Occupational Licensing and Immigrants*

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Abstract

This study examines the incidence and impact of occupational licensing on immigrants using two sources of data: the Current Population Survey and the Survey of Income and Program Participation. We find that immigrants are much less likely to have a license than similar natives, and that this gap is largest for non-naturalized immigrants, men, and for workers in the highest education level. The licensing rate increases with years since migration and shows large variation by immigrant region of origin. A lack of English proficiency reduces the probability an immigrant has a license. The wage premiums to having a license are much larger for women than men but seem to be the same for natives and immigrants after controlling for English language ability.

1. Introduction

Occupational licensing has become an increasingly prevalent aspect of the US labor market over the past several decades. Approximately 29 percent of US workers are required to have an occupational license; as a result, occupational licensing directly impacts more workers than either the minimum wage or unionization (Kleiner and Krueger 2010; Kleiner 2000).

Proponents of occupational licensing highlight improvements in the quality of services provided and reductions in catastrophes such as unintended fires or misdiagnoses as some of the main benefits. Higher quality services may result from licensing requirements, creating greater incentives for individuals to invest in more occupation-specific human capital. Notwithstanding these potential benefits, by imposing a cost to working in an occupation, licensing restricts the supply of labor and therefore may drive up its cost.

Immigrants may be particularly impacted by occupational licensing for several reasons. First, acquiring a license takes time. Newly arrived immigrants are essentially new entrants in the US labor market, and some licenses have a residency or citizenship requirement that would naturally impact immigrants more so than natives. Second, a license may require educational credentials that may not transfer easily (if at all) between an immigrant's source country and the United States. Additionally, language barriers may interfere with acquiring a license; for example, licensure may involve taking an exam in English.[1] Natives and immigrants may also differ in the types of occupational licenses they obtain, and may therefore differ in the wage premiums they obtain by having a license. A 2015 report on occupational licensing from the Obama White House, recognizing the potentially important connection between immigrants and occupational licensing, says: "Our licensure system can also prevent immigrants who have considerable training and work experience abroad from applying their skills in the United States, since often they do not meet the relevant licensing requirements" (US Treasury 2015, 8).

Acquiring an occupational license can be thought of as a labor market investment, since licenses are costly in terms of time and monetary expenses. A common finding in the occupational licensing literature is that a worker with a license tends to enjoy a wage premium, with estimates across previous studies typically ranging from 10 percent to 15 percent (Kleiner and Krueger 2013). This wage premium helps incentivize workers to acquire licenses. In the presence of such a wage premium, any difficulty acquiring an occupational license by immigrants may contribute to their well-known wage gap with natives. Furthermore, as discussed in Borjas (2015), more recent immigrant cohorts to the United States have experienced slower earnings assimilation relative to earlier cohorts. The increasing prevalence of occupational licensing may help to explain this assimilation slowdown if immigrants are being partly excluded from licensed occupations. Furthermore, being an investment, an occupational license is only worth acquiring if the worker has sufficient confidence that he or she will spend enough time working to pay back the (often substantial) cost of acquiring the license. Immigrants who may return migrate, therefore, would probably be less likely to invest in a license.

An occupational license, being a costly investment, also helps to serve as a signal about the worker (Blair and Chung 2017). Employers in the United States are likely to have reliable information about immigrant

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[1] Federman, Harrington, and Krynski (2006) observed an increase in the number of Vietnamese manicurists following the introduction of the Vietnamese language exam. They posit that policies of offering English-only licensing exams affect immigrants by acting as a barrier to entry.

workers compared to otherwise similar native workers (e.g., it may be difficult to assess the quality of an education acquired abroad). Thus, immigrants may turn to occupational licenses to help alleviate the asymmetric information problems that are more severe for them than for natives. Therefore, we might expect *higher* licensing rates for immigrants than natives.

Unfortunately, due in part to a lack of large-scale data on occupational licensing that spans all occupations and states, there is little research on occupational licensing and immigrants. Of the limited number of occupational licensing studies that focus on immigrants, most focus on high-skilled occupations such as doctors and how their credentials transfer (or not) internationally. Take, for instance, Kugler and Sauer (2005), which studies relicensing of immigrant physicians.[2] There is also a small literature studying immigrants and particular occupations, including Federman, Harrington, and Krynski (2006), which looks at the effects of occupational licensing of manicurists and Vietnamese immigrants.

However, to our knowledge, there is no work that uses large-scale, representative data to explore the relationship between immigration and occupational licensing in the United States. Gomez et al. (2015) investigate the occupational licensing of immigrants to Canada. They find that immigrants are less likely to have a license than natives and that immigrant men may benefit in terms of wages from having a license more so than natives. In addition to studying a different country, Gomez et al. (2015) impute licensing status based on occupation code alone—they do not observe if the worker is licensed (i.e., actual licensing attainment). Also, they are not able to control for English or French language proficiency. Tani (2018), using longitudinal data on immigrants in Australia, finds that occupational licensing improves wages of licensed workers, though many immigrants do not continue to work in their pre-migration occupation. These results suggest that barriers to entry caused by occupational licensing may be leading to skill wastage.

In this paper, we are primarily interested in the following questions: How do natives and immigrants differ in their probability of having an occupational license? Do we see evidence of immigrants and natives acquiring different types of occupational licenses in terms of requiring an exam, etc.? How does this gap change with years since migration (YSM) in the country (i.e., do immigrants tend to "assimilate" toward natives)? What is the importance of English language proficiency on having a license? Do natives and immigrants differ in the wage premium associated with having a license? And what is the relationship between licensing status and hours worked for natives and immigrants?

To answer these questions, we make use of two sources of data: the Current Population Survey (CPS) and the Survey of Income and Program Participation (SIPP). The CPS and the SIPP each provides distinct advantages, and neither alone allows us to answer all the questions posed above. The CPS, which added occupational licensing questions to their monthly survey in 2015, includes information about the immigrant year of migration (and thus years since migration and age at migration) as well as immigrant birthplace. It is also a much larger survey than the SIPP, and since the licensing questions are now a standard part of the survey, the CPS will continue to be a valuable source of occupational licensing information going forward.

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[2] See also Peterson, Pandya, and Leblang (2014), as well as McDonald, Warman, and Worswick (2015) for the case of immigrant physicians in Canada.

The SIPP, during Wave 13 of the 2008 sample, included a topical module on certification and licensing.[3] The SIPP includes data on English language proficiency, which is of obvious importance when studying immigrants. Information on the requirements necessary to earn and maintain a license is also available in the SIPP, and these additional details about workers' licenses allow us to see if immigrants and natives differ in the types of licenses acquired. Lastly, while the CPS and SIPP each has its unique advantages, using both provides a robustness check on some of our results where the CPS and SIPP overlap.

Both the CPS and SIPP allow us to directly measure occupational licensing attainment of workers. In contrast, due to a lack of direct licensing attainment data, much of the literature has relied on licensing *coverage* (i.e., whether or to what degree an occupation in a given state is licensed).[4] By directly measuring licensing *attainment*, we can estimate the relationships between licensing status and both wages and hours worked, where these relationships are identifiable by variation in who reports having a license within an occupation in a state as well as variation in licensing rates by occupation across states.

The results from both the CPS and SIPP show that immigrants are around 30–35 percent less likely than otherwise similar natives to have an occupational license. This licensing gap is much larger for men (45–50 percent) than women (15–20 percent). Immigrant licensing rates increase with years since migration, consistent with labor market assimilation, as well as English language proficiency. However, we also find that most of the characteristics of the licenses held by natives and immigrants are the same. For example, they are equally likely to have taken an exam to receive their license.

