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# Licensing, Educational Credentialing, and Wages Among Foreign Skilled Workers in Germany

Daniela Rohrbach-Schmidt

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**Abstract** The article studies whether foreign skilled workers have similar access to licensed and more credentialed occupations, and whether they profit from these regulations in terms of similar wages in these occupations to comparable domestic skilled workers. The theoretical foundations of this article are concepts of signaling and occupational closure. The analyses use a sample of 60,000 employed persons from the 2006, 2012 and 2018 Employment Surveys of the German Federal Institute for Vocational Education and Training (BIBB) and the Federal Institute for Occupational Safety and Health (BAuA), and a reweighting approach to account for the selection on observables. Results show an ambivalent picture of the regulation of occupations: on the one hand, at least foreign skilled men earn similar wages to domestic skilled men in more closed occupations; on the other hand, foreign skilled workers are less likely to enter these positions and they have monetary disadvantages compared with domestic skilled workers in less closed occupations.

**Keywords** Immigrants · Wages · Licensing · Credentialism · Occupational closure

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Online Appendix: [www.kzfss.uni-koeln.de/sites/kzfss/pdf/Rohrbach\\_Schmidt.pdf](http://www.kzfss.uni-koeln.de/sites/kzfss/pdf/Rohrbach_Schmidt.pdf)

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## Lizenzierung, Kredencialismus und Löhne von Erwerbstätigen mit ausländischen Qualifikationen in Deutschland

**Zusammenfassung** Der Beitrag untersucht, ob im Ausland qualifizierte Erwerbstätige einen ähnlichen Zugang zu lizenzierten und stärker kredencialistisch geschlossenen Berufen haben wie ansonsten vergleichbare Erwerbstätige mit in Deutschland erworbenen Qualifikationen. Weiter wird untersucht, ob die Lohnunterschiede zwischen beiden Gruppen in lizenzierten und stärker kredencialistisch geschlossenen Berufen geringer sind als in weniger geschlossenen Berufen. Wichtige theoretische Ansätze in dem Beitrag sind die Signalingtheorie und das Konzept der beruflichen Schließung. Die Analysen basieren auf den Erwerbstätigenbefragungen des Bundesinstituts für Berufsbildung und der Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (BIBB/BAuA) 2006, 2012 und 2018 und einem Reweightingansatz zur Berücksichtigung von Selektion bei beobachteten Merkmalen. Die Ergebnisse zeigen ein ambivalentes Bild der Regulierung von Berufen: Einerseits erzielen zumindest männliche Erwerbstätige mit ausländischen oder deutschen Qualifikationen in geschlossenen Berufen ähnliche Löhne. Andererseits sind Erwerbstätige mit ausländischen Qualifikationen seltener in geschlossenen Berufen tätig; in den weniger geschlossenen Berufen haben sie deutliche monetäre Nachteile gegenüber Erwerbstätigen mit deutscher Qualifikation.

**Schlüsselwörter** Immigranten · Löhne · Lizenzierung · Kredencialismus · Berufliche Schließung

### 1 Introduction

The integration of immigrants into the labor market is a particularly important policy issue in high-income countries. Repeatedly, research has shown that immigrants face above-average risks of being employed in positions that do not match their qualifications and skills. Typically, these positions go together with wage penalties and lower job satisfaction (e.g., see Chiswick and Miller 2009).

So far, research has focused on which individual characteristics of immigrants, such as differences in language skills and abilities, and differences in the quality of educational qualifications from abroad, can explain the risk of inadequate employment and wage differentials from non-immigrants. The significance of institutional regulations at the occupational level for these inequalities have been infrequently explored. With licensure and credentialism, this article considers two institutionalized strategies of occupational closure (Weeden 2002) as factors that shape employment opportunities and wage prospects of immigrants with foreign credentials<sup>1</sup>. In this article, I justify that these workers have lower access to licensed and credentialed occupations, and hypothesize that they still benefit in these occupations from higher

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<sup>1</sup> The definition of immigrants in this article is tied to the acquisition of a degree outside Germany. As will be discussed, foreign skilled workers in the data used here probably are mostly persons who have immigrated to Germany.

wages and lower wage differentials compared with workers who earned their degrees in Germany. Whereas similar considerations have been explored in other countries, this study is the first that applies this issue to Germany.

The German labor market is characterized by relatively rigid allocation mechanisms, which are closely linked to the vocational education system but also to academic professions. It is not only vocational or academic certificates that are decisive for access to employment positions, but in particular the fact that employment opportunities are closed for specific occupations (Shavit and Müller 1998; Haupt 2012). Against this background, the recognition of foreign qualifications in Germany is of great importance. Until 2012, the right to occupational recognition was rather restrictive. It can be assumed that persons with foreign qualifications have worse chances of working in licensed or credentialed occupations than persons with German qualifications. Prior work for Germany has shown that immigrants have lower chances of being employed in positions that match their skills and qualifications and of working in their learned occupation (Konietzka and Kreyenfeld 2001). As a first contribution, this study adds to this literature by studying foreign skilled workers' chances of working in licensed and credentialed occupations in Germany.

Employment in licensed or credentialed occupations has specific advantages that go beyond advantages from adequate employment per se. Occupations closed by licensure or credentialism are usually attractive occupations, i.e., they are associated with wage premiums and with lower wage inequalities among the occupation holders (e.g., Weeden 2002; for Germany Haupt 2012). In particular, two recent studies have shown that wage inequalities between immigrants and non-immigrants are much lower in closed than in nonclosed occupations in Canada (Gomez et al. 2015) and Norway (Drange and Helland 2019). The second contribution of this paper is that it studies whether foreign skilled workers in Germany gain from such institutions in the same way.

The findings in this paper show that foreign skilled workers practice licensed and more credentialed occupations less often than domestic skilled workers. At the same time, the analyses reveal wage gains of these regulations for foreign skilled workers. An inequality-reducing effect of the two closure devices is clearly only apparent for foreign skilled men. The results are robust to alternative sample selection rules and specifications that consider the countries of origin. Strictly speaking, the analyses do not identify any causal effects of foreign credentials. Presumably, foreign skilled workers in (highly) closed occupations differ from other employees with an immigration biography in terms of observable and unobservable characteristics. The paper deals with these issues by exploiting a German data set of skilled labor force participants with significant language skills. In addition, the data include important but usually unobserved variables of labor market skills, which lowers the problem of omitted variable bias (Smith and Todd 2005). By using a reweighting approach, the comparison groups of workers with foreign and domestic credentials are further narrowed down in terms of observable characteristics. Finally, with licensure and credentialism, the analyses consider two different closure devices to get a more complete picture of labor market integration of foreign skilled workers.

The paper brings together two lines of research—the literature on the transferability of human capital across countries and the immigrant–non-immigrant wage

gap (e.g., Chiswick and Miller 2009) and the literature on labor market effects of occupational regulation, i.e., credentialism and licensing (Kleiner and Krueger 2013; Weeden 2002). The paper adds to this literature by presenting evidence for the benefits of these institutionalized strategies from the perspective of foreign skilled workers in Germany. Findings on this issue are rather scarce, but they are of high policy importance for occupational recognition as an instrument helping to overcome labor market barriers for foreign skilled workers.

In the following section, I discuss the state of research on employment opportunities and wage disadvantages of immigrants in Germany. The subsequent section presents the basics of occupational regulation and foreign credential recognition in Germany, followed by a section in which hypotheses are derived based on theoretical considerations. In the two sections after that data, variables, and methods and the results are discussed. The article concludes with a summary and discussion of the main findings.

