

EFFECTS OF OCCUPATIONAL LICENSING LAWS ON MINORITIES:  
EVIDENCE FROM THE PROGRESSIVE ERA

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March 17<sup>th</sup>, 2008

Abstract

This paper investigates the effect of occupational licensing regulation on the representation of minority workers in a range of skilled and semi-skilled occupations. We take advantage of a quasi-experiment afforded by the introduction of state-level licensing regulation during the late nineteenth and to mid twentieth centuries to identify the effects of licensing on female and black workers. We find that licensing laws seldom harmed minority workers. In fact, licensing often helped minorities, particularly in occupations where information about worker quality was difficult to ascertain.

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*Occupational licensing coupled with white-dominated craft unions has been a particularly effective tool for reducing employment for Negroes.*

*(Williams 1982, p. 90-91)*

*Professionalization, with its carefully delineated medical prerequisites, spelled out in detail the requirements for being a doctor... If one must gain entrance into a medical society or obtain a license, women could rise to meet the requirements... In short, it is possible to argue that it is easier to overcome a series of known obstacles than tilt at a series of shadowy specters.*

*(Walsh 1977, p. 14-15)*

## I. INTRODUCTION

It is often claimed that occupational licensing regulations disadvantage minorities such as women, blacks, and Jews (Kessel 1958, 1970; Alchian and Kessel 1962; Frech 1975; Sorkin 1977; Williams 1982). Licensing laws may reduce the prevalence of minorities, either because minorities find it more costly to meet licensing requirements, or because licensing represents a deliberate effort to exclude minorities. While in the first instance a decline in minority representation is an unintended consequence of licensing, in the second, licensing allows regulatory authorities and incumbent practitioners to indulge in their taste for discrimination.<sup>1</sup>

To the extent that it raises entry barriers (Stigler 1971), licensing may reduce the representation of disadvantaged groups within an occupation. However, this is not the only role that licensing may play. Since Arrow (1963), economists have recognized that licensing can help solve informational asymmetries about professional quality (Akerlof 1970; Leland 1979; Law and Kim 2005). If uncertainty about worker quality gives rise to statistical discrimination over observable characteristics like sex or race, then licensing

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<sup>1</sup> The claim is not that there was no discrimination against minorities in the absence of licensing but rather that licensing may have the effect of reducing the representation of minority workers even further. Indeed, the historical literature suggests that there was discrimination against minority workers in many occupations (Walsh 1977; Williams 1982). Because we will employ a differences-in-differences approach, our empirical methodology controls for state-specific discriminatory tastes as well as discriminatory tastes that are changing over time across all states.

regulation that serves as an imprimatur of quality and increase the presence of minority workers in regulated occupations (Lundberg and Startz 1983; Coate and Loury 1993).<sup>2</sup>

Relatively little empirical work has systematically examined the relationship between occupational licensing and the representation of minority workers. This is a significant omission given that 20 percent of today's labor force is licensed by state governments (Kleiner 2006). In this paper we remedy this deficiency. Specifically, we take advantage of the quasi-experiment afforded by cross-state and temporal variation in the adoption of licensing regulation across a broad sample of occupations representing approximately 6 percent of the non-agricultural civilian labor force during the late nineteenth and early twentieth centuries (the Progressive Era) to identify how licensing affected the representation in women and black workers. Because licensing laws were adopted at different times in different states, we can compare the differential effect of the adoption of licensing regulation on the majority group (white men) and minorities (female and blacks) in various occupations, using states that did not adopt licensing to control for nationwide trends in minority participation in these occupations. By including a range of occupations that represent a spectrum of high and low skill jobs, we are able to speak generally about the effects of licensing on minority groups. Additionally, for two occupations (teachers and physicians) we have data on specific licensing requirements that allow us to measure licensing more precisely.

