

Occupational Recognition and Immigrant Labor Market Outcomes

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October 2015

Abstract

In this paper, we analyze how the formal recognition of immigrants' foreign occupational credentials affects their subsequent labor market outcomes. Our empirical analysis is based on a novel German data set that links respondents' survey information to their administrative records, allowing us to observe immigrants at monthly intervals before, during and after their application for occupational recognition. To address the inherent issue of self-selection into the application process, we focus on a sample of immigrants who eventually all receive full recognition, and exploit variation in the duration of the recognition process. Our empirical findings show substantial employment and wage gains from occupational recognition, both in the short and in the long run. After four years, immigrants who obtained full recognition are around 45 percentage points more likely to be employed and earn around 40 percent higher hourly wages than immigrants without recognition.

Keywords: Occupational Recognition, Immigrants, Labor Markets

JEL Classification: J15, J24, J44, J61

1 Introduction

It is a well documented fact in most developed economies that immigrants perform significantly worse in the labor market than their native counterparts (see, e.g., Dustmann and Frattini, 2013). In many cases, the main reason appears to be a lack of human capital, which pushes immigrants into low paying and precarious jobs and prohibits them from moving into more desirable segments of the labor market. What is more, even if immigrants accumulated valuable skills in their country of origin prior to migration, the transferability of these skills to the host country economy is often problematic, partly because of insufficient language skills (Chiswick and Miller, 2003) but partly also because legal restrictions make it difficult for immigrants to work in certain occupations. While the safeguarding of quality standards is the main rationale for such restrictions, their strict enforcement often leads to an under-utilization of immigrants' skills, which is reflected in their pronounced occupational downgrading in many host countries (see, for example, Friedberg, 2001, for Israel, Mattoo et al., 2008, for the US, and Dustmann et al., 2013, for the UK).¹ Gaining recognition for foreign occupational credentials is a costly process for immigrants but one would expect the economic benefits to be sufficiently large to make it worth its while. Yet, so far, there exists little empirical evidence on the issue.

In this paper, we estimate the causal impact of occupational recognition on immigrants' labor market outcomes. To get their foreign credentials recognized in Germany, immigrants are required to go through a formal process, at the end of which, if successful, the responsible authorities certify the equivalence between the immigrants' foreign qualification and its German counterpart. From a labor market perspective, occupational recognition has two main effects. First, it reduces uncertainty about the skill set of immigrant workers, which allows employers to better screen in the hiring process, leading to higher quality matches between workers and firms. Second, a successful recognition gives the immigrants access to segments of the labor market that they could previously not enter. These regulated segments are typically characterized by high wages, both because of high skill content and returns, and because of the monopoly rents that tend to go hand in hand with occupational licensing (compare Kleiner and Krueger, 2010,

¹A related manifestation of the low transferability of human capital are the remarkably low returns to foreign education and experience observed in many destination countries (see Dustmann and Glitz, 2011, for a comprehensive overview of this literature).

2013). Both effects suggest a positive impact of occupational recognition on immigrants' employment outcomes and wages, part of which is driven by immigrants moving into regulated occupations.

Identifying the causal impact of occupational recognition is not straightforward due to self-selection on the part of the immigrants. Presumably, those immigrants who obtain occupational recognition would also perform comparatively well in the labor market if they had not received it, conditional on other observable characteristics. This is because having obtained recognition reflects a specific set of skills that is likely to be generally valued in the labor market, both in the regulated and non-regulated segment. In addition, immigrants who decide to go through the costly application process are likely to differ from those who do not in terms of unobservable characteristics such as ambition, motivation, and return migration intentions, all factors that on their own would be associated with better labor market outcomes. We deal with these issues by exploiting a novel German data set that links detailed survey information on the exact timing of the application process for recognition with comprehensive social security data on the respondents' entire work histories in Germany. Our starting point is an estimation sample that consists exclusively of immigrants who eventually all obtain full recognition for their foreign credentials. To identify the impact of recognition, we take advantage of the differential timing at which applicants receive their final decisions, following an approach similar to Bratsberg et al. (2002) and Arai and Thoursie (2009). Our estimates are thus derived from comparisons between labor market outcomes of individuals with full recognition and those of individuals who applied but have not yet received their final decision. We estimate both average effects of occupational recognition and dynamic impacts which precisely reflect the evolution of the employment and wage effects over time.