## 2 Employment Opportunities and Wages of Immigrants in Germany

There are numerous empirical studies on the employment opportunities of immigrants in Germany that cannot be described in detail here. These studies show concordantly that immigrants have worse employment opportunities than non-immigrants (for Germany, cf. Kalter 2005 at a glance). First, immigrants have less chance of being employed at all or in higher-status and level-adequate positions (Konietzka and Kreyenfeld 2001; Granato and Kalter 2001; Kogan 2011; Uhlen-dorff and Zimmermann 2014; Höhne and Schulze Buschoff 2015; Damelang and Abraham 2016; Mergener and Maier 2019) and are at higher risk of involuntary part-time work and permanent employment (Höhne and Schulze Buschoff 2015). Konietzka and Kreyenfeld (2001) use the German Socio-Economic Panel (SOEP) to show that the chances of repatriates<sup>2</sup> and foreigners gaining a higher status depend largely on whether they have access to their learned profession. Conversely, neither repatriate nor foreigners benefit from their certificate if they work in other occupations. However, the probability of entering the occupation they have learned is much lower for repatriates than for West Germans<sup>3</sup>. Second, a large number of studies for Germany (e.g., Diekmann et al. 1993; Aldashev et al. 2009; Lehmer and Ludsteck 2011; Beyer 2017; Basilio et al. 2017) show average earning (wage) disadvantages of between 10 and 20% for immigrants compared with otherwise comparable non-immigrants, depending on the study. Some of these studies verify that earnings disadvantages are heterogeneous across origin countries (Lehmer and Ludsteck 2011; Basilio et al. 2017). Other studies have investigated the extent to which the wages of immigrants increase with work experience and the (potential

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<sup>2</sup> Repatriates (in German: “Aussiedler” and “Spätaussiedler”) are immigrants of German descent who came to Germany from a state of the (former) Eastern Bloc, in particular from the former Soviet Union, Poland, and Romania.

<sup>3</sup> The authors limit the study to western Germany, because at the time of the analyses (wave 1998) only a fraction of the repatriates were living in eastern Germany.

but not always observed) improvement of language skills, or adapt to the wages of non-immigrants. The evidence for such adaptation in Germany is not clear (cf. Beyer 2017). Basically, German language skills are relevant for all aspects of immigrants' labor market integration (Esser 2006; Dustmann and Van Soest 2002).

Few studies exist on the access to and wage benefits of occupational closure for foreign skilled immigrants: Peterson et al. (2014) demonstrate occupational licensing to be a barrier to high skill migration in the USA using the example of doctors. Similarly Alecu and Drange (2019) find lower chances of obtaining a licensed job for foreign degree holders in Norway. Gomez et al. (2015) use Canadian panel data to demonstrate lower chances of having a job in a licensed occupation for individuals who immigrated to Canada than non-immigrants. Furthermore, they examine wage regressions that show lower wage penalties in licensed occupations than in unlicensed occupations. In fact, they find greater wage gains from licensing for immigrants. Separate models for women and men show that the wage advantages of licensing are more pronounced for women, but greater gains of licensing can only be observed for male immigrants (see *ibid.*, p. 88). The study by Drange and Helland (2019) reveals highly similar results to that of the Canadian case, and examines effects of credentialism, certification, and unionization in addition to licensure. The authors use Norwegian register data and a definition of immigrant status that is based on country of origin, conditional on having some education from Norway. They demonstrate, first, that immigrants in Norway have lower shares than non-immigrants in all occupational closure characteristics. Second, they show that the estimated wage differentials between immigrants and non-immigrants are lower in more closed occupations than in less closed occupations. Immigrants even receive a higher wage premium from being employed in licensed and unionized occupations than do majority colleagues. In addition, fixed-effects regressions of workers who change into highly licensed or unionized occupations suggest that this wage adjustment might not be due to selection effects, i.e., unobserved skill differences between immigrants and non-immigrants.

Beyond these studies, several studies for Germany (Giesecke and Verwiebe 2009; Groß 2009; Haupt 2012, 2016) have shown that various features of occupational closure, including licensing in particular, are associated with higher wage levels and lower internal wage inequality than less closed occupations. For Germany, Haupt (2016) finds a 13.2% higher (unadjusted) mean hourly gross wages for workers in licensed than in nonlicensed occupations. There is no study available to date that examines access to and wage benefits of occupational closure for foreign skilled immigrants in Germany. This article addresses this research gap.

### 3 Occupational Regulation and Foreign Credential Recognition in Germany

The German labor market is strongly structured by occupations. Its national vocational education and training system with common quality standards reduces information asymmetries; employers trust German certificates and credentials when evaluating employees' performances. Access to employment in an occupation is usu-

ally linked to a corresponding certificate, which excludes persons with credentials that are either not equivalent to those in demand or not considered to be trustworthy by the employers (Müller and Shavit 1998). Credentialism, as one central closure device (Weeden 2002), is thus common in many areas of the German labor market, including some occupations trained in the dual system (Haupt 2012). As a specifically strong but different form of occupational closure, licensing restricts access to a number of occupations by assigning the exclusive right to practice to those with the license (Kleiner and Krueger 2013; for Germany see Haupt 2016). Whereas credentialism only implies that educational credentials are used as a source of closure and does not have any legal support, the unauthorized practice of a licensed occupation is illegal (cp. Drange and Helland 2019). Typically, a license is issued if the corresponding training is successfully completed with a state examination. In addition, there are ethical, health, and (often) German language requirements (Haupt 2016, p. 44). Related to the fact that licensing in Germany is justified in the state's interest in the protection of common goods (Haupt 2016, p. 40), the nationwide licensed occupations encompass occupations in health care (e.g., registered general nurse, healthcare assistants, and medical doctors), education (teachers and educators), the state (e.g., judicial officers, judges, tax consultants, public accountants), and safety and order (e.g., military, police, architects). Importantly, access to the labor market for many occupations in Germany requires (certain) dual vocational training or academic credentials and is thus strongly closed by credentialism, whereas no occupation of the dual system is licensed. Several fully school-based training occupations are, however, licensed (e.g., health-care worker and nurses). The number of regulated occupations has not changed throughout the last few decades, the demand for and thus the number of employees in health-care and education occupations has increased over time. For 2011/2012, Haupt (2016, p. 51) estimates a share of employees in licensed occupations of 14.6% among the German working population, whereby health-care occupations and teachers make up almost 50% of all licensed workers. In Germany, the state also initiates and authorizes price regulations in the form of fee structures and scales of charges for licensed occupations (e.g., "Gebühren- und Honorarordnungen," for example, for architects, engineers, notaries). While some of the wage premiums for licensing are due to monopoly pensions, in Germany they must also be understood to be caused by licensed occupations' organization and bargaining power, their secured demand, higher costs of fluctuations, and the potential of license holders to attain high wages in unregulated markets (see Haupt and Witte 2016, pp. 12–13).

To work in licensed (or synonymously: regulated) occupations, foreigners must have their foreign qualifications accredited in one of the more than 600 competent accrediting authorities in Germany. Until the far-reaching change with the Federal Recognition Act ("Act for the Improvement of the Establishment and Recognition of Occupational Qualifications Attained Abroad") 2012 and further changes thereafter (see BMBF 2017), the right to occupational recognition for licensed occupations was

limited to EU citizens (including Swiss) and repatriates<sup>4</sup>. In nonlicensed occupations, and thus in all training occupations in the dual system, no accreditation was possible. Typically, information on accreditation procedures was rare, and procedures were time-consuming and costly, and differed between federal states (Braun 2012, p. 3).