Because licensing laws were introduced in the Progressive Era, it is important to interpret our findings in light of the historical facts about labor markets for minority workers. Unequal access to education, union control of entry in certain trades, and

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<sup>2</sup> The potential for licensing to reduce the extent of statistical discrimination has been noted by Walsh (1977, p. 15) who writes: "Female physicians already suspect because of their sex, required corroboration of their expertise to meet a disbelieving public."

imperfect credit markets greatly restricted minority entry into certain high skilled occupations (Higgs 1977; Walsh 1977; Margo 1990). Additionally, prevailing attitudes about the appropriate roles of blacks and women resulted in some occupations being segregated along race or sex lines. In particular, there were strong norms that prevented blacks from holding positions of authority over whites and women over men (Dewey 1952; Fishback 1984; Whatley 1990; Goldin 1990; Sundstrom 1994). For segregated occupations, as well as for high skilled occupations with few minority workers, it is unlikely that licensing laws were introduced with the specific intent to reduce minority participation since minority workers were not a competitive threat.<sup>3</sup> The intent to exclude minorities through licensing was therefore more likely for those occupations like barbering where minorities were well represented and could potentially compete with white or male workers. However, for all occupations minorities may have been less able to meet the new licensing requirements.

In all markets, segregated or otherwise, where worker quality was difficult to ascertain, licensing may have provided information about quality that reduced the extent of statistical discrimination and increased employment opportunities for minority workers. This is for two reasons. First, minorities may statistically discriminate against themselves. If a medical license helps assure quality, then blacks who previously sought out a white doctor or no doctor at all may decide to patronize a black doctor. Second, for segregated professions like teaching, decisions about which teachers to hire for black students were often made by white public school officials. A teacher license may have assured these officials of teacher quality and facilitated greater employment opportunities

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<sup>3</sup> This is consistent with Becker (1957), who points out that discrimination is often less virulent in settings where there are few minority workers.

for black teachers. Therefore, we expect that the effects of licensing on minority participation in a given occupation will depend on the extent to which minorities were a competitive threat in that occupation, as well as the degree of uncertainty about worker quality.

## II. LITERATURE REVIEW

Much of the evidence on the effects of licensing on minorities has focused on national time series trends on the minority share of an occupation during periods when licensing laws were introduced or strengthened. Frech (1975) and Sorkin (1977), for instance, argue that stricter licensing requirements introduced in the early decades of the twentieth century halted a steady increase in the percentage of female and black physicians. While these trends are suggestive, one must be cautious about attributing changes in the composition of an occupation at a national level to changes in legislation that are enacted at the state level.

An alternative approach to analyzing the effect of licensing on minority representation focuses on the effects of licensing exams (Dorsey 1980, 1983; Federman, Harrington and Krynski 2006). For instance, Dorsey (1983) finds that black cosmetology license applicants were 30 percent less likely to pass the licensing exam than white applicants, holding constant education and training. However, factors apart from education and training are likely to affect examination pass rates. Individual ability and the quality of training are also likely to matter. Additionally, the evidence from these studies is limited to a small number of occupations in a small number of states.

Our work builds on this literature in the following ways. First, we examine the effect of licensing on eleven different occupations for two minority groups (women and blacks), which allows us to speak more generally about the impact of licensing on minority representation than previous studies. Second, we take advantage of a potentially exogenous source of variation in licensing, namely cross-state and temporal variation in the introduction of licensing laws, to examine the effect of licensing regulation on minority representation. This approach is similar to the literature that exploits variation in regulatory regime to determine how changes in the competitive environment affect the earnings and occupational status of minority workers (Heywood and Peoples 1994; Black and Strahan 2001). Finally, unlike the existing literature, we have a clearly articulated alternative hypothesis. Theoretically, licensing regulation may increase the presence of minorities in occupations where information about worker quality is an issue.

### III. OCCUPATIONAL LICENSING AS A QUASI-EXPERIMENT

In order to make valid causal inferences we need to establish that the introduction of licensing is exogenous with respect to other factors that might influence minority participation in newly regulated occupations. We first examine national trends in the adoption of licensing regulation. Our measure is the percentage of workers in a given occupation who operate in a state that regulates that occupation. Information on the introduction of state licensing laws is from the Council of State Governments (1952), which surveyed state government agencies about the characteristics of their licensing laws. This survey reports the year in which a state first enacted a licensing law. We code

a state as having introduced licensing in a given census year, say 1920, if the state enacted a licensing law between 1909 and 1919.<sup>4</sup>

Figure 1 presents information on the growth of occupational licensing between 1870 and 1950 for 9 occupations: accountants, barbers, beauticians, engineers, midwives, pharmacists, plumbers, practical nurses and registered nurses. For an occupation to be included in our sample, it had to meet three criteria. First, the adoption of licensing regulation had to span at least two decades. Second, the occupation had to have a sufficiently large sample within the Integrated Public Use Microdata Samples (IPUMS) of the Census of Population. Finally, at least one percent of the occupation had to be either black or female. This implies that for some occupations, we will analyze the effect on women but not blacks or blacks but not women.