Our findings show substantial positive effects of occupational recognition on employment and wages. On average, immigrants who obtained full recognition are 26.7 percentage points more likely to be employed and earn 11.6 percent higher wages than comparable immigrants who are still in the application phase. In addition, they are 13.9 percentage points more likely to work in a regulated occupation. These results are robust to a variety of alternative sample selection rules. Turning to the dynamic process underlying these average effects, our estimates show that the probability of being employed relative to the

control group increases rapidly with the receipt of occupational recognition, reaching 30.1 percentage points within the first twelve months. In the following years, the employment gap continues to widen, though at a lower pace, reaching a value of around 45 percentage points after four years. The wage gains from occupational recognition take a little longer to materialize but start increasing steadily from the second year after recognition onwards, reaching 40 percent four years after recognition. Finally, the relative shift into the regulated segment of the labor market takes place mostly within the first twelve months after recognition, after which the relative gap levels off at around 22 percentage points.

Our paper relates to the literature on the economic assimilation of immigrants (see, e.g., Borjas, 1995, or Lubotsky, 2007) in that it studies a specific mechanism through which immigrants may be held back in the host country's labor market. In comparison to this extensive literature, the evidence on the impact of occupational recognition on immigrant labor market outcomes is scarce. Houle and Yssaad (2010) analyze descriptive statistics for Canada and find that, for instance, immigrants with higher education levels are more likely to successfully apply for recognition. Their data also show that the likelihood of a recognition varies with the place of residence. Chapman and Iredale (1993) use Australian data and find that men who apply for recognition unsuccessfully earn 15-30 percent lower wages than those who obtain recognition. However, they do not find similar differences when looking at women. One important aspect of occupational recognition is that it helps overcome employment barriers to licensed occupations. In this context, Kleiner and Krueger (2010) document that 20-30 percent of US jobs require licensure or certification, making it likely that these types of labor market regulations affect immigrants as well. Peterson et al. (2014) provide corresponding evidence by looking at the migration decision of physicians in the US and find that states with stricter licensing requirements for immigrants receive fewer foreign physicians. However, to the best of our knowledge, we are the first to show a comprehensive quantitative analysis of the impact of occupational recognition on immigrants' labor market outcomes.

The paper is structured as follows. In the next section, we present the theoretical background against which our empirical results can be interpreted. In Section 3, we then sketch the institutional setting in which the occupational recognition process takes place in Germany. In Section 4, we present our empirical model and identification strategy,

followed by a description of our data set and summary statistics in Section 5. Section 6 is dedicated to the discussion of our main results. Section 7 concludes.

2 Theoretical Background

The implications of recognizing foreign credentials can be illustrated most easily in a framework of a two-sector economy, where final output is produced by two intermediate inputs. The first input is produced by a high-productivity sector, h , where production technologies require that workers have to exceed a minimum productivity threshold level, y^* . The second input is produced by a low-productivity sector l , where a productivity threshold level does not exist. Product market regulation requires that firms can hire only workers with approved credentials in sector h , which ensures that actual labor productivity exceeds the minimum threshold level, i.e. that $y > y^*$ for all workers hired by sector h . Before hiring workers, firms invest in sector-specific capital, k_i , which in turn determines production technologies and the subsequent skill requests. We assume that $k_h > k_l$. Accordingly, workers decide whether to invest in the recognition of foreign credentials, which involves a certain cost, c . Instead of a two sector-economy one might also consider the case of a labor market which is stratified by productivity and skill requirements of workers into two segments.

Since firms cannot observe the true productivity of their workers, they form expectations on their productivity based on the signals they receive. More specifically, the expected average productivity level of workers who have achieved the recognition of their foreign credentials is above that of workers who have not, i.e. $E(y|r) > E(y|n)$, where the index r denotes a worker who has an approved credential and n a worker who has not. Similarly, workers form expectations about the returns of an investment in the recognition of foreign credentials depending on the probability of becoming employed in the respective sectors and the wages paid there.

The details of the implications of recognizing foreign credentials can be derived formally from a search- and matching framework (e.g. Pissarides, 1990). The predictions of such a framework in the steady-state are however straightforward so that they can be outlined verbally: wages of workers whose foreign credentials are recognized and who are employed in the high-productivity sector are higher than those of workers whose cre-

credentials are approved as well but are employed in the low-productivity sector, and the wages of the latter group of workers are higher than those who do not possess approved credentials, i.e. $w_h^r > w_l^r > w_l^n$. Note that the higher capital endowments in the high-productivity sector assure that wages of workers with approved foreign credentials are higher compared to those of the same type of workers employed in the low-productivity sector.

Assume moreover for convenience that the job destruction rate, the replacement rate and the bargaining power of both types of worker are similar. Then it follows that steady-state unemployment rates of workers with recognized foreign credentials are below those of workers without approved foreign credentials, i.e. $u^s > u^h$. This can be traced back to the fact that workers whose foreign credentials have been recognized can also seek for jobs in the low-productivity sector.

These considerations can be easily extended to the case where workers, who have already applied for recognition but did not yet receive a