## 4 Hypotheses

### 4.1 Access to Licensed and More Credentialed Occupations

Licensure and credentialism rules determine how easy it is for immigrants with foreign credentials to gain access to the labor market for their specific skills. As discussed, formal accrediting procedures, at least up to 2012, were restricted to licensed occupations, and these procedures were time consuming and costly, restricted to immigrants from specific countries of origin, and differed between federal states. Thus, initially, for reasons of legislation, gaining access to licensed occupations should pose a particularly difficult barrier for citizens with credentials from foreign countries, or even legally impossible for third-country citizens (i.e., from countries outside the EU and repatriates, except for medical doctors, see footnote 4). In addition, access to highly credentialed occupations (i.e., occupations that do not require a certain qualification by law, but in which employers expect a certain qualification) should be more difficult with foreign credentials, because until 2012 there was no right to recognition in these credentialed, nonlicensed occupations.

The Signaling Theory (Spence 1973) and the Statistical Discrimination Theory (Phelps 1972) can be used to reason that employers are less likely to hire applicants with foreign qualifications, especially when employers lack verified information on their skills, i.e., information on the full or part equivalence with a German reference occupation from competent authorities. This uncertainty regarding the applicants' productivity might create incentives for employers to use *indices* such as ethnicity or country of origin as a proxy for productivity instead of *signals* (achieved characteristics such as educational attainment and experience). In fact, the quality of education systems differs between countries owing to different resources that countries are able to devote to them. Studies of poorer labor market opportunities, especially for individuals with educational qualifications from economically less developed countries, may indicate that employers use economic development to assess productivity (see Basilio et al. (2017) and Damelang and Abraham (2016) for a similar argument)<sup>5</sup>. In conclusion, *individuals with foreign credentials should have a lower probability of working in licensed occupations than individuals with*

<sup>4</sup> For medical doctors (who are licensed) from third countries, however, it was possible to work in their field as assistant doctors with a temporary work permit. Immigrants also had a legal claim to an academic comparative assessment procedure ("Statement of Comparability"), independently of their country of origin.

<sup>5</sup> However, Mergener and Maier (2019) have shown that these effects are less noticeable in areas with high skill shortages.



*domestic credentials; similarly, they should work in occupations with lower degrees of credentialism than domestic skilled individuals (H1, limited access hypothesis).*

Human capital theories, as well as search and match theories, argue that inequalities in access to skills-adequate employment would decline with increasing labor market experience in the host country (Chiswick and Miller 2009). On the one hand, employers are increasingly better able to assess the true productivity of workers with foreign credentials and, on the other hand, these workers' productivity improves with better language skills and labor market experience. In fact, with the new law, labor market experience may also be taken into account in the equivalence assessment during the recognition process. However, if access to occupations is restricted by credentialism or licensing, and the foreign credential is not recognized (either because the immigrant didn't want to or couldn't take the initiative for formal recognition, or employers do not accept the qualification as equivalent), then workers with foreign credentials employed in inadequate positions or positions of low occupational closure at the time of arrival may nevertheless have difficulties in leaving these positions, even in the long run. In fact, the literature does not show any uniform findings on wage adjustment of immigrants to those of non-immigrants in Germany (see Beyer 2017). I analyze whether the chances of workers with foreign credentials gaining access to licensed occupations (or, equivalently, occupations with higher degrees of credentialism) significantly improve with increasing work experience. I thereby assume a slight assimilation between individuals qualified abroad and the German-trained individuals because of an *increase in access chances to licensed or more credentialed occupations of individuals with foreign credentials with rising labor market experience (H2, assimilation hypothesis).*

#### 4.2 Wage Returns to Closure in Germany Among Foreign Skilled Workers

Immigrants who successfully enter closed occupations may however benefit compared with their peers in more open occupations. Above, I argued that employer uncertainty about foreign credentials should lower the employment chances of immigrants in licensed and credentialed occupations. If they have apparently managed to take up licensed or highly credentialed employment, it must have been preceded by recognition of their degrees by the employer (and, in addition, by competent authorities in the case of licensed occupations). In these cases, the credential (the license) had become the crucial characteristic, not ethnicity or country of origin. In this perspective, occupational closure may work as a "shelter" against wage discrimination for immigrants who have gained access (Drange and Helland 2019, p. 5). Especially in licensed occupations, but also in occupations closed by educational credentialing, the stricter recruitment of specific employees (i.e., employees with a license or specific credential) leads to comparatively homogeneous groups of jobholders (cp. Damelang and Abraham 2016). Similarly, Haupt (2012, p. 736) has argued that the importance of individual characteristics for wages is declining with rising degrees of closure of the occupation. He proves such a mechanism of more equal wages within closed occupations for gender. In the Canadian (Gomez et al. 2015) as well as in the Norwegian case (Drange and Helland 2019), occupational licensing even raises wages higher for immigrant workers than for non-immigrants.

Consequently, for Germany, I assume *wage differences between foreign and domestic skilled workers to be lower in licensed occupations and occupations with higher degrees of credentialism than in nonlicensed occupations and occupations with lower degrees of credentialism* (H3, attenuation hypothesis).

## 5 Data, Variables, and Methods

### 5.1 Data and Study Sample

The study uses a pooled sample of 60,048 employed persons from the 2006, 2012, and 2018 Employment Surveys of the Working Population on Qualification and Working Conditions in Germany carried out by the Federal Institute for Vocational Education and Training (BIBB) and the Federal Institute for Occupational Safety and Health (BAuA). The samples are representative employment cross-sections and highly comparable in design and content<sup>6</sup>. The study populations comprise employed persons, aged 15 and over, with a regular working time of at least 10 h per week. The data were collected in CATI interviews in the German language, and thus it should be recognized that the study population represents a selective group of employed individuals with significant language skills.

The strength of the data for the given purpose is the availability of a large number of relevant worker-related variables, including measures for the degree of educational credentialing requirements in the workplace, gross monthly wages and working hours, detailed occupational information, as well as information on the country in which the foreign credential was obtained. Compared with most other studies, data on the level of German language proficiency required at the respondent's workplace are also included.

To identify foreign skilled workers in the data, I use information on whether the respondent has achieved (all of)<sup>7</sup> his or her vocational or academic degrees outside Germany. In contrast to non-German mother tongue or citizenship as (visible) characteristics of ethnic origin, the presence of a foreign qualification is the relevant characteristic for testing the hypotheses. It can be assumed that the majority of persons with foreign qualifications in the three subsamples grew up in another country, went to school there, and immigrated to Germany<sup>8</sup> (for a justification see the online appendix).

<sup>6</sup> 2006: <https://doi.org/10.7803/501.06.1.1.20>, (Hall and Tiemann 2020), 2012: <https://doi.org/10.7803/501.12.1.1.40> (Hall et al. 2015), 2018: <https://doi.org/10.7803/501.18.1.1.10> (Hall et al. 2020).

<sup>7</sup> In each survey wave and for each respondent, up to five attained degrees and their country of origin were collected. Only those who have obtained all their qualifications abroad are coded as foreign skilled workers. Those who have obtained at least one degree in Germany are coded as domestic skilled workers.