Several facts emerge from an analysis of Figure 1. First, while the extent of licensing overall increased during these decades, there are no obvious temporal patterns regarding the growth of licensing across these occupations. Some occupations, like pharmacy and accounting, began licensing earlier (in the 1870s and 1880s) than other occupations, like engineers and beauticians (which did not begin to become licensed until the early 1900s). Second, the rate at which licensing diffused within an occupation also differs dramatically across these occupations. While regulation of accountants, engineers, and registered nurses spread very quickly, licensing of barbers, plumbers, midwives and practical nurses spread more gradually. Third, the extent to which each occupation was licensed by the end of the sample period varies dramatically across occupations. Accordingly, while the Progressive Era did witness the rise of state level occupational

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<sup>4</sup> We also allowed a five year lag for licensing to take effect. Our empirical results were unaffected by this change.

licensing of various professions, these facts suggest that licensing was not clearly correlated with time.

If licensing is to serve as a quasi-experiment, then the characteristics of states that adopt licensing in a given period (the treatment group) should be similar to the characteristics of states that do not (the control group). For instance, if urbanization leads to rising female labor force participation and is also correlated with licensing, then any positive correlation between licensing and female participation in licensed professions may be spurious. Additionally if states that adopted licensing early were also states where minorities were increasing their representation in skilled jobs, then we might misattribute the growth of minority workers in these occupations to the adoption of licensing laws. The failure to find a correlation between changes in state-level characteristics (like urbanization and minority labor force participation) and the introduction of licensing would suggest that unlicensed states are indeed a valid control.

We estimated a series of probit regressions of the factors that influence whether a state has adopted licensing of a given occupation in a given census-year.<sup>5</sup> As state-census-year controls we included the average age of the population, literacy rates, urbanization rates, the share of the population that is domestic born, census region and year dummies. We also include variables that directly measure state-level changes in minority representation. No systematic patterns emerge from an analysis of these coefficients. The timing of the adoption of licensing legislation for each of these occupations does not appear to be related to region, urbanization, or demography in any obvious way. Additionally, the passage of licensing laws is uncorrelated with trends in the race or gender composition in a state or within an occupation. The results suggest that

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<sup>5</sup> For full results see SSRN Working Paper No. 943765.

the adoption of occupational licensing regulation furnishes a quasi-experiment that will allow us to make causal inferences about how licensing laws affected women and blacks.

#### IV. THE DATA

The data for our analysis are from IPUMS which represent a sample of individual returns from the United States Census of Population. Our full sample includes individual-level observations from the 48 contiguous states from the 1870 through 1960 censuses.<sup>6</sup> The population censuses include information on occupation (self reported), race, sex, state of residence, and other individual and household level characteristics. For consistency, we use the IPUMS 1950 Census of Population occupational definitions. We restricted our attention to individuals aged 14 years and older. Additionally, we dropped housewives, inmates, retired persons, military personnel, and individuals living on reservations from our sample.

Our key variables pertain to the race (black versus white) and sex (male versus female) of the individual.<sup>7</sup> Table 1 presents information on the size of the sample available for each of the occupations under investigation. The sample size (in person years) depends on which census years are included and the presence of workers in that occupation by sex or race. While the number of person years in our sample is very large, it is important to note that the source of identification is state-year variation in licensing regulation. Hence, in the fourth column, we also report the number of state-years of data available for each occupation.

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<sup>6</sup> 1890 is excluded because the individual census returns were destroyed.

<sup>7</sup> We experimented with including foreign born workers as a minority group and found little evidence that they were affected by licensing.

Table 1 also shows the total number of workers in each occupation, the share of that worked in each occupation, as well as the number and share of female and black workers in each of the regulated occupations. A glance at this table demonstrates that minority representation varies across occupations. Women are highly represented as teachers and nurses, but not as engineers or plumbers. For barbers and beauticians, practical nurses and teachers, black workers are reasonably well represented. However, there are very few black physicians and even fewer black accountants. In fact, for some occupations, blacks are so poorly represented that we cannot analyze how licensing affects them.

In those cases where the number of minority workers is very small we must be cautious because many state-year cells contain no minority workers in a given occupation. However, because we have information on many occupations for which different states enacted licensing laws at different times, finding similar results across different occupations gives us more confidence in our analysis.