Notably, we find that the licensing gap between natives and immigrants is much larger for workers with more than a bachelor's degree compared to other education levels. In fact, for women with a bachelor's degree or less, there is only a modest gap in licensing between natives and immigrants. For native workers, both men and women, there is a substantial jump in the licensing rate between BA and GRAD levels of education (about 15 and 20 percentage points for men and women, respectively). For immigrants, however, there is only a modest increase between BA and GRAD education levels (around 5 percentage points for both men and women), and thus a substantial license gap between natives and immigrants opens up at the highest education level.

We also find large variations in licensing rate by immigrant region of origin. Immigrants from three regions in particular—the Caribbean, Southeast Asia, and Africa—show high licensing rates, especially among women. These results are consistent with immigrants from these regions clustering into occupations that are typically licensed, notably nursing and cosmetology.

We find an overall wage premium from having a license of 8.5 percent in the CPS and 6.5 percent in the SIPP, and in both the CPS and SIPP, women have a much higher licensing wage premium than men. The wage premium is higher for immigrants than natives, especially in the CPS, where the licensing premium is 7 percent higher for immigrants than natives. However, controlling for English ability in the SIPP reduces the positive immigrant and license interaction term, suggesting that licensing status may be serving as a proxy for English ability (which is not measured in the CPS). Similar to Blair and Chung

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[3] The 2014 SIPP panel includes occupational licensing information.

[4] See, for example, Gittleman and Kleiner (2016), which uses the National Longitudinal Survey of Youth 1979 and a database maintained by the US Department of Labor of occupations by state that require a license.

(2017), we find that the wage gap between natives and immigrants with an occupational license is much smaller than the wage gap between natives and immigrants without a license.

Our paper demonstrates the usefulness of the new CPS certification and licensing questions. While not the central focus of our paper, we provide one of the first estimates of the wage premium associated with occupational licensing using the new CPS variables, finding lower premiums than previous studies of occupational licensing, though similar returns to those from the SIPP.[5]

Our paper has the following structure. Section II describes our two data sources: the CPS and the SIPP. Our main results are shown in section III, where III.A discusses the occupational licensing rate results for both the CPS and SIPP, and III.B discusses the relationship between licensing and both wages and hours worked, again for both the CPS and the SIPP. Section IV concludes.

2. Data

3.1. Current Population Survey

The first dataset used in our analysis is the Current Population Survey (CPS), drawn from the Integrated Public Use Microdata Series (IPUMS) (Flood et al. 2017). The CPS is a monthly representative dataset in the United States that interviews each household for four consecutive months, followed by an eight-month period during which the household is not interviewed; then the household is interviewed for an additional four months before exiting the survey permanently. The "fifth" month refers to the fifth month an individual is in the sample, which, because of the eight-month break, is one year after the first month. During months four and eight, when households are about to be "rotated out" of the survey, households are part of the Outgoing Rotation Group (ORG). As such, they are asked more detailed income questions than are asked during the other three months.

Beginning in 2015, in their first and fifth survey months, respondents are asked three questions related to occupational certification and licensing:[6] (1) Do you have a currently active professional certification or a state or industry license?, (2) Were any of your certifications or licenses issued by the federal, state, or local government?, and (3) Is your certification or license required for your job? Due to issues with the implementation of the survey, information from the third question is unavailable for 2015. Note also that the second question asks if *any* license or certification was issued by federal, state, or local government; for individuals with both a certification and a license, this may lead to an overstatement of the fraction of credentials that are licenses. We find that while the credential rate is very similar between the CPS and SIPP, the fraction of these credentials that are reported as licenses (i.e., issued by some level of government) is higher in the CPS than the SIPP. Also note that the wording of question 3 makes it unclear whether the certification or license is legally required, or whether it is required only by the worker's employer.

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[5] A recent working paper by Kleiner and Soltas (2018) also uses the CPS, though it focuses mostly on licensing *coverage* by occupation and state as opposed licensing attainment. The authors also do not consider natives and immigrants separately, which is the focus of our paper.

[6] For additional information regarding the licensing and certification questions in the CPS, please see: https://www.bls.gov/cps/certifications-and-licenses.htm.

We say an individual has a *credential* if they answer "yes" to the first question; an individual is *licensed* if they answer "yes" to all three questions, while they are *certified* if they have a credential that is not a license.[7]

We utilize the IPUMS-created variable *cpsidp* to link individuals across survey months.[8] Only very limited income information is available in the first and fifth survey months of the monthly basic CPS, so to explore the relationship between occupational licenses, wages, and hours worked, we link these months with the ORG months (i.e., months four and eight).

The CPS contains two important immigrant-related variables not included in the 2008 SIPP: year of immigration and birthplace. Year of immigration allows us to calculate an immigrant's years since migration as well as his or her age at migration.[9]

Our dataset includes CPS basic monthly observations from January 2016 to January 2019. We use two different estimation samples from the CPS—one for exploring the probability of having a license, and another for exploring the relationship between licensing and both wages and hours worked. All samples include respondents between the ages of 18 and 64 who are in the labor force and currently working, but who are neither self-employed nor in the armed forces.[10] We exclude childhood immigrants—defined as immigrants who arrived in the United States at age 17 or younger—from all samples.[11] Omitting childhood immigrants, which we are unable to do with the SIPP samples since age at migration cannot be calculated, does make the SIPP and CPS immigrant samples different, so care is needed when comparing the CPS and SIPP results.

The probability sample includes only the first and fifth survey months since those are the months during which licensing questions are asked. We have 428,455 person-months of observations, from 335,557 unique individuals. Our wage and hours worked sample uses the outgoing rotation group (ORG). We use the licensing status in the first (fifth) month and assign it to the ORG sample in the fourth (eighth) month. We use directly reported hourly wage for workers paid by the hour and calculate hourly wage of salary workers based on their weekly earnings and usual hours worked per week. We include workers with hourly wages between $5 and $100 and drop observations with an imputed wage. This sample includes 212,184 observations from 176,572 unique individuals.

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[7] Utilizing the third question requires that we drop data from 2015, as the third question was not included that year. Our results are qualitatively similar when using the broader definition of license, where the individual is licensed if they answer "yes" to questions one and two. Results available upon request.

[8] See Flood and Pacas (2016) for further discussion.

[9] We follow Bleakley and Chin (2004) and, for each year of immigration range, use the maximum year, which results in years since migration being minimized and so age at migration maximized. Thus, some immigrants who actually arrived as children will be classified as adult immigrants and are therefore included in our sample.

[10] We drop self-employed from all samples in the CPS as well as the SIPP because the ORG sample does not contain earnings data for the self-employed.

[11] There are a number of compelling reasons to focus on adult immigrants only: (1) childhood immigrants are much more likely to be proficient in English than adult immigrants, (2) the effect of years since migration is likely to vary greatly between adult and childhood immigrants, (3) a childhood immigrant will acquire nearly all of their work experience in the United States, and (4) childhood immigrants will likely have at least some exposure to the US school system. Results in which we include childhood immigrants do not differ qualitatively from those presented here and are available upon request.