<sup>8</sup> As in most other studies, there is neither a variable that directly surveys whether the respondent is an immigrant or the date when immigration took place, nor is there information on whether the respondent took an initiative for recognition of his/her foreign credential. The data almost certainly do not include cases that fell under the new recognition law of 2012. With around 140,000 applications and, accordingly, a smaller number of pending applications for full/partial equivalence since 2012 (Böse and Schmitz 2019), the incidence in the population as a whole is too low.

After sample restrictions (see below), I observe 438 foreign skilled workers in 2006, 401 in 2012, and 478 in 2018. These figures only consider skilled workers with valid occupational information (without military occupations), aged 20–65, and those working in plant locations in Germany with valid information on all variables used in the analyses. Around 2500 observations from each round are not included in the analysis, the majority of which are removed because of selection by education or age, and because of missing information on at least one variable of interest. The final size of the analysis sample is 52,417.

The analyses focus on labor market outcomes of immigrant workers with relevant human capital attained abroad. Compared with all immigrants with foreign qualifications (as evident from German Microcensus data, see Mergener 2018), the sample probably contains a positive selection of successful labor market participants, especially among the smaller group of non-EU qualified workers (for a more detailed discussion see the online appendix). In Germany, foreign skilled workers more often have an academic degree and less often a vocational training degree than the domestic skilled population (*ibid.*), which is also evident in the given sample (see Table 1). These persons have attained their foreign credentials in different regions of origin<sup>9</sup>: at 58.5%, immigrants with credentials from EU countries, Switzerland, and repatriate countries (or, former areas of origin of repatriates such as (Upper) Silesia, East Prussia) make up by far the largest group of foreign skilled workers in this sample. Thus, the majority belong to the group of those who, even before 2012, had a more privileged legal situation: 12.4% earned their degree in EU candidate countries, 11.6% in other European countries, 8.9% in Asian countries, 6.3% in American or Caribbean countries, and only 2.4% in African countries (Table 1).

## 5.2 Variables

I consider two measures of closure at the occupational level. The first measure is an indicator variable that equals one if the three-digit occupation in the German Classification of Occupations (KldB) 2010 is licensed in Germany taken from the compilation provided by Haupt (2016). To work in a licensed occupation, a license must be available, i.e., persons with foreign credentials must have their qualifications recognized. Using this approach, 19.1% of domestic skilled workers and 15.1% of foreign skilled workers in the sample work in licensed occupations. Health-care occupations (health care and nursing, 813; human medicine and dentistry, 814; geriatric care, 821) and education occupations (education and social work, and pedagogic specialists in social care work, 831; teachers, 841, 842) account for the largest share of licensed employment (overall and in both subsamples). Significantly more women than men work in licensed occupations (29.5% compared with 10.7% among the German skilled and 21.5 to 10.6% among the foreign skilled). Compared with men (both subsamples), a clearly higher share of women's total licensed employment is in health care and nursing (813), care of the elderly (821), and education and social work (831). On the contrary, for men, it is clearly higher in construction scheduling and supervision, and architecture (311), police and criminal investigation, jurisdic-

<sup>9</sup> For individuals with several degrees from other countries, I use the country of the last degree.

**Table 1** Summary statistics

	German skilled sample (weighted share 95.8%)	Foreign skilled sample (weighted share 4.2%)
<i>Gender (% share women)</i>	0.45	0.41
<i>Married</i>	0.60	0.70
<i>Age</i>	42.9 (11.0)	44.0 (9.98)
<i>Health status</i>		
Poor	0.02	0.03
Not so good	0.10	0.10
Good	0.54	0.49
Very good	0.25	0.29
Excellent	0.10	0.10
<i>Highest qualification</i>		
No vocational degree	<i>Dropped</i>	<i>Dropped</i>
Dual/school-based training (VET)	0.66	0.47
Advanced training degree	0.08	0.02
University degree	0.26	0.51
<i>Working hours per week</i>	39.4 (12.0)	38.9 (12.8)
<i>Years of labor market experience</i>	20.4 (11.4)	20.1 (11.3)
<i>Tenure (years)</i>	12.1 (10.5)	9.6 (8.7)
<i>Log hourly wages (Euros)</i>	2.71 (0.53)	2.71 (0.58)
<i>German-language requirements</i>		
No requirements	0.08	0.13
Basic requirements	0.46	0.49
Advanced requirements	0.45	0.38
<i>Employment status</i>		
Blue-collar worker	0.23	0.28
White-collar worker	0.60	0.58
Public servants	0.07	0.02
Self-employed	0.10	0.13
Helping family members	0.004	0.003
<i>Occupational closure</i>		
Licensed occupation	0.19	0.15
Degree of credentialism of current occupation	-0.001	-0.205
<i>Country/region of educational qualification</i>		
Germany	100.0	0.0
EU, Switzerland, repatriate country	0.0	0.59
EU candidates	0.0	0.12
Other European countries	0.0	0.12
Asian countries	0.0	0.09

**Table 1** (Continued)

	German skilled sample (weighted share 95.8%)	Foreign skilled sample (weighted share 4.2%)
American, Caribbean countries	0.0	0.07
African countries	0.0	0.02
<i>Firm size<sup>a</sup></i>	339 (516)	377 (555)
<i>Number of cases</i>	51,100	1317

Source: BIBB/BauA Employment Surveys 2006, 2012, 2018, weighted by sample weights, own calculations

Sample is restricted to 20–65-year-olds

<sup>a</sup>Number of cases 49,310 and 1218

tion, and the penal institution (532), and human medicine and dentistry (814). Many occupations are either strongly male (e.g., 311, 532) or female-dominated (813, 821, 831), and this applies to both subsamples.

The second measure is a gradual measure of occupational closure that focuses on educational credentialing, which is borrowed from Haupt (2012). The measure uses unique employee information<sup>10</sup> on the degree of closure, i.e., occupational incumbents stating (i) that having a certificate is a requirement for their job, (ii) that the current occupational activity corresponds to or is related to their vocational training (as opposed to “has nothing to do with it”), and (iii) that they can use much or quite a lot of the occupational knowledge and skills they have acquired in training in the current job. I aggregate the individual-level information at the three-digit level of the KldB 2010, and combine them into a measure by using the first component of a factor analysis. As in Haupt (2012), the scales load on a single factor. The measure has a reliability coefficient of 0.91. The average score on this measure among domestic skilled workers is  $-0.001$  and among foreign skilled it is  $-0.205$  (Table 1). In the combined sample, the measure varies between  $-3.0$  and  $+1.69$  (mean  $-0.02$ , standard deviation 0.96).<sup>11</sup> The degree of occupational closure is lowest for cleaning and disposal occupations (three-digit code 541), around zero for office and administrative occupations (714), and highest for human medicine and dentistry (814), among others.

For the wage models, I use gross hourly wages (inflation-adjusted), and imputed missing values. Highest qualification is depicted as dummy variables, which indicate whether a person has a dual or full-time school-based vocational training degree (VET), an advanced training degree (master craftsmen, technicians, business administrator, and similar) or a university degree (this includes University of applied science degrees). Labor market experience in years is operationalized as interview year minus years of employment gaps, minus year of first employment.

<sup>10</sup> Similar to Haupt (2012), I do not consider the self-employed, freelancers, family helpers, persons without a valid occupational title, and soldiers and officers in determining the relative frequency at the occupational level.

<sup>11</sup> Of the combined sample, 10.4% work in occupations with a high degree of credentialism (i.e., a score  $>1$ ), and 12.3% in occupations with a low degree of credentialism (score  $\leq 1$ ). The share of foreign skilled workers in occupations with a low degree is around 5% points above that of domestic skilled workers, at the expense of employment in medium credentialed occupations.

