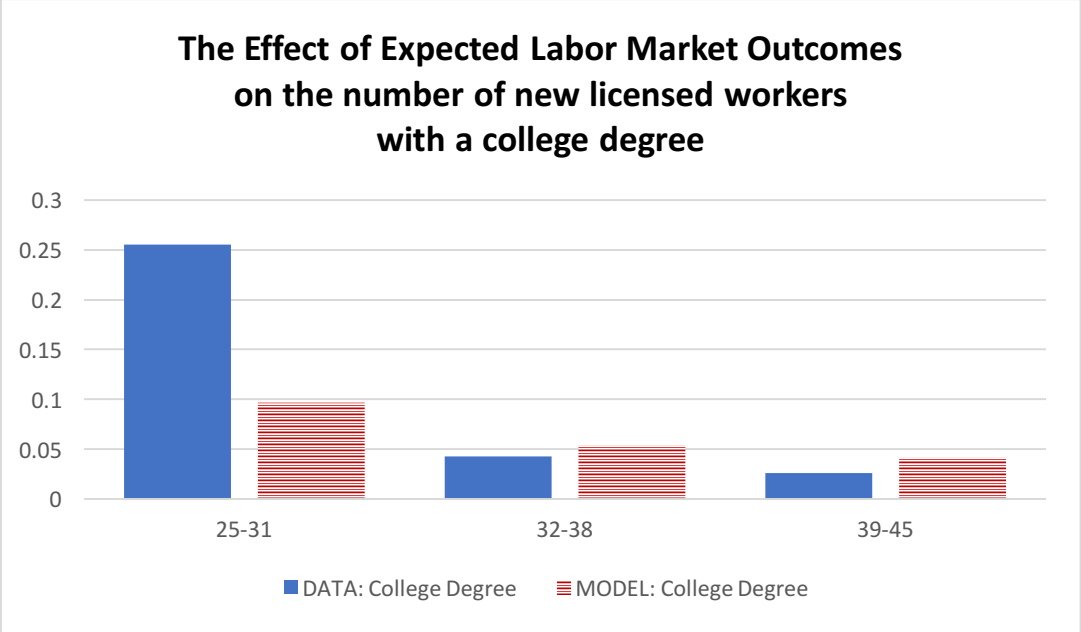

Figure 8: Occupational Licensing of workers with college degrees

First, the estimated model is consistent with the effect of work-life expectancy on the probability of becoming licensed. Second, the model reveals that young workers, especially those with a college degree over-invest suggesting that perhaps the cost of licensing is lower for young educated workers (age 25-31) than for older workers (age 32-45). In addition, while the model does a good job of capturing the share of new licensed workers with a college degree (see figure 8), the short supply of licensed workers without a college degree suggests that the burden of licensing is higher for non-college educated workers (see figure 7).

The model suggests high barriers of entry when the flow of new licensees is lower than the flow predicted by the labor market returns to licensing. In addition, the gap between the predicted flow and the observed flow varies across different groups suggesting that licensing requirements are more harmful for some groups relative to other groups. Our results reveal the unfair burden of state licensing requirements.

V. Discussion

In this section, we provide a discussion of our results.

In our model, when workers are identical and there are no licensing costs, even if a license guarantees higher wages, an increase in the number of licensed workers puts downward pressure on the probability that a licensed worker finds a job causing some workers to opt for non-licensed jobs that pay lower wages but are easier to get. Workers face the tradeoff between better paying licensed jobs that are harder to get and lower paying jobs that are easier to obtain. In equilibrium, workers are indifferent between obtaining a license and not getting one. However, with positive licensing costs, the licensing costs prevent the flow of new licensed workers and so the job finding rate of licensed workers remains higher than that of workers searching for jobs that don't require a license.

When workers differ in their productivities, workers with a lower outside option have the highest surplus from obtaining a license. This explains why workers with no college degrees should be selecting into licensed jobs at a higher rate. The fact that fewer non-graduates relative to graduates are obtaining a license indicates the presence of skill-biased licensing requirements. These barriers to entry are harmful to groups of unemployed workers who would most benefit from a license.

VI. Conclusion

[Incomplete]

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