Summary statistics of the probability sample are shown in table 2. We show the full sample as well as the subsamples of licensed and unlicensed separately by natives and immigrants, where an immigrant is defined as someone born outside of the United States.[12] Immigrants are much less likely than natives to have a credential, license, or certification. Workers with licenses are older and more educated, more likely to be married, and are disproportionately white. Comparing natives and immigrants with and without a license, licensed natives are much more educated than unlicensed natives, while the education level difference between licensed and unlicensed immigrants appears to be less dramatic. We discuss the relationship between educational attainment and licensing further in section III.A. Years since migration is higher for licensed than unlicensed immigrants.

3.2. Survey of Income and Program Participation

The 2008 panel of the SIPP is a nationally representative longitudinal survey of the United States. Every four months, respondents answer a core group of questions about the preceding four months. These responses provide detailed monthly information about demographics, employment situations, wages, and a variety of other characteristics. Occupational licensing information is derived from the Wave 13 Professional Certifications, Licenses, and Educational Certificates topical module collected between September and December of 2012.

A respondent is said to have a *credential* if they respond "yes" to the following question: Do you have a professional certification or state or industry license? Respondents are also asked: Who awarded this certification or license? and Is this certification or license required for your current or most recent job? If a certificate or license was awarded by the federal, state, or local government, and if it is also required for their job, we refer to the credential as a *license*; otherwise, we refer to it as a *certificate*.[13] Thus, as in the CPS, we use the strictest definition for *licensed*.

The SIPP licensing and certification module asks several additional questions about occupational licensing not included in the CPS, such as: Did you take courses or training to earn this certification or license? These additional licensing questions allow us to go into more depth regarding the differences in occupational licensing between natives and immigrants. The SIPP, unlike the CPS, contains a self-reported measure of English speaking proficiency.

Our sample includes workers aged 18 to 64. We use a single observation per worker from Wave 13, which is either month four (in 93 percent of cases) or the nearest month for those not employed in month four. As in the CPS, we keep workers who are not self-employed and whose hourly wages are between $5 and $100, and we drop observations with an imputed wage. An immigrant is defined as anyone born outside of the United States. At 21,269 observations, the SIPP sample is much smaller than either the CPS probability or wage samples. Unlike the CPS, we have only one SIPP sample that we use to explore licensing probability, wage premium, and hours worked.

Descriptive statistics of our SIPP sample are shown in table 3, which follows the same format as the descriptive table for the CPS. The credential rate is higher in the SIPP than the CPS, though a larger

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[12] Individuals from Puerto Rico, Guam, Northern Mariana Islands, American Samoa, and the US Virgin Islands are considered born in the United States and are thus natives.

[13] This distinction between certificate and license follows definitions 1 and 2 from Gittleman, Klee, and Kleiner (2018).

fraction of these credentials are licenses in the SIPP than the CPS, which leads to an overall lower licensing rate of natives in the SIPP (17.6 percent) than the CPS (19.8 percent). Otherwise, very similar patterns are observed in the SIPP as in the CPS: licensed workers are older, more educated, and are less likely to be immigrants. Licensed immigrants have much higher English proficiency than unlicensed immigrants. While this is consistent with a lack of language proficiency imposing a barrier to obtaining a license, it does not, of course, control for other worker characteristics, such as age or level of education.

In table 4, we take advantage of the richer certificate information provided in the SIPP to see if immigrants and natives are acquiring different types of licenses. For workers with a license, we show (separately for natives and immigrants) the fraction of licenses that (1) required coursework or training, (2) required a skills demonstration or exam, (3) require maintenance in the form of continuing education, and (4) were acquired for work or personal reasons. We detect no major differences between natives and immigrants in any of these license characteristics. While only a small number of descriptive statistics, these results suggest that the types of licenses acquired by natives and immigrants may not differ much in their characteristics.

3. Results

We begin by discussing the licensing rate results from both the CPS and SIPP in section III.A. We then proceed to discuss the relationships between licensing and both hourly wage and hours worked in section III.B, again for both the CPS and SIPP. The estimation models are as similar as possible between the two datasets, with notable differences including years since migration in the CPS and language ability in the SIPP.

3.1. Probability of Having an Occupational License

We start by exploring the relationship between being an immigrant and the probability of being licensed. The summary statistics for both the CPS and SIPP indicate that licensed workers tend to be more educated than unlicensed workers (Kleiner and Vorotnikov 2017), though the licensing rate appears to increase more strongly with education among natives than among immigrants.

To visualize the relationship between licensing rates and educational attainment, figure 1 shows the fraction of people at each education level who report having a license, separately for men and women as well as separately for natives and immigrants, from the CPS probability sample. The increasing trend of licensing with education for all groups is clear; however, licensing increases with educational attainment more rapidly for natives than immigrants. The native/immigrant licensing gap is substantially larger for the most educated group (GRAD) than any other, particularly for women. In fact, native and immigrant women exhibit little difference in their licensing rates across the other four education levels. Thus, it seems plausible that the impacts of occupational licensing on the labor market may be more relevant for highly educated immigrants.

To give an idea of the type of occupations licensed workers perform, table 5 shows the ten most common occupations reported among licensed workers, again from the CPS probability sample. This is done separately for men and women as well as natives and immigrants for the full sample of licensed workers. Also, given the apparent relevance of the most educated group of workers in understanding the native/immigrant licensing gap, we repeat this exercise but for only the workers with the most education.

For both natives and immigrants, licensed women are frequently in nursing or a closely related occupation; 19.6 percent of licensed immigrant women are registered nurses, a further 17.1 percent are nursing orderlies, 3.1 percent are licensed practical nurses, 4.8 percent are physicians, 1.9 percent are health aides, and 1.7 percent are physical therapists. Thus, licensed immigrant women are well represented in the medical industry. After nursing, "hairdressers and cosmetologists" is the most common occupation category for licensed immigrant women at 8.6 percent, which is much higher than the rate for native licensed women (2.3 percent). Native women with a license are much more likely than immigrants to be teachers.

For workers at the highest education level with a license, native workers are much more likely than immigrants to be teachers; in total, 37 percent of native women with a GRAD level of education are some form of school teacher, while only 20 percent of immigrant women are teachers. For men, 23 percent of natives but only 11 percent of immigrants are teachers. So while likely not the full story, it seems that this occupation alone may be a large contributor to the significant native/immigrant licensing gap at the highest level of education; the data suggest that the teaching profession may be disproportionately unattractive or difficult to enter for immigrant workers.

On the other hand, while nursing is a common occupation among licensed workers, the rates are much lower for men than for women, especially for native male workers. Truck driver is a common occupation for both native and immigrant male licensed workers. Licensed immigrant men are much more likely to be physicians than native men, at 8.6 percent and 3.1 percent, respectively.

Considering the most educated group, where the native/immigrant licensing gap is most severe, we see for both immigrant men and women, physician is by far the most common occupation. Lawyer is the most common occupation among highly educated licensed male natives, but only 2.5 percent of highly educated licensed immigrant men are lawyers. Thus, for both men and women, while there are some interesting differences in the type of occupations that licensed workers engage in, there is a lot of overlap.