Unfortunately, in the 2006 and 2012 data, one cannot differentiate between pre- and post-immigration labor market experience. This is an important restriction, and thus, strictly speaking, interaction effects of foreign qualification and labor market experience cannot be reliably tested.<sup>12</sup> As a robustness check, analyses differentiating years of labor market experience abroad and in Germany with the 2018 sample are discussed. In order to capture differences in productive capacity, I also consider the level of German language skills required for the job (none, basic, advanced skills) and the state of health (from poor, 1, to excellent, 5). All models include tenure, seven labor market entry cohorts, and dummies for survey round and German federal states because of different recognition legislation before 2012 and wage differences across states. In the wage models, firm size is additionally controlled for (reducing the sample to 50,528 observations). Additionally, employment status is used in the selection model (see below). Haupt (2012, pp. 159–161) demonstrates that the wage effects of licensing are particularly noticeable for women. In addition, the descriptive analyses above show that men and women are not evenly distributed among licensed occupations. To allow for gender-specific differences, the wage models are also estimated separately for men and women.

Table 1 gives the summary statistics of the variables in the domestic and the foreign skilled samples.

The foreign skilled sample is more strongly stratified by gender (male dominated) and includes more married and academically trained workers. Also, foreign skilled workers are, on average, older and have fewer years of tenure. As one would expect, smaller shares of the foreign skilled work in jobs that require specific German language skills and are largely under-represented in white-collar occupations and jobs as civil servants, but over-represented in blue-collar jobs. Differences between the two subsamples in average working time, experience, and hourly wages, as well as subjectively perceived state of health, are not particularly large.

## 5.3 Methods

### 5.3.1 *Balancing Observables*

The descriptive statistics show that foreign skilled workers differ from the domestic skilled sample in observed characteristics for some decisive variables (e.g., education, employment status). The distributions of other variables are more similar (working hours, experience). Moreover, the sample size for foreign skilled workers is comparatively small ( $n=1317$ ). For a more thorough analysis of the effect of being a foreign skilled worker on closure and wages, I follow a propensity-score-based reweighting approach (Nichols 2007, 2008). The basic concept is to first fit a logistic selection model of the “treatment,” i.e., in this case “foreign skilled”, to observable characteristics, and to estimate the conditional probability  $\lambda$  of being in

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<sup>12</sup> As studies for several countries (see Dustmann and Glitz 2011), among them Germany (Basilio et al. 2017), suggest, foreign labor market experience attracts little or no reward in the receiving labor market. The estimates of labor market experience on chances of entering favorable positions might be therefore over- or underestimated.

the treatment group. The estimated propensity scores, i.e., the odds  $\lambda / (1-\lambda)$  are then used as weights for the control group. After constructing this weight, the models of interest can be run on the reweighted data. The reweighting approach makes the groups similar with respect to those variables included in the propensity-score model. It is not claimed, however, that the estimate of the treatment variable in the weighted regression models can be interpreted as a causal effect. Identification is a problem as long as the usually unobserved characteristics influence the selection in the treatment group or the outcome variables.

Because it is important to balance prognostically important covariates in addition to covariates that influence treatment selection but have no effect on the outcome (see Austin and Stuart 2015), the selection model considers sex, cohort, marital status, age, highest vocational education attained, experience, tenure, working time, German language job skill requirements, health status, employment status, German federal states, and survey rounds. Figure A1 in the online appendix shows the distribution of the propensity score of both subsamples before and after the matching. Table A1 in the online appendix gives the means and standard deviations of the covariates in both groups using the stabilized weights. These diagnostic evaluations suggest that the reweighting creates a control group sample in which the parameters of continuous and categorical covariate variables are similar in foreign and domestic skilled workers.

### 5.3.2 Reweighted Regression Models of Licensing, Occupational Closure, and Wages

To test the limited access hypothesis (*H1*), I estimate reweighted logistic regression models of licensing, and reweighted linear regression models of the degree of credentialism (both with robust standard errors). These models consider the main effects of being a foreign skilled worker and experience, as well as their interaction, to study whether the association between foreign skilled workers and licensing/credentialism changes over time in the labor market (*H2*). The reference group for these models are German-skilled, male, VET graduates from survey round 2006 with an average number of years of experience, who entered the labor market in the 1980–1990 cohort, with basic German skill requirements at their workplaces, and a medium state of health in North Rhine-Westphalia.

Given that until the Federal Recognition Act of 2012, the right for the recognition of licensed occupations was limited to EU citizens and repatriates, and because of the presumably higher acceptance of the EU by German employers, one should observe lower differences in licensure and credentialism to the reference group for these workers than for workers who earned their degrees in other European, American, and Asian countries. Respective sensitivity analyses with region of origin complement the analyses.

In a second step, reweighted linear regression models of log hourly wages assess whether there are lower wage penalties for foreign skilled workers in licensed than in nonlicensed occupations, and whether wage penalties are lower in occupations with higher degrees of credentialism (*H3*). The reference group for these models is

as for the models discussed above, and with average firm size. As argued above, these models are also estimated separated by gender.

## 6 Results

### 6.1 Access to Licensed and Credentialed Occupations

To what extent do foreign skilled workers in Germany have access to licensed occupations, and occupations closed by credentials? Table 2 presents independent regression models for these two dependent variables of interest, i.e., licensure (see column 1) and credentialism (column 2). Basically, the *limited access hypothesis (HI)* is validated: foreign skilled workers have, on average, a 3-percentage-point lower probability of working in a licensed occupation (which constitutes a 16%

**Table 2** Reweighted logistic regression model of working in a licensed occupation and reweighted linear regression model of degree of credentialism of the current occupation

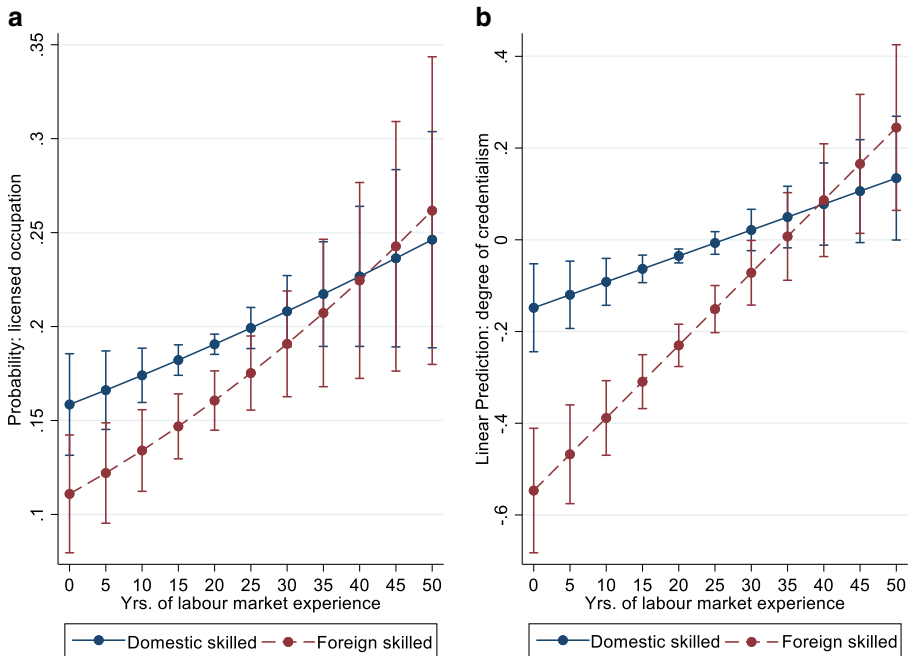
	(1) Employment in a licensed occupation		(2) Degree of credentialism of the current occupation
	OR	AME	b-coefficient
Foreign skilled	0.633* (0.116)	-0.030	-0.399*** (0.065)
Years of labor market experience	1.013+ (0.007)	0.002	0.006* (0.003)
Foreign skilled×experience	1.011 (0.008)	-	0.010*** (0.003)
Women	3.615*** (0.234)	0.173	0.068** (0.025)
<i>Highest qualification (ref. VET)</i>			
Advanced training degree	0.597*** (0.073)	-0.043	0.304*** (0.056)
University degree	2.365*** (0.176)	0.111	0.575*** (0.027)
<i>German language requirements (ref. basic requirement)</i>			
No requirements	0.201*** (0.038)	-0.133	-0.441*** (0.046)
Advanced requirements	1.264*** (0.086)	0.033	0.236*** (0.025)
Constant	0.075*** (0.014)	-	-0.475*** (0.070)
Pseudo R <sup>2</sup> /R <sup>2</sup>	0.122		0.181
N	52,417		52,417