## V. EMPIRICAL RESULTS

To estimate the effect of occupational licensing regulation on the prevalence of female or black workers in each occupation, we use a “difference-in-differences” (DID) estimator. In terms of the regression framework, we obtain the DID estimator by interacting a licensing indicator variable with a black or female indicator variable. The coefficient on this interaction term is the DID estimate. The interaction term tells us if female or black workers are disproportionately affected by licensing, controlling for the effect that licensing has on the likelihood of any individual belonging to this occupation.

For each occupation and minority group, we estimate the following probit regression equation:

$$P(y_{ijt} = 1) = F\{\beta_1 L_{jt} + \beta_2 M_{ijt} + \beta_3 L_{jt} M_{ijt} + \beta_4 X_{ijt} + \beta_5 S_j + \beta_6 T_t + \varepsilon_{ijt}\}$$

$P(y_{ijt} = 1)$  is the probability that individual  $i$  in state  $j$  in census year  $t$  works in the occupation;  $L_{jt}$  is the licensing indicator variable that equals 1 if a state had introduced licensing regulation for the occupation by year  $t$  and 0 otherwise;  $M_{ijt}$  is the minority status (black or female) indicator variable;  $L_{jt}M_{ijt}$  is the interaction term;  $X_{ijt}$  is a vector of other individual and household level controls including dummy variables for married, widowed (the excluded category is never married), residence in a metropolitan area, domestic born, school attendance, and literacy. We also include variables measuring the number of families living in the household, age of the respondent, and the number of children;<sup>8</sup>  $S_j$  and  $T_t$  are state and year fixed effects; and  $\varepsilon_{ijt}$  is the error term. The variable of interest is  $\beta_3$ , the coefficient on the interaction term.

Tables 2 and 3 display the DID estimates of the effects of occupational licensing regulation on black and female workers respectively. Each column shows the coefficient estimates for a given occupation. The only negative and statistically significant interaction term is found for barbers. Barbering was a relatively low-skilled occupation, where whites and blacks directly competed for clientele. Given that blacks were well represented in the barbering profession, black barbers were potential competitive threats.<sup>9</sup>

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<sup>8</sup> Because the 1870 Census of Population did not include information on marital status, the first two indicator variables were excluded for our analysis of those occupations where licensing began very early in the sample period. Since questions about current school attendance were not asked in the 1950 Census of Population, we exclude this variable in those regressions that include 1950 in the sample. Whenever possible we include a binary variable that equals 1 if the individual is literate.

<sup>9</sup> Contemporary documents cited by Higgs (1977a, p. 86) indicate that barbering associations were frequently instructed by their membership to “Admit many [new members], but restrain Negroes when possible.”

In addition there was little role for statistical discrimination in barbering. Thus, it makes sense that barbering is an occupation in which we observe licensing harming minority participation.<sup>10</sup>

For female engineers, pharmacists, plumbers and registered nurses and for black practical nurses, the interaction term ( $\beta_3$ ) is positive and statistically significant. This implies that the representation of minorities increased more in states that licensed these occupations than control states that did not. It is revealing that the occupations where licensing helped female or black workers are relatively skilled occupations where minorities were not a competitive threat. Additionally, markets for these services were characterized by poor information about worker quality. In such markets consumers might rationally engage in statistical discrimination. Licensing therefore provided a few determined minorities an opportunity to prove their mettle. Although we hesitate to put too much weight on finding increasing minority representation in any one occupation with few minority workers, the fact that we discover positive and statistically significant effects for minority workers in five of the nine occupations gives us confidence that licensing did indeed help minority workers in higher skilled occupations.

*Robustness check: grandfathering and licensing*

So far our analysis has focused on the effects of licensing on all workers within a given occupation. Perhaps one reason why we do not find significant negative effects of licensing on minority representation is because licensing laws invariably grandfather

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<sup>10</sup> One might expect a similar finding for beauticians. While the coefficient on the interaction term is not statistically significant in the beauticians regression using the full sample, if one removes the southern states, the coefficient on the black indicator variable becomes positive and statistically significant and the interaction term becomes negative and statistically significant.

existing workers and only apply to new entrants. As a result, a significant portion of the sample may be unaffected by the introduction of a licensing law in a given year, biasing coefficient estimates toward zero. As a robustness check, we re-estimated our DID regressions focusing on young workers (less than 35 years old), the sub-sample of workers for whom licensing requirements are most likely to be binding.<sup>11</sup> Because the sample only includes 19 young midwives, we were unable to estimate this regression for midwives.