The descriptive statistics suggest large differences between natives and immigrants in their licensing rate. In order to statistically test whether, and to what extent, otherwise similar natives and immigrants differ in their probability of being licensed, we turn to our econometric model. We estimate a series of linear probability regressions where the dependent variable equals one if the individual reports having an occupational license, and zero otherwise:

$$License_{it} = \beta_X X_{it} + \beta_{Imm} Imm_i + \beta_{YSM} YSM_{it} + \beta_{YSM2} YSM_{it}^2 + \delta_s + \epsilon_{it} \tag{1}$$

where $License_{it}$ equals one if worker i has a license in month t, and zero otherwise; X_{it} is a vector of individual and other characteristics; δ_s is the fixed effect for state of residence s; and Imm_i equals one if the worker is an immigrant, and zero otherwise. Years since migration values (YSM_{it} and YSM_{it}^2) equal zero for natives. We control for state of residence, age (introduced as a third-order polynomial), educational attainment (five categories), survey year, month of sample (i.e., first or fifth month), month of the year, whether the individual appears once or twice in the sample, racial and ethnic dummy variables

(black, Asian, other, and Hispanic), a married dummy variable, and number of children.[14] This estimation is performed on the full sample, as well as separately for men and women.

The results from these estimations are shown in table 6. As our focus is on immigration and licensing, our primary coefficients of interest are those on the immigrant dummy and years since migration, though we also show the coefficients for gender and educational attainment. The row "Mean" shows the mean of the dependent variable (i.e., the fraction of the sample that has an occupational license).

Before discussing the immigrant-specific results, first note the gender gap in licensing rates: controlling for other characteristics, women are 5.4 percentage points more likely than men to be licensed. While the focus of this paper is immigration and licensing, it is worth speculating briefly regarding this large gender licensing gap that has received little attention in the literature. In the presence of asymmetric information that might be more severe for women than men,[15] women may be more likely to acquire an occupational license, since a license may serve as a signal of worker characteristics such as ability or labor market attachment. Alternatively, it may be that occupations that are more attractive to women than men (possibly due to non-pecuniary characteristics like time flexibility)[16] are more likely to be licensed, so accessing these occupations requires holding a license. These crucial questions are left for future work to explore.

Consistent with figure 1, educational attainment has a strong, positive relationship with licensing status; workers with a BA are 12.5 percentage points more likely than high school dropouts to be licensed, while workers with more than a BA (GRAD) are 31.1 percentage points more likely.

The coefficient on the immigrant dummy variable is negative, statistically significant, and economically large an all estimations. Consistent with labor market assimilation, the probability an immigrant is licensed increases with years since migration—ten years after migration, the probability increases by 3.6 percentage points. In the full sample, we find that ten years after migration, immigrants are 6.5 (9.7-3.6+0.4) percentage points less likely to have an occupational license; given the overall rate of 18.9 percent, this corresponds to a 34.4 percent lower probability.

Considering the results by gender, the licensing gap ten years after migration is 7.5 percentage points for men and 4.7 percentage points for women, so the licensing gap between natives and immigrants is greater for men than women. Furthermore, the overall licensing rate for women is quite a bit higher than men (22.4 percent versus 15.6 percent). In percentage terms, immigrant men and women, ten years after migration, are 48.1 percent and 20.1 percent, respectively, less likely to be licensed than natives. Also, the effect of years since migration is weaker for men than women (i.e., male immigrants seem to assimilate more slowly in terms of licensing status than female immigrants). Ten years after migration, the licensing probability increases by only 1.4 percentage points for men but by 4.8 percentage points for women, and thus the gender licensing gap for immigrants grows with years since migration.

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[14] Attrition between the first and fifth survey months may not be random; thus including the fifth month results may bias our results. With this in mind, we repeated the estimates using data from only the first month. The results were nearly identical.

[15] See Milgrom and Oster (1987) for a discussion of the Invisibility Hypothesis, and Cassidy, DeVaro, and Kauhanen (2016) for an application of that hypothesis to promotion signaling by gender.

[16] See Goldin (2014) for a discussion of time flexibility and the gender pay gap within occupations.

A prominent phenomenon among immigrant workers in the United States is occupational clustering—immigrants of the same nationality tend to work in similar occupations, especially when clustered in the same city (Patel and Vella 2013). A well-known example in the occupational licensing literature is Federman, Harrington, and Krynski (2006), which studies Vietnamese manicurists. In the presence of occupational clustering, where certain occupations may require a license, we might expect variation in occupational licensing rates by birthplace, as is the case for Vietnamese manicurists.

We explore this idea by dividing immigrants by region of birth.[17] Figure 2 shows the license rates of each region relative to natives, for men and women separately. Two values per region are shown: (1) the raw difference in licensing rate and (2) the adjusted difference that accounts for worker characteristics. These adjusted differences are computed by adding region of birth to the regression specification in equation (1), and then using the coefficients on these region dummy variables, adjusted such that years since migration equals 15, which is approximately the mean of the sample.

Licensing rates are lowest for immigrants from Mexico and Central America for both men and women. Interestingly, and consistent with occupational clustering, we find high licensing rates for immigrants from the Caribbean, Southeast Asia, and Africa. Immigrants from these regions, especially women, tend to work in occupations such as nursing, for which occupational licensing is more prevalent. For example, 12.0 percent of immigrant women from Southeast Asia work as "Miscellaneous personal appearance workers," a category that includes manicurists, while only 0.2 percent of native women work in that occupation.

Adjusting for worker characteristics expands the licensing gaps for many regions; the main driver for this difference appears to be educational attainment. For many regions of origin, educational attainment is relatively high, and since licensing rates increase with educational attainment, these immigrants have larger adjusted licensing rates and thus a large gap relative to otherwise similar natives. For example, female immigrants from English-speaking developed countries have a mean licensing rate that is higher than rates for natives; however, their adjusted licensing rate is lower, due largely to their high levels of education. Immigrants from Mexico, on the other hand, have a smaller adjusted licensing rate gap than their raw gap (though both are negative), due largely to their low average education levels.

Note that in addition to male immigrants from English-speaking developed countries, both male and female immigrants from Northern and Western Europe have low adjusted licensing rates. This finding is somewhat curious since immigrants from developed (especially English-speaking) countries may be more familiar with the US labor market than immigrants from other regions and are the least likely to be illegal immigrants, which would make acquiring a license less difficult; nevertheless, they are substantially under-licensed relative to natives. One reason for this large adjusted gap is that a substantial fraction of immigrants from these regions are highly educated (around 52 percent for those from Northern and Western Europe), and so comparing them to otherwise-similar natives means comparing them to the most-educated (and as previously discussed, most-licensed) group of workers, leading to a large potential licensing gap that does indeed appear in the data.[18] This suggests that a lack of familiarity with the US

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[17] Regions are English-speaking developed countries (Canada, Australia, New Zealand, United Kingdom, and Ireland), Mexico, Central America, the Caribbean, South America, Northern and Western Europe, the rest of Europe and Russia, East Asia, Southeast Asia, Central/South/Southwest Asia, the Middle East, and Africa.

[18] The fact that immigrant regions of origin with high average levels of education have the potential for high licensing gaps does not, of course, imply that a large licensing gap will appear. Recall that the adjusted licensing gaps shown in figure 2 control for

labor market may not be a large contributing factor in explaining the gap in licensing rates between natives and immigrants.

We now turn to discuss the licensing probability results using SIPP data. Since many of the results are quite similar between the datasets, our discussion focuses on the novel contributions of the SIPP and the instances where the CPS and SIPP results diverge either in direction or substantially in magnitude.

We first estimate a linear probability regression model, as described in equation (1), where the dependent variable equals one if the worker has a license, and zero otherwise. We include similar controls as the CPS probability estimations. Specifically, all estimations control for an immigrant dummy variable, state of residence, age (introduced as a third-order polynomial), educational attainment (five categories), racial and ethnic dummy variables (black, Asian, other, and Hispanic), a married dummy variable, number of children, a union dummy variable, government worker dummy variable, service worker dummy variable (derived from industry code), and a paid-by-the-hour dummy variable. Notably, unlike the CPS, we cannot control for years since migration. We then add a dummy variable for immigrants' English proficiency.