Source: BIBB/BAuA Employment Surveys 2006, 2012, 2018, weighted values (reweighting), own calculations.

Sample is restricted to 20–65-year-olds. Workers without any vocational degree are dropped. All models include dummies for survey rounds, labor market entry cohorts, federal states, and state of health. Robust standard errors in parentheses

+*p*<0.10, \**p*<0.05, \*\**p*<0.01, \*\*\**p*<0.001





**Fig. 1** Predictive margins (with 90% confidence intervals) of immigrant status over years of labor market experience for licensure (a) and credentialism (b). (Source and notes: see Table 2, coefficients based on models in Table 2)

effect based on the probability of being in a regulated occupation for the sample as a whole). The estimated average degree of their occupations' degree of credentialism is  $-0.399$  points (40% of the standard deviation) below that of workers who earned their degrees in Germany, but with otherwise similar observable characteristics. These results should be particularly recognized, as this study only considers skilled foreign workers and that, in the approach, the selection of workers into the groups of foreign and domestic skilled workers is controlled for by observable characteristics. Moreover, these differences apply under control of a variety of relevant confounding variables. With German language skills and health, unobserved characteristics are controlled for.

Based on the previous literature, I theorized that the chances of immigrants entering closed occupations would improve with labor market experience. The model of licensing (column 1) estimates a positive but not, at conventional levels, statistically significant interaction effect of being a foreign skilled worker and labor market experience. For educational credentialing (column 2), there is a positive significant effect though. The *assimilation hypothesis* (H2) is thus not clearly applicable for the stricter closure device, i.e., licensing, but it is applicable for credentialism. Figure 1 shows the predicted probabilities in a marginal effects plot to ease interpretation. As Fig. 1 demonstrates, for foreign skilled workers, the lower probability of employment in a licensed occupation, and the estimated lower degree of their occupations' degree of credentialism, seem to persist over many years in the labor market.

Robustness analyses with the 2018 data alone show that the expected occupational degree of credentialism increases with higher German labor market experience but not with foreign labor market experience (see annex Table A2, model 1)<sup>13</sup>. Another robustness analysis replaces the indicator “foreign skilled” by whether the respondent started working in Germany after a first employment abroad. This analysis supports the results in Table 2 to the extent that this indicator of immigrant status also has negative effects on the probability of working in a licensed occupation, and is negatively related to the degree of credentialism of the workers’ occupation (see models 2a and 2b, annex Table A2).

As a further sensitivity check, the above analyses are performed with region of origin instead of foreign qualification (see Table A3 in the online appendix). The results are compatible with heterogeneous effects across countries in the previous literature and before accreditation procedures. The gap to workers qualified in Germany is much smaller for workers trained in the EU, Switzerland, and repatriate countries than for those from EU-candidate or other European, American, or Caribbean countries (but, in the case of licensure, not for Asian qualifications).

## 6.2 Foreign Skilled Workers’ Wage Penalties in Licensed Occupations and in Occupations with Higher Degrees of Credentialism

Do foreign skilled workers gain from the closure regulations in terms of similar wages in these occupations to those of comparable domestic skilled workers? Table 3 first contains several independent reweighted regression models of log hourly wages<sup>14</sup> to answer this question with regard to licensing.

Model 1 includes all cases (men and women) and an interaction term for licensing and foreign skilled workers. Models 1a and 1b are the same models but for men and women only. The results of these models show wage penalties from being foreign skilled of  $-7.4$  log points ( $-7.7\%$ ) in the pooled sample and of  $-8.6$  log points ( $-9.0\%$ ) and  $-5.4$  log points ( $-5.5\%$ ) for male and female foreign skilled workers respectively, with similar observable characteristics and independently of a large number of other observable wage-related attributes. These models also indicate a substantial and significant wage gain measured in log points of  $12.7$  ( $13.5\%$ , pooled sample),  $9.0$  ( $9.4\%$ , men), and  $15.0$  ( $16.2\%$ , women) associated with working in a licensed occupation. The values for the pooled sample are thus similar to the unadjusted values estimated by Haupt for Germany, and at a similar level to the ordinary least squares results for Canada ( $16.4$ ) and Norway ( $6.5$ ). As these latter studies have also found, the premium of licensing is more concentrated within women than men. In contrast to the findings for at least Norway, the interaction terms in models 1, 1a, and 1b, between immigrant status (but defined here as foreign skilled worker) and licensure show no substantially large and statistically significant

<sup>13</sup> As for the whole sample, for licensing, no statistically significant effect of immigrant status times experience shows up in the 2018 sample, for neither German nor foreign labor market experience.

<sup>14</sup> The results of further covariates correspond in height and direction to the results of other studies. The indicators for language skills and health status show positive wage correlations. However, these and other inter-relationships are not discussed further for reasons of space.

**Table 3** Reweighted linear regression models of log hourly wages: licensure

	(1) Total	(1a) Men	(1b) Women	(2a) Men Nonlicensed	(2b) Men Licensed	(3a) Women Nonlicensed	(3b) Women Licensed
Foreign skilled	-0.074*** (0.016)	-0.086*** (0.020)	-0.054* (0.024)	-0.086*** (0.020)	-0.026 (0.069)	-0.051* (0.024)	-0.164*** (0.042)
Licensure	0.127*** (0.013)	0.090*** (0.022)	0.150*** (0.015)	-	-	-	-
Foreign skilled x licensure	-0.042 (0.040)	0.065 (0.075)	-0.112* (0.049)	-	-	-	-
Women	-0.221*** (0.013)	-	-	-	-	-	-
<i>Highest qualification (ref. VET)</i>							
Advanced training degree	0.121*** (0.025)	0.164*** (0.027)	0.029 (0.052)	0.166*** (0.028)	0.089 (0.107)	0.036 (0.060)	0.003 (0.041)
University degree	0.364*** (0.014)	0.404*** (0.018)	0.309*** (0.021)	0.402*** (0.019)	0.394*** (0.073)	0.304*** (0.025)	0.307*** (0.033)
Years of labor market experience	0.008*** (0.002)	0.008* (0.002)	0.008*** (0.002)	0.007*** (0.003)	0.011+ (0.006)	0.007*** (0.002)	0.013** (0.004)
Years of labor market experience <sup>2</sup>	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.001* (0.000)	-0.000*** (0.000)	-0.000 (0.000)
Tenure (years)	0.013*** (0.001)	0.012*** (0.001)	0.015*** (0.001)	0.012*** (0.001)	0.013*** (0.002)	0.015*** (0.001)	0.011*** (0.002)