Table 4 displays the DID regressions for the sub-sample of young black workers. While our earlier results suggested that black representation in barbering was harmed by licensing, when we restrict attention to the group most likely to be disadvantaged by licensure, we find no such effect. For the remaining occupations, the interaction term is insignificantly different from zero. The introduction of licensing laws therefore did not disproportionately harm young blacks. Table 5 shows the corresponding regressions for young female workers. For pharmacy, plumbing, and registered nursing, the interaction term is positive and significant while for the other occupations it is insignificantly different from zero. The evidence therefore suggests that the adoption of licensing legislation did not reduce the representation of young female workers and often increased

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<sup>11</sup> Because licensing laws grandfather existing workers, one might be tempted to estimate a differences-in-differences-in-differences (triple diff) regression that interacts licensing, minority status and an indicator for young workers. An advantage of this approach is that it controls for within-state omitted factors that are potentially correlated with minority representation. The validity of a triple diff approach, however, rests in part on the assumption that old minority workers function as a good control for young minority workers with regards to occupational choices. This assumption is unlikely to be valid in our context. For instance, the old sub-sample of our data set likely includes old black workers who were former slaves. These workers are unlikely to be a good control for young black workers. Additionally, marriage and family obligations and the influence they have on female labor force participation and occupational choices make older women a poor control for younger women. Hence, we choose to present our analysis that focuses exclusively on young minority workers. The triple diff approach does, however, generate qualitatively similar results. Our results are also robust to the choice of age cutoff. Qualitatively similar results were found using 30 years of age as the cutoff for young workers.

it. These occupations, as discussed earlier, are ones where uncertainty about worker quality was likely an issue. If licensing requirements only apply to new entrants, and if licensing laws reduce uncertainty about worker quality, then new entrants should disproportionately benefit from licensing.

## VI. PHYSICIAN AND TEACHER LICENSING CASE STUDIES

We now turn attention to a detailed analysis of two occupations: medicine and teaching. This is of interest for several reasons. First, for these occupations, we can measure licensing using specific licensing requirements. A potential problem with the licensing variable used in the previous sections is that it treats all states that license a given occupation as having identical licensing regimes. An advantage of using a specific licensing requirement is that it should reduce measurement error that biases coefficient estimates towards zero. Second, an examination of physician and teacher licensing regulation may provide additional support for the statistical discrimination hypothesis because uncertainty about worker quality was important for these two professions.<sup>12</sup> Third, critics of medical licensing requirements have often claimed that licensing laws were used by organized medicine to harm minority and female workers (Kessel 1958; 1970; Starr 1982).

For each occupation, we measure licensing in two ways. For physicians, we use the year in which a four-year medical degree was required for a medical license or the year in which some pre-medical college education was required for a medical license.

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<sup>12</sup> During the Progressive Era, advances in basic science dramatically altered the nature of the medical profession, making the issue of physician quality increasingly salient to consumers of medical services. (Law and Kim 2005; Ludmerer 1985; Starr 1982). Similarly, in teaching, the growing importance of high school education and training in more technical scientific subjects also increased the knowledge base required to be an effective teacher (Goldin 1998).

Data on these requirements are from Baker (1984) and from the American Medical Association's Council on Medical Education (1930). For teachers, we use the year in which graduation from high school was required for the lowest level of certification or the year in which some college education was required for the lowest level of certification. Our data on teacher licensing requirements are taken from the US Bureau of Education's survey of state-level teacher licensing requirements (US Bureau of Education).

In probit regressions (not shown) of the correlates of teacher and physician licensing requirements at the state-year level, we find no systematic relationship between state-census-year controls and the presence of teacher and physician licensing requirements. Additionally, the adoption of teacher licensing requirements is uncorrelated with high school enrollment rates that may have favored male teachers. Accordingly, licensing of teachers and doctors furnishes a good quasi-experiment.

Our key findings are as follows.<sup>13</sup> Licensing increased the representation of blacks when the pre-medical college requirement is used to measure physician licensing. For women, licensing did not affect representation. Licensing may have allowed a few determined black physicians to display their competency. These results contrast with the conventional view, which argues that minority representation in medicine was adversely affected by Progressive era physician licensing laws. We find that teacher licensing requirements increased black representation and reduced female representation, regardless of how we measure licensing. The results for blacks are consistent with the statistical discrimination hypothesis. Taken at face value, the results for women are consistent with the standard hypothesis that argues that entry barriers facilitate

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<sup>13</sup> See SSRN Working Paper No. 943765 for full results.

discrimination. However, we are uncertain as to whether this is the correct interpretation, since in occupations that are disproportionately female it is unclear which sex is the target of discrimination.