Results are shown in table 7. Without language ability controls, immigrants are 4.8 percentage points less likely to have a license; given the overall licensing rate of 16.4 percent, this represents a 29.3 percent lower probability of having a license. Immigrants proficient in English are 23.2 percent less likely than natives to have a license, while immigrants who do not speak English well are 43.3 percent less likely to have a license.

Male immigrants are 5.6 percentage points (42.1 percent) less likely to have a license relative to natives, while female immigrants are only 3.6 percentage points (18.2 percent) less likely. Female immigrants who speak English very well are only 11.6 percent less likely to have a license than native women, while male immigrants who speak English very well are 35.3 percent less likely than male natives to have a license. The values for female and male immigrants who do not speak English well are 32.8 percent and 55.6 percent, respectively. The difference between the licensing rates of proficient and non-proficient English speakers differs at the 10-percent significance level for both men and women.

Comparing the SIPP and CPS results, we find that at the mean years since migration (about 15 in the CPS), the results are very similar at 29.3 percent lower probability in the SIPP and 27.5 percent lower probability of having a license in the CPS. Notably, the SIPP results provide suggestive evidence that language proficiency, or the lack thereof, is an important contributor to the native/immigrant licensing difference, especially for female immigrants.

We end our discussion of occupational licensing attainment and immigrants by investigating one potentially critical immigrant characteristic that we have thus far not discussed: citizenship. As documented in Calvo-Friedman (2014), there are numerous examples of states in which eligibility for particular occupational licensure is restricted to citizens or to citizens and permanent residents. For example, a funeral home director in Massachusetts is required to be a citizen, while a funeral home

education. However, for immigrants from regions with low average levels of education, there is simply little scope for a large licensing gap with otherwise-similar natives, since even native workers with low levels of education have low rates of licensing.

director in New York must be either a citizen or a permanent resident.[19] Thus it seems quite plausible that a lack of citizenship may impede an immigrant's ability to acquire an occupational license.

Indeed, as expected, immigrants who are citizens are more than twice as likely to have an occupational license as non-citizens. However, citizens are also on average more educated and have been in the country longer; these traits are positively related to the probability of having an occupational license, as the results above show. To see the relationship between citizenship status and occupational licensing while controlling for other characteristics, we repeat the linear probability model estimation described in equation (1), but we add a control for whether the immigrant is a citizen. Also, we include only immigrants in the estimation, since we are interested in whether citizen status affects licensing rates within the immigrant group, and for brevity we only include the results from the CPS.

The results are shown in table 8 and include the full sample as well as the sample of men and women separately. We also repeat the estimation with and without the citizenship dummy variable, so each of our three samples has a pair of estimations. First, before discussing the citizenship results, it is worth noting that when focusing only on immigrants, the educational gradient in occupational licensing is much flatter than when considering all workers; immigrants with the highest level of education (GRAD) are only 15.9 percentage points more likely to be licensed than high school dropouts, whereas in the full sample that includes natives (table 6), this value was 31.1 percentage points. This result mirrors what is shown in figure 1.

Citizenship status, even in the presence of a rich set of other controls, is strongly related to occupational licensing attainment; in the full sample, immigrants who are citizens are 5.8 percentage points (45.7 percent) more likely to have a license than non-citizens. When looking at men and women separately, these values are 54.3 percent and 37.1 percent, respectively, suggesting that citizenship may be more relevant for male than female immigrants. Also, while years since migration continues to be informative even when controlling for citizenship status, the magnitude of the coefficients declines, suggesting that part of the "assimilation" process that years since migration captures is the naturalization process. Lastly, though not shown here, repeating these estimations for the SIPP we find that controlling for English proficiency only somewhat lowers the coefficient on the citizenship dummy variable. Thus it is unlikely that citizenship in the CPS is merely proxying for English language ability.[20]

An obvious concern with these results is the strong potential for selection bias—immigrants who become citizens are probably not a random sample of the immigrant population. Since acquiring an occupational license is a costly investment, immigrants who acquire a license may also be the type who are likely to stay in the United States for a long period of time, perhaps permanently, and thus are also more likely to become citizens. It is beyond the scope of this paper to address this important issue. However, two things are clear: (1) many states restrict occupational licensing to only citizens and permanent residents for certain occupations, and (2) non-citizen immigrants are much less likely to be licensed than otherwise similar citizens. Using data from the 1990s, Bratsberg, Ragan, and Nasir (2002) find that naturalization of US immigrants accelerates their wage growth and reduces employment barriers. The increasing prevalence of occupational licensing in the economy since that time suggests that the returns to naturalization may have risen, a topic that deserves closer attention.

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[19] See Calvo-Friedman (2014), appendix 2, for many other examples.

[20] SIPP results available upon request.

3.2. Licensing, Wages, and Hours Worked

We turn now to the relationship between occupational licensing and labor market outcomes, specifically wages and hours worked. We estimate the following regression model:

$$Y_{it} = \beta_X X_{it} + \beta_{Lic} License_{it} + \beta_{Imm} Imm_i + \beta_{LicXImm} License_{it} * Imm_i + \delta_s + \epsilon_{it} \qquad (2)$$

where Y_{it} is the labor market outcome of interest (i.e., either log wage or hours worked) for individual i in month t, $License_{it}$ is a dummy variable that equals one if the worker has a license in month t, Imm_i is a dummy variable that equals one if the worker is an immigrant, X_{it} is a vector of control variables, and δ_s is the fixed effect for state of residence s. The interaction term $License_{it} * Imm_i$ tests if the effect of having a license differs between immigrants and natives.

The baseline estimation includes the same set of controls used in the license probability regressions. In addition, we include a number of other job-related controls that are not introduced in the probability estimations. These include controls for whether a worker is full-time or part-time, paid by the hour, a union member, or a government worker. We again perform these estimates on the full sample as well as separately for men and women. For brevity, only the immigrant dummy variable and the occupational licensing variables are shown. Table 9 shows the CPS results for both log wage (panel A) and hours worked (panel B), while table 10 shows the SIPP results, again for both log wage and hours worked.

We begin by discussing the log wage results from the CPS (table 9, panel A). The licensing coefficient is positive and statistically significant in all specifications. In the full sample without interacting licensing status with the immigrant dummy, we find a wage premium of 8.5 percent, which is somewhat low relative to the existing results in the literature, though it is higher than the results from Gittleman, Klee, and Kleiner (2018) and our own results from the SIPP (Kleiner and Krueger 2013; Pizzola and Tabarrok 2017). The licensing premium is much higher for women (12.3 percent) than men (4.5 percent), a finding that has received little attention in the literature.[21]

The immigrant and license interaction terms are positive, statistically significant, and meaningfully large in all three samples; the wage premium for immigrants is 14.8 percent (7.8+7.0) for the full sample, while for natives it is only 7.8 percent, with the difference between these results significantly different at the 0.1 percent level. Considering the male and female samples separately, we find that immigrant men earn a much larger licensing premium than native men (3.7 percent versus 12.0 percent), while immigrant women also earn a higher premium than native women (11.8 percent versus 17.7 percent).