**Table 3** (Continued)

	(1)	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
	Total	Men	Women	Men Nonlicensed	Men Licensed	Women Nonlicensed	Women Licensed
<i>German language requirement (ref. basic requirement)</i>							
No requirement	-0.070*** (0.019)	-0.041+ (0.023)	-0.098*** (0.030)	-0.046* (0.023)	0.207 (0.279)	-0.080* (0.031)	-0.087 (0.104)
Advanced requirement	0.137*** (0.013)	0.112*** (0.017)	0.165*** (0.020)	0.117*** (0.018)	0.086* (0.041)	0.202*** (0.024)	0.091** (0.031)
<i>Health status (ref. good)</i>							
Poor	-0.096* (0.040)	-0.117* (0.057)	-0.079 (0.051)	-0.105+ (0.061)	-0.238 (0.157)	-0.084 (0.058)	-0.094 (0.071)
Not so good	-0.060** (0.020)	-0.071** (0.027)	-0.048+ (0.028)	-0.069* (0.030)	-0.087 (0.055)	-0.078* (0.031)	0.037 (0.050)
Very good	0.100*** (0.013)	0.098*** (0.017)	0.104*** (0.020)	0.104*** (0.018)	0.047 (0.049)	0.085*** (0.024)	0.149*** (0.036)
Excellent	0.095*** (0.020)	0.095*** (0.024)	0.087* (0.034)	0.095*** (0.024)	0.111 (0.097)	0.065+ (0.039)	0.113+ (0.063)
Firm size	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Constant	2.709*** (0.019)	2.709*** (0.024)	2.480*** (0.029)	2.708*** (0.025)	2.843*** (0.086)	2.438*** (0.034)	2.744*** (0.046)
R <sup>2</sup>	0.360	0.342	0.311	0.344	0.240	0.322	0.238
N	50,528	25,407	25,121	21,995	3,412	17,068	8,053

Source: BIBB/BAuA Employment Surveys 2006, 2012, 2018, weighted values (reweighting), own calculations  
 Sample is restricted to 20–65-year-olds. Workers without any vocational degree are dropped. All models include dummies for survey rounds, labor market entry cohorts, and federal states. Robust standard errors in parentheses  
 + $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

positive effects. Thus, foreign skilled workers in Germany do not seem to earn an additional wage premium from this closure device. Whereas the coefficient for men is positive (but not significant), the model 1b instead estimates a negative effect for women. Apparently, the pay gap for women in licensed occupations is greater between foreign and domestic skilled workers than in nonlicensed occupations.

Models 2a and 2b are restricted to men. Model 2a includes only cases with employment in nonlicensed occupations and model 2b includes only cases with licensed occupations. In nonlicensed occupations, on average, foreign skilled men earn 8.6 log points less than domestic skilled men with similar observable characteristics and under control of a number of other regressors. On the contrary, in the case of licensed occupations, model 2b estimates an average wage loss of  $-2.6$  log points for foreign skilled workers, which is not statistically different from zero. The results for men thus clearly speak in favor for some sort of attenuation, i.e. *H3*: foreign skilled men indeed clearly gain as compared to foreign skilled workers in non-licensed occupations. In contrast to them, they do not experience any wage disadvantages. Contrary to the Canadian and Norwegian findings, however, they do not benefit more from licensing than their non-immigrant colleagues (their payoff to licensing of 9.0 log points, on average, is the same).

The separate models for women (models 3a and 3b) are not compatible with the expectation of greater wage equality between foreign and domestic skilled workers in licensed occupations. Whereas the wage penalty of foreign skilled women in non-licensed occupations is about  $-5.1$  log points ( $-5.2\%$ ), it is  $-16.4$  log points ( $-17.8\%$ ) in licensed occupations. As well as the results of the model with the interaction effect (model 1b), this suggests a greater wage inequality between foreign and domestic skilled women in licensed occupations. In principle, this could result either if these foreign skilled women tend to occupy occupations with lower pay levels within the distribution of licensed occupations than domestic skilled women or, within the same licensed occupations, if they tend to work in jobs with lower requirement levels than their domestic skilled colleagues, e.g., as licensed health and nursing or geriatric *auxiliaries* (Gesundheits- und Krankenpflegehelfer, Altenpflegehelfer, i.e., KldB 2010 codes 81301/82101) instead of health-care worker and (geriatric) nurses (81302/82102)<sup>15</sup>. Insofar as the descriptive analyses show that foreign and domestic skilled women have a similar concentration in certain licensed occupations, such as health care, nursing, and care of the elderly (see the subsection 5.2), it is not surprising that the additional control of occupational dummies (two digits) does not change the results for women (and men; see annex Table A4, models 1 and 4). However, they change for women if one takes into account the requirements level of the occupation (i.e., the fifth digit). Compared with the wage penalty of  $-16.4$  log points ( $-17.8\%$ ), the effect of foreign qualifications for women thus drops to  $-9.9$  points ( $-10.4\%$ , model 2 in annex Table A4). It is  $-11.5$  log points if both occupations and requirement level are controlled for (model 3). In fact, simple mean value comparisons show that the jobs of foreign skilled women (but not of men) have significantly

<sup>15</sup> On the fifth, bottom level, the classification structure of the KldB 2010 is broken down by a vertical dimension, whereas the first to fourth levels are functional differentiations at the horizontal level (see Paulus and Matthes 2013).

**Table 4** Reweighted regression models of log hourly wages: degree of credentialism

	(1)	(2)	(3)
	Total sample	Men	Women
Foreign skilled	-0.069*** (0.014)	-0.064** (0.020)	-0.072*** (0.021)
Degree of credentialism	0.103*** (0.006)	0.095*** (0.008)	0.110*** (0.008)
Foreign skilled × degree of credentialism	-0.010 (0.014)	0.026 (0.019)	-0.041* (0.018)
R <sup>2</sup>	0.380	0.365	0.329
N	50,528	25,407	25,121

Source: BIBB/BAuA Employment Surveys 2006, 2012, 2018, weighted values (reweighting), own calculations

Sample is restricted to 20–65-year-olds. Workers without any vocational degree are dropped. Controls as in Table 3. Robust standard errors in parentheses

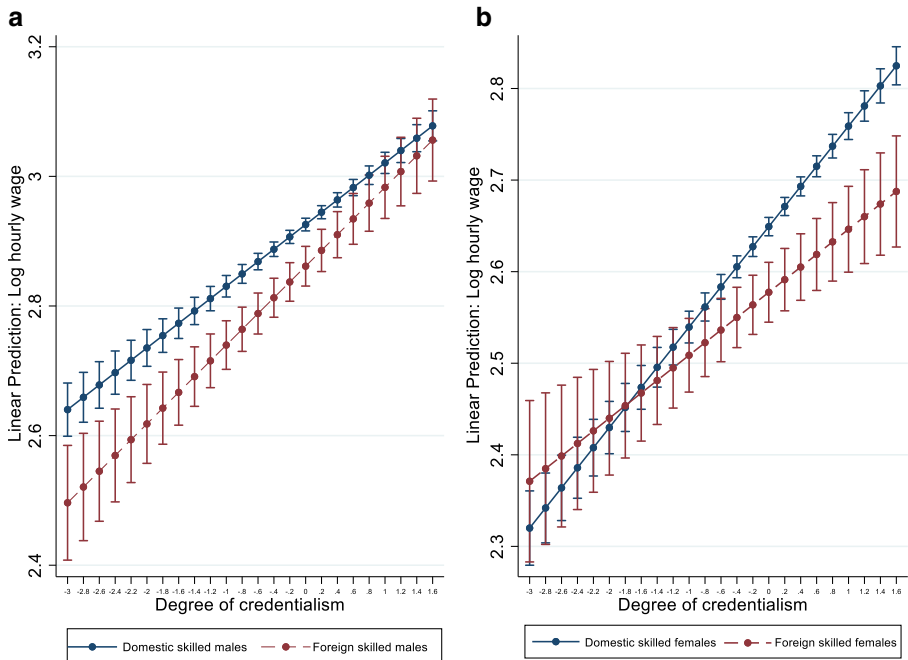
\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