As a robustness check, we re-estimated the teacher and physician regressions focusing exclusively on the young sub-sample of our data set. These results mirror those found using the full data set. We have two additional concerns regarding the teacher regressions. First, southern states licensed teachers later than other states. We re-estimated the teaching regressions excluding states from the South Atlantic (OK, AR, TX, LA) and West South Central (MS, AL, TN, KY) census regions and found similar results. Second, the time period during which teacher licensing requirements were introduced was also a period when marriage bars—laws that prohibited married women from working—were also adopted by local school districts (Goldin 1990). Because women who never married were not subject to these laws, we re-estimated the teacher regressions on the sub-sample of workers who were never married. The significantly negative impact of licensing on female representation in the teaching profession persists in these regressions.

## VII. CONCLUSION

It is widely believed that licensing laws reduce opportunities for traditionally disadvantaged workers. In this paper we take advantage of cross-state and temporal variation in the introduction of occupational licensing regulation during the Progressive Era to determine if in fact this is the case. By merging information on the timing of state licensing laws with individual-level data, we are able to investigate the effects of these

laws on a broad sample of occupations, ranging from unskilled occupations like barbers and beauticians to skilled occupations like engineers and pharmacists. Additionally, for two occupations (teachers and physicians), we examined the effects of specific licensing requirements on minority representation. Analyzing the effects of licensing on a broad range of occupations where licensing evolved differently allows us to speak generally about its impact.

Contrary to received wisdom, our empirical analysis suggests that the introduction of licensing legislation did not generally harm black or female workers. In only two occupations was licensing harmful for minority representation. Barber licensing reduced the representation of black barbers and teacher licensing harmed the representation of women in the teaching profession. However, for the remaining occupations in our sample licensing either had no effect on female or black participation or it had a positive effect. For instance, we find that licensing increased the representation of blacks among teachers, physicians, and practical nurses, and women in engineering and pharmacy. Hence, the conventional wisdom about how licensing affects minorities is not well supported, at least during the Progressive Era.

Two important conclusions emerge from this analysis. First, it is possible for incumbent practitioners to use the regulatory process to exclude minorities. However, our findings suggest that licensing is only likely to harm minority workers in those occupations where they are in sufficiently large number to pose a competitive threat. Second, in those occupations where minorities are under-represented, but where information about worker quality is costly to obtain, licensing can reduce statistical discrimination. Given that minorities are still under-represented in many skilled

occupations, this suggests that licensing may have an important role to play helping talented minority workers signal quality.

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Figure 1: The growth of licensing, 1870-1950