It is unclear why immigrants appear to benefit more than natives from holding an occupational license. One possible explanation is that, because an occupational license is a costly investment, it serves as a signal, and the value of that signal is greater for immigrants than natives. US employers likely have less information about immigrants than they do about natives (e.g., the quality of their educational credentials), and thus a license is a stronger signal for immigrants than natives. Alternatively, an occupational license may signal a lower probability of return migration and thus a stronger attachment to

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[21] Blair and Chung (2017) find evidence of a higher return to occupational licensing for women than men using the 2008 SIPP, which they argue is due to higher returns to human capital acquired with a license.

the US labor force, which may make employers more likely to train immigrant workers with a license relative to immigrants without a license.

Due to the positive interaction term between immigrant status and licensing status, the wage gap between licensed natives and immigrants is lower than the wage gap between unlicensed natives and immigrants. For unlicensed workers, the native/immigrant wage gap is 18.6 percent; however, comparing native and immigrant licensed workers, this wage gap narrows significantly to only 11.6 percent. Thus, immigrants able to acquire an occupational license do relatively well in the labor market compared to native workers. This result mirrors Blair and Chung (2017), which finds that occupational licensing can help to narrow the black/white wage gap.

To estimate the effect of occupational licensing on wages in the SIPP (table 10, panel A), we repeat a similar log wage regression as described in equation (2) with the same control variables on the SIPP linear probability estimations described in the previous section. In the full sample, we find a return to holding a license of 6.5 percent. Interacting the license and immigrant controls, we find a positive coefficient, which is consistent with the CPS results: immigrants with a license earn 8.8 percent higher wages, while natives with a license earn 6.2 percent higher wages. The interaction term, however, is not statistically significant at conventional levels, so we cannot rule out that natives and immigrants receive the same wage premium from having a license. Nonetheless, adding immigrant language proficiency controls results in the immigrant-license interaction term to be negative. This result suggests that holding a license may partly serve to proxy for English proficiency, which is consistent with the large, positive returns to English language proficiency for immigrants found in the literature.[22]

Considering men and women separately, as in the CPS, we find a much larger licensing wage premium for women (11.0 percent) than for men (0.1 percent). In fact, we find no evidence of a licensing premium for men. Contrary to the wage results from the CPS, neither of the license and immigrant interaction terms are statistically significant at conventional levels, though both are positive. Adding English proficiency again results in the coefficient of the immigrant and licensing interaction term to become negative for both men and women, consistent with holding a license proxying for English ability.

Our wage results, using both datasets, identify a positive and statistically significant license premium. However, these estimates may not fully capture the relationship between licensing and worker earnings if hours worked is related to licensing status. In tables 8 and 9, panel B repeats the log wage analysis from panel A, with usual number of hours worked per week replacing log wages as the dependent variable.

In the CPS, we find that workers with a license work 1.1 more hours per week than those without a license. Interacting licensing status with immigrant status, we find a positive though statistically insignificant interaction term. Repeating these estimates separately for men and women, we find a much stronger (more positive) relationship between having a license and hours worked for men than women, though for both men and women the coefficient is positive and statistically significant. This larger effect of licensing on hours worked for men than women should, to some extent at least, offset the much larger wage premium for women than men found in panel A. One possible explanation for the overall positive licensing status and hours worked relationship is that workers who would tend to work more hours (for

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[22] See Bleakley and Chin (2004), among many others, for evidence that English proficiency improves earnings.

some exogenous reason, such as a relatively low preference for leisure) have additional incentive to acquire a license to boost their hourly wage.

The immigrant-license interaction term is large, negative, and statistically significant for men, which again would serve to reduce the overall earnings effect of having a license on immigrants versus natives. For women, the immigrant and license interaction term is positive and statistically significant at conventional levels, thus the larger wage premium for licensed immigrant women found in panel A understates the difference in the effect of holding a license on earnings between immigrant and native women.

Turning to the SIPP hours worked results (table 10, panel B), we find that as with the CPS result, there is a positive relationship between hours worked and having a license, and this positive relationship is also larger for men than women. Of note, the magnitude of the coefficient on licensing status is lower in the SIPP results than in the CPS results. The interaction terms between licensing status and immigrant status are negative, though they are statistically insignificant for men in all specifications and only marginally significant for women. Nonetheless, the SIPP and CPS differ notably in the relationship between immigrant women who hold a license versus those who do not.

Overall, while there are some differences between the SIPP and the CPS results in terms of hours worked, we find evidence that licensed individuals work more hours per week than unlicensed workers. This seems to suggest that the wage premium from being licensed likely understates the earnings premium from holding a license.

4. Further Discussion and Conclusion

We use two sources of data—the Current Population Survey (CPS) and the Survey of Income and Program Participation (SIPP)—to explore the differences in occupational licensing between natives and immigrants. Each dataset provides unique advantages, allowing us to paint a clearer picture of how occupational licensing differs between natives and immigrants than would be possible by using either dataset alone.

Though the CPS and SIPP differ in some key ways, where comparable our results are quite similar between the two datasets. We find that immigrants are significantly less likely to have an occupational license than natives; this gap is larger for men than for women and is especially large for the highest education level. The wage premium from having a license may not differ between natives and immigrants when controlling for English language ability, suggesting that though immigrants are less likely to have a license, they seem to benefit at least as much as natives from having one. Licensed workers tend to work more hours per week than otherwise similar unlicensed workers, so the wage premium understates the earnings premium.

Using the CPS, we find that the native/immigrant licensing gap declines with years since migration, consistent with immigrants assimilating toward natives. We also find large differences in licensing rates by region of origin; in particular, women from the Caribbean, Southeast Asia, and Africa have a higher probability of having a license than otherwise similar natives.

Using the SIPP, we find that a lack of English language proficiency lowers the probability that an immigrant has a license, even when controlling for other individual characteristics such as education level. Utilizing the richer set of occupational licensing questions available in the SIPP, we find no evidence to

suggest that license characteristics differ between natives and immigrants, and thus we find no evidence that natives and immigrants are acquiring different types of licenses.

Our results suggest that occupational licensing disproportionately affects immigrants, especially male immigrants, those lacking English proficiency, and the most educated group. Indeed, insofar as occupational licensing helps to protect incumbent (largely native) workers in an occupation from competition, it is unsurprising that immigrants are particularly impacted. Results from both the SIPP and CPS indicate that among licensed workers, the native/immigrant wage gap is smaller than among unlicensed workers, though evidence from the SIPP suggests that this may be due in part to licensing status proxying for English language ability, which is unmeasured in the CPS.

Given the substantial increases in both the prevalence of occupational licensing as well as the fraction of the US workforce that comprises immigrants, and given the apparent difficulty that immigrants have in acquiring occupational licenses, our results provide what we believe to be important insights into a largely underexplored aspect of the occupational licensing debate. Furthermore, our results suggest that the impacts of these licenses are heterogeneous in a number of important dimensions, including by education level and region of origin. Understanding how occupational licensing affects different groups of workers (e.g., men versus women and natives versus immigrants) is important in providing a clear picture of the impact of occupational licensing in its entirety.

One important characteristic of immigrant workers in the United States is that they are a more mobile group than natives and thus help labor market efficiency by making locational choices based on wage differences across locations. This is especially true of newer immigrants. In the words of Borjas (2001), immigrants are "…grease on the wheels of the labor market." Occupational licensing requirements, however, have the opposite effect: Johnson and Kleiner (2017) find evidence that between-state migration rates are significantly lower for workers in occupations with state-specific licensing exam requirements compared to workers in other occupations. Since occupational licensing appears to more strongly impact immigrants, licensing requirements may serve to diminish this important role that immigrants play in the economy, leading to lower labor market efficiency and greater interstate wage inequality. Put differently, if immigrants find it more difficult to acquire an occupational license (as our results suggest they do), then this otherwise highly mobile group of workers will be less able to respond to work opportunities across state lines if these opportunities are in licensed occupations.