lower requirement levels than those of domestic women. The mean difference in licensed occupations is about 2.2 times higher than in the nonlicensed occupations (results upon request). Accordingly, some differences between foreign and domestic skilled women could stem from differences in the composition of requirement levels<sup>16</sup>. However, significant wage differentials remain even after the requirement level has been controlled. Importantly, whether the differences in requirement levels are caused by self-selection, lack of (full) recognition, or by employer discrimination cannot be clarified using the available data.

The finding of lower wage inequalities only for men is further supported by results for occupational closure (Table 4).

Similar to licensing, wages are higher in occupations with higher degrees of occupational closure as measured by the gradual measure that focuses on credentialism. Being trained abroad has a substantially large, significant negative wage effect (-6.9 log points in the pooled sample and -6.4 and -7.2 for men and women respectively). Also, with reference to this gradual measure, the attenuation hypothesis seems to apply only to men (model 2). Even though the interaction effect of foreign skilled work and credentialism is not statistically significant at conventional levels, a small attenuation of differences between foreign and domestic skilled men with rising levels of occupational credentialism shows up in predicted values (Fig. 2). Women, on the other hand, tend to see an increase in wage inequality between those with and without German credentials with an increasing degree of credentialism.

<sup>16</sup> An analysis of the federal recognition statistics (thanks to Nadja Schmitz for providing these figures) shows that in the case of nurses with third-country qualifications, full equivalence is relatively often not achieved in the first step of the recognition procedure, but that an adjustment measure must first be taken (for both men and women). Unfortunately, the statistics do not provide any information as to whether the applicants take up an adjustment measure, whether they work in parallel, what activities they perform, or whether, for example, they are actually employed and paid as fully qualified specialists after they have successfully completed the measure.



**Fig. 2** Predictive margins (with 90% confidence intervals) of foreign skilled work over occupational closure for men (a) and women (b). (Source and notes: see Table 4)

## 7 Summary and Conclusion

Against the background of numerous studies on the lack of integration of immigrants into the labor market, the aim of this study was to investigate the employment of skilled workers trained abroad in licensed occupations or occupations with a higher degree of credentialism, and the wages associated with it. The core findings are as follows: first, in line with findings for Canada and Norway, and a definition of immigrants tied to the acquisition of a degree outside Germany, this study finds that foreign skilled workers are less often employed in licensed occupations, or, alternatively, in occupations that are more highly closed by means of educational credentialing. Second, these worse chances improve only moderately with increasing labor market experience. Third, for men, wage penalties for these foreign learners are clearly lower or even non-existent in highly closed, i.e., licensed, or highly credentialed occupations. Overall, for men, this gives an ambivalent picture of foreign credential recognition and occupational closure as effective institutions for labor market integration of skilled workers from abroad: on the one hand, they earn higher wages in closed occupations, and their wage disadvantage is lower (or, even non-existent) in these occupations. On the other hand, these workers are less likely to enter these often more attractive occupations, but rather remain in less closed segments of the labor market, where they have to accept substantial wage differentials compared with resident educated workers. For women, no such attenuation effect is

observed. Future research should focus on the extent to which this has to do with the allocation of certain requirement levels within licensed occupations or other possible causes that cannot be observed here. The extent to which self-selection processes, lack of (full) recognition, or wage discrimination by employers play a role here are important questions to be answered.

From the point of view of the findings presented here, the comparatively strong occupational closure of the German labor market represents a difficult hurdle for immigrants on the one hand. Qualifications acquired abroad must be brought to bear in order to gain access to more attractive employment opportunities. On the other hand, however, closure institutions such as licensure and educational credentialing offer the potential to restrict the scope for education-independent selection and remuneration mechanisms. If there is a qualification that can be assessed by employers, then there is a good chance that the skilled workers from abroad will be recruited and paid accordingly. Occupational closure might then work as a “shelter” against wage discrimination (Drange and Helland 2019, p. 5). If, however, employers lack reliable information on the equivalence of foreign qualifications to German qualifications, then there is the risk that they use indices such as ethnicity or country of origin as a proxy for productivity.

Until 2012, the legal framework for the recognition of foreign qualifications was rather restrictive. With the Federal Recognition Act 2012 and further changes thereafter (BMBF 2017), the main shortcomings were changed. Up to 2012, the right to occupational recognition was limited to EU citizens and repatriates, and no procedures existed for unregulated occupations. Accordingly, the sensitivity analyses in this paper show lower probabilities of entering favorable positions with qualifications from different regions of origin other than EU/repatriate countries. In 2012, the general legal claim to an accreditation procedure was made independent from the country of origin and has been extended to unregulated occupations (Braun 2012, p. 6), so that differences between countries can be expected to decline. Moreover, the procedures were made more transparent by a central “information portal” ([www.anerkennung-in-deutschland.de](http://www.anerkennung-in-deutschland.de)), procedures were given fixed terms, the implementation was more standardized across federal states, and possibilities of financial support, adjustment measures in the case of a lack of documents, and recognition procedures from abroad prior to immigration were added subsequently. Because of these changes, the overall level of formal recognition should continue to rise in the next few years so that limited access becomes less of a problem. In fact, since 2012, the number of applications has risen annually, with average increases from countries outside the EU (Böse and Schmitz 2019; BMBF 2017).

Whether or not the new legal framework leads to better integration of immigrants into the German labor market strongly depends on the recruitment and compensation systems of firms, i.e., the decisions of employers. The formal recognition of credentials does not change the competencies of immigrants as such. However, it is a measure that may reduce employer uncertainty regarding the individual skills of immigrants (Tibajev and Hellgren 2019). Occupational regulation could continue to be an obstacle for immigrants if the knowledge of recognition procedures or their acceptance in firms is low. The few studies to date, however, have demonstrated the positive effects of the new law (BMBF 2017; Brücker et al. 2018).



This integration of immigrants deserves further attention because of rising immigration to Germany in the last few years and because of expected skill shortages. As Gomez et al. (2015) recognize, not bettering the earning potential of immigrants “can foster poverty traps and a reliance on transfer payments” and may lead to immigrants becoming “disillusioned” if their skills are of no value (ibid., p. 582). Importantly, as Smyth and Kum (2010) put it with regard to refugee integration and refugees’ professional skills in Scotland, “When they don’t use it they will lose it”. Against this background, from a policy perspective, optimizing the institutional conditions for integration must be given high priority. While the limitations of the data used here are evident, they complement the current state of research on the integration of immigrants promisingly with regard to the consideration of institutional mechanisms at the occupational level. For more in-depth analyses, of gender and occupational differences as well, comparable data with larger numbers of cases for the immigrant population should ideally be collected and analyzed.

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