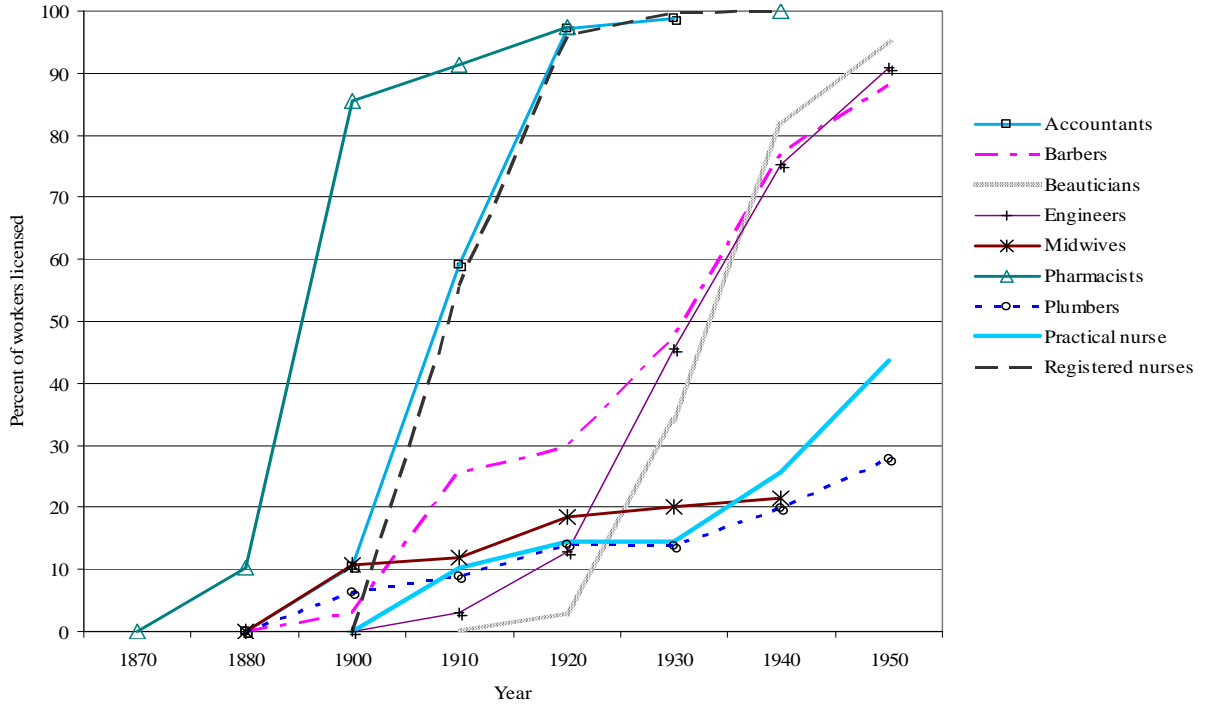


Table 1: Descriptive data on sample

Occupation	Years included in sample	States excluded (missing licensing data)	State years of data	Sample size (person years)	Number of workers in occupation	Number of female workers in occupation	Number of black workers in occupation
Accountants (percent)	1880-1930 <sup>a</sup>		192	957,787	1,745 (0.18)	188 (10.8)	0 <sup>d</sup>
Barbers (percent)	1880-1950	MI, NV	321	1,811,048	8,953 (0.49)	n/a <sup>b</sup>	1,000 (11.2)
Beauticians (percent)	1910-1950		240	441,193	4,700 (1.07)	n/a <sup>b</sup>	584 (12.43)
Engineers (percent)	1900-1950		288	1,901,607	10,865 (0.57)	127 (1.17)	0 <sup>d</sup>
Midwives (percent)	1880-1930	IL, PA	229	188,039 <sup>c</sup>	158 (0.07)	158 <sup>c</sup> (100)	115 (72.8)
Pharmacist (percent)	1870-1940 <sup>a</sup>		288	1,421,937	2,708 (0.19)	98 (3.62)	0 <sup>d</sup> (0)
Plumbers (percent)	1880-1950	ME, MI	321	2,331,786	9,965 (0.44)	118 (1.2)	243 (2.4)
Practical Nurses (percent)	1900-1960	MA, MI, MO, OK, PA, SC, SD, TN	280	2,374,246	5,836 (0.25)	5,582 (95.6)	922 (15.8)
Physicians (percent)	1900-1930		192	1,117,373	4,332 (0.39)	185 (4.3)	61 (1.4)
Registered nurses (percent)	1900-1940		240	1,470,335	5,736 (0.39)	5,580 (97.3)	138 (2.4)
Teachers (percent)	1910-1940		192	1,187,781	22,388 (1.9)	17,614 (78.7)	1,321 (5.9)

Notes:

<sup>a</sup> 1910 not included because accounting and pharmacy not reported as an occupation in that year.

<sup>b</sup> By the census definitions, barbers are always men and beauticians are always women.

<sup>c</sup> We exclude men from this sample because there were only two male midwives.

<sup>d</sup> We exclude blacks from this sample because the share of the occupation that was black was less than one percent.

Table 2: Effect of occupational licensing on black workers

	Barber	Beautician	Midwives	Plumber	Practical Nurse	Registered Nurse
Licensing indicator	0.007 (0.023)	0.043 (0.030)	0.276 (0.113)*	0.115 (0.035)**	-0.054 (0.035)	-0.031 (0.057)
(Black)*(licensing)	<b>-0.173</b> <b>(0.049)**</b>	-0.055 (0.075)	0.137 (0.175)	0.039 (0.063)	<b>0.137</b> <b>(0.067)*</b>	-0.086 (0.135)
Female				-1.005 (0.022)**	1.298 (0.032)**	1.424 (0.040)**
Black	0.215 (0.052)**	-0.015 (0.073)	-0.014 (0.101)	-0.471 (0.027)**	-0.060 (0.046)	-0.539 (0.138)**
Observations	1,737,679	441,193	164,243	2,225,502	2,374,246	1,470,335
State years	321	240	229	321	280	240

Notes: State and year fixed effects as well as individual and household level controls (age, literacy, urban residence, domestic, married, widowed, children, two families, three families, at school) are also included when available. Robust standard errors, clustered at state level, are in parenthesis. \*\* and \* denote statistical significance at the 1 and 5 percent levels, respectively. Each column represents a separate regression.

Table 3: Effect of occupational licensing on women workers

	Accountant	Engineer	Pharmacist	Plumber	Practical Nurse	Registered Nurse
Licensing indicator	-0.077 (0.082)	0.037 (0.020)	-0.053 (0.033)	0.114 (0.037)**	0.056 (0.041)	-0.252 (0.061)**
(Female)*(licensing)	0.110 (0.106)	<b>0.105</b> <b>(0.049)**</b>	<b>0.398</b> <b>(0.133)**</b>	<b>0.114</b> <b>(0.035)**</b>	-0.099 (0.053)	<b>0.239</b> <b>(0.080)**</b>
Female	-0.371 (0.106)**	-1.10 (0.044)**	-0.950 (0.132)**	-1.036 (0.014)**	1.333 (0.027)**	1.202 (0.081)**
Black				-0.461 (0.030)**	0.001 (0.025)	-0.616 (0.054)**
Observations	834,382	1,901,607	1,421,937	2,225,502	2,374,246	1,470,335
State years	192	288	288	321	280	240

Notes: State and year fixed effects as well as individual and household level controls (age, literacy, urban residence, domestic, married, widowed, children, two families, three families, at school) are also included when available. Robust standard errors, clustered at state level, are in parenthesis. \*\* and \* denote statistical significance at the 1 and 5 percent levels, respectively. Each column represents a separate regression.

Table 4: Effect of occupational licensing on young black workers

	Barber	Beautician	Plumber	Practical Nurse	Registered Nurse
Licensing indicator	-0.038 (0.035)	0.042 (0.037)	0.141 (0.048)**	-0.025 (0.061)	-0.013 (0.060)
(Black)*(licensing)	-0.065 (0.066)	-0.097 (0.089)	0.036 (0.085)	0.085 (0.075)	0.141 (0.146)
Female			-1.000 (0.034)**	1.170 (0.032)**	1.493 (0.043)**
Black	0.135 (0.056)*	-0.032 (0.073)	-0.523 (0.030)**	0.177 (0.039)**	-0.765 (0.135)**
Observations	849,076	257,966	1,112,244	1,104,664	748,407
State years	321	240	321	280	240

Notes: State and year fixed effects as well as individual and household level controls (age, literacy, urban residence, domestic, married, widowed, children, two families, three families, at school) are also included when available. Robust standard errors, clustered at state level, are in parenthesis. \*\* and \* denote statistical significance at the 1 and 5 percent levels, respectively. Young is defined as below 35 years of age. Each column represents a separate regression.

Table 5: Effects of occupational licensing on young women workers

	Accountant	Engineer	Pharmacist	Plumber	Practical Nurse	Registered Nurse
Licensing indicator	-0.126 (0.137)	0.060 (0.025)*	-0.127 (0.052)*	0.138 (0.050)**	0.077 (0.076)	-0.340 (0.084)**
(Female)*(licensing)	0.015 (0.135)	0.136 (0.088)	<b>0.571</b> <b>(0.231)*</b>	<b>0.182</b> <b>(0.058)**</b>	-0.092 (0.067)	<b>0.375</b> <b>(0.097)**</b>
Female	-0.253 (0.0128)*	-1.097 (0.072)**	-1.122 (0.216)**	-1.036 (0.038)**	1.19 (0.040)**	1.154 (0.089)**
Black		-0.970 (0.068)**		-0.515 (0.032)**	0.210 (0.021)**	-0.635 (0.060)**
Observations	436,889	1,061,878	721,956	1,112,244	1,104,664	748,407
State years	192	288	288	321	280	240

Notes: State and year fixed effects as well as individual and household level controls (age, literacy, urban residence, domestic, married, widowed, children, two families, three families, at school) are also included when available. Robust standard errors, clustered at state level, are in parenthesis. \*\* and \* denote statistical significance at the 1 and 5 percent levels, respectively. Young is defined as below 35 years of age. Each column represents a separate regression.