Lastly, our results have important implications for potential changes to immigration policy, particularly movements toward more skill-based immigration.[23] Skill-based immigration would favor immigrants with high levels of education. Our results indicate that it is precisely this group that exhibits the largest licensing attainment gap with natives. Increasing the flow of immigrants from this education level may lead to substantial occupational mismatch for this group of immigrants if they face difficulty in acquiring licenses needed to work in their pre-migration occupations. As policymakers discuss the movement to a more skill-based immigration system, they should carefully consider the issue of occupational licensing for

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[23] Canada and Australia currently use a points-based immigration system that determines immigration eligibility partly based on criteria such as age, English (or French) language ability, and educational attainment. In the United States, the Reforming American Immigration for Strong Employment (RAISE) Act (S. 354, revised version S. 1720) introduced by Senators Tom Cotton and David Perdue in 2017 would introduce a points system for potential immigrants to the United States, also based in part on age, educational attainment, and English ability.

immigrants in order to avoid occupational mismatch, depressed earnings, and loss of economic efficiency, all of which would undercut the potential advantages of high-skilled immigration.

References

Blair, P. Q., and B. W. Chung. 2017. "Occupational Licensing Reduces Racial and Gender Wage Gaps: Evidence from the Survey of Income and Program Participation." HCEO Working Paper Series.

Bleakley, H., and A. Chin. 2004. "Language Skills and Earnings: Evidence from Childhood Immigrants." *Review of Economics and Statistics* 86:481–96.

Borjas, G. J. 2001. "Does Immigration Grease the Wheels of the Labor Market?" *Brookings Papers on Economic Activity* 1:69–133.

———. 2015. "The Slowdown in the Economic Assimilation of Immigrants: Aging and Cohort Effects Revisited Again." *Journal of Human Capital* 9:483–517.

Bratsberg, B., J. F. Ragan, Jr., and Z. M. Nasir. 2002. "The Effect of Naturalization on Wage Growth: A Panel Study of Young Male Immigrants." *Journal of Labor Economics* 20:568–597.

Calvo-Friedman, J. 2014. "The Uncertain Terrain of State Occupational Licensing Laws for Noncitizens: A Preemption Analysis." *Georgetown Law Journal* 102:1597–645.

Cassidy, H., J. DeVaro, and A. Kauhanen. 2016. "Promotion Signaling, Gender, and Turnover: New Theory and Evidence." *Journal of Economic Behavior & Organization* 126:140–66.

Federman, M. N., D. E. Harrington, and K. J. Krynski. 2006. "The Impact of State Licensing Regulations on Low-Skilled Immigrants: The Case of Vietnamese Manicurists." *American Economic Review* 96:237–41.

Flood, S., M. King, S. Ruggles, and J. R. Warren. 2017. *Integrated Public Use Microdata Series, Current Population Survey: Version 5.0.* Machine-readable database. Minneapolis: University of Minnesota.

Flood, S., and J. Pacas. 2016. "Using the Annual Social and Economic Supplement with Current Population Survey Panels." Minnesota Population Center Working Paper No. 2016-4.

Gittleman, M., M. A. Klee, and M. M. Kleiner. 2018. "Analyzing the Labor Market Outcomes of Occupational Licensing." *Industrial Relations* 57:57–100.

Gittleman, M., and M. M. Kleiner. 2016. "Wage Effects of Unionization and Occupational Licensing Coverage in the United States." *Industrial and Labor Relations Review* 69:142–72.

Goldin, C. 2014. "A Grand Gender Convergence: Its Last Chapter." *American Economic Review* 104:1091–119.

Gomez, R., M. Gunderson, X. Huang, and T. Zhang. 2015. "Do Immigrants Gain or Lose by Occupational Licensing?" *Canadian Public Policy* 41:S80–S97.

Johnson, J. E., and M. M. Kleiner. 2017. "Is Occupational Licensing a Barrier to Interstate Migration?" NBER Working Paper 24107.

Kleiner, M. M. 2000. "Occupational Licensing." *Journal of Economic Perspectives* 14:189–202.

Kleiner, M. M., and A. B. Krueger. 2010. "The Prevalence and Effects of Occupational Licensing." *British Journal of Industrial Relations* 48:676–87.

———. 2013. "Analyzing the Extent and Influence of Occupational Licensing on the Labor Market." *Journal of Labor Economics* 31:S173–S202.

Kleiner, M. M., and E. J. Soltas. 2018. "Occupational Licensing, Labor Supply, and Human Capital." Working paper.

Kleiner, M. M., and E. Vorotnikov. 2017. "Analyzing Occupational Licensing among the States." *Journal of Regulatory Economics* 52:132–58.

Kugler, A., and R. Sauer. 2005. "Doctors without Borders? Relicensing Requirements and Negative Selection in the Market for Physicians." *Journal of Labor Economics* 23:437–65.

McDonald, J. T., C. Warman, and C. Worswick. 2015. "Immigrant Selection Systems and Occupational Outcomes of International Medical Graduates in Canada and the United States." *Canadian Public Policy* 41:s116–s137.

Milgrom, P., and S. Oster. 1987. "Job Discrimination, Market Forces, and the Invisibility Hypothesis." *Quarterly Journal of Economics* 102:453–76.

Patel, K., and F. Vella. 2013. "Immigrant Networks and Their Implications for Occupational Choice and Wages." *Review of Economics and Statistics* 95:1249–77.

Peterson, B. D., S. S. Pandya, and D. Leblang. 2014. "Doctors with Borders: Occupational Licensing as an Implicit Barrier to High Skill Migration." *Public Choice* 160:45–63.

Pizzola, B., and A. Tabarrok. 2017. "Occupational Licensing Causes a Wage Premium: Evidence from a Natural Experiment in Colorado's Funeral Services Industry." *International Review of Law and Economics* 50:50–59.

Tani, M. 2018. "Selective Immigration, Occupational Licensing, and Labour Market Outcomes of Foreign-Trained Migrants." IZA Discussion Paper No. 11370, 1–40.

US Department of the Treasury Office of Economic Policy, Council of Economic Advisers, and Department of Labor. 2015. *Occupational Licensing: A Framework for Policymakers*.
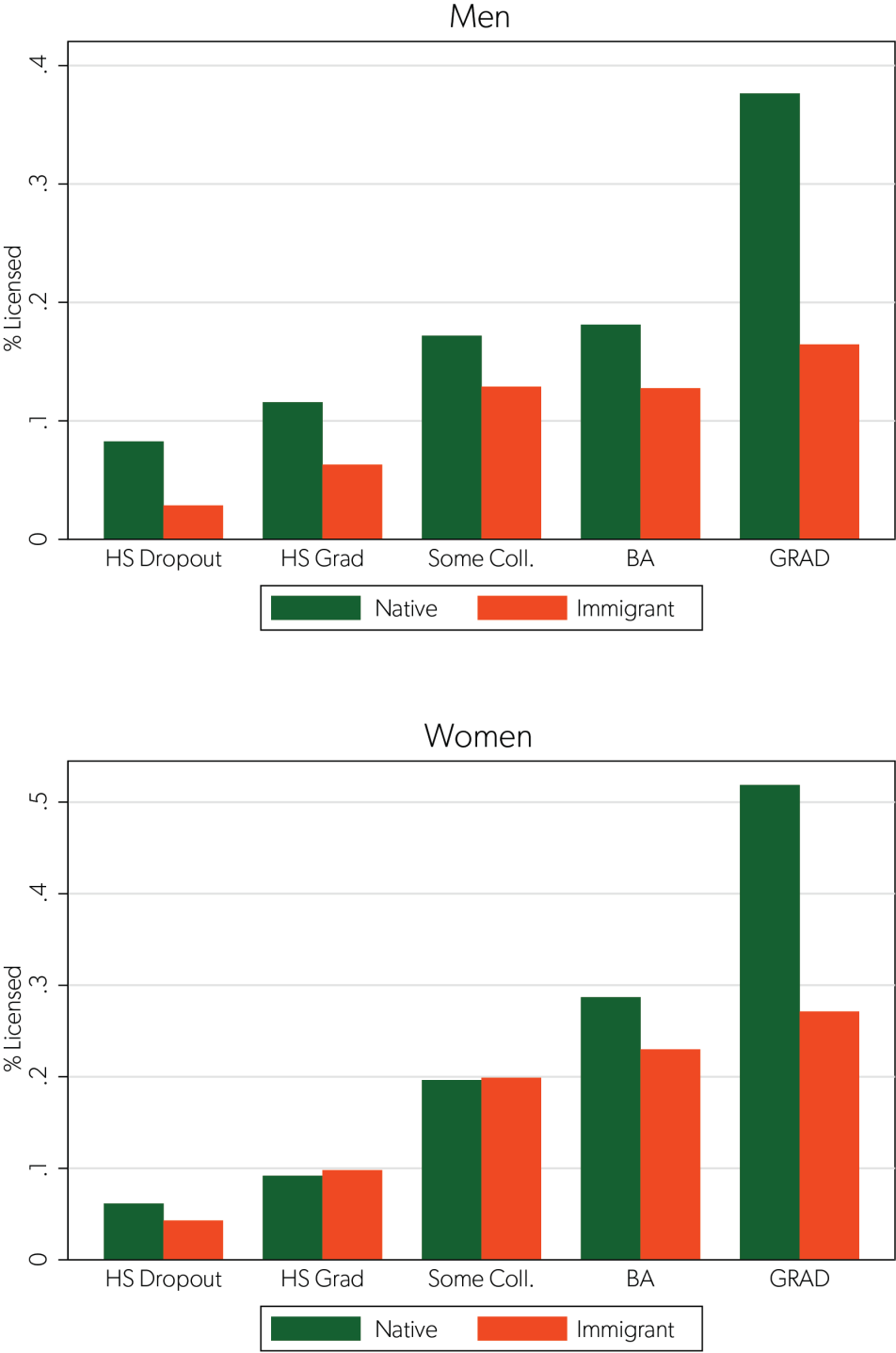
Appendix: Tables and Figures

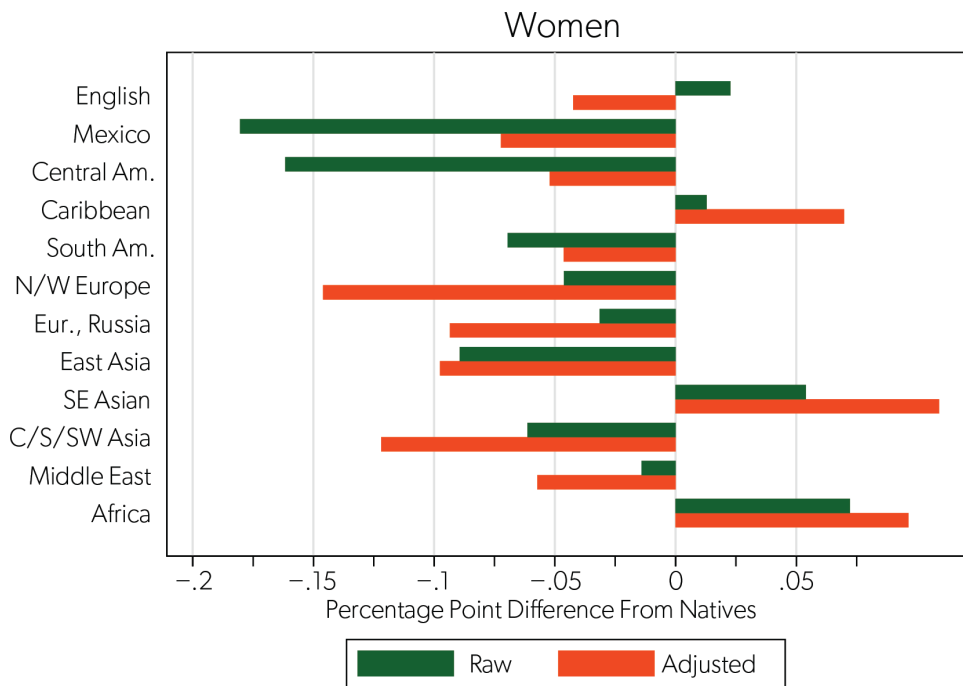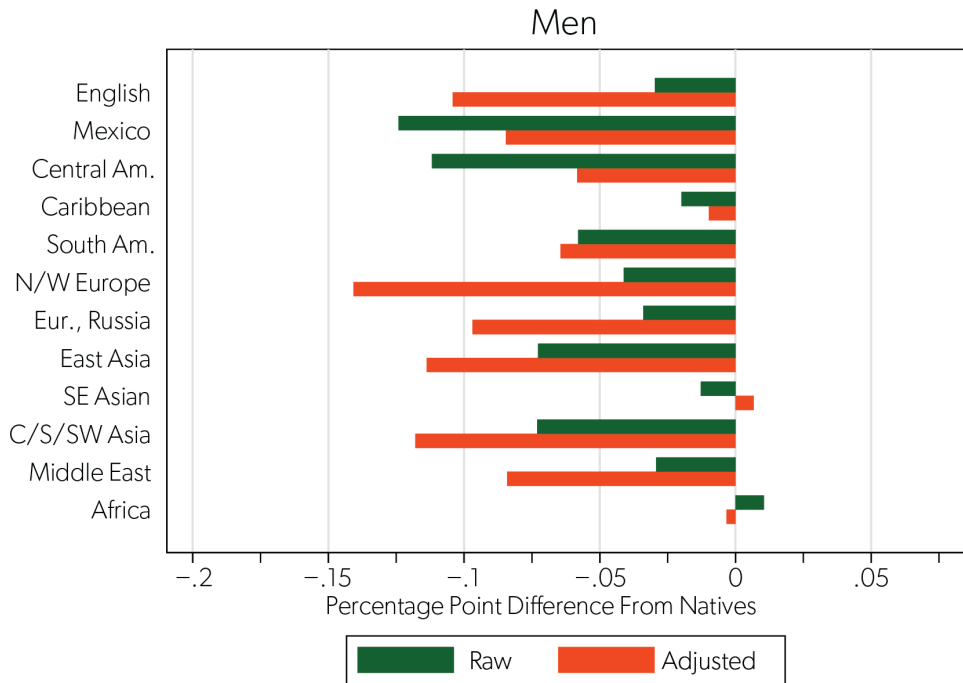Figure 1. Occupational Licensing by Education Level, Natives and Immigrants

Figure 2. Occupational Licensing Rate Deviation from Natives by Immigrant Region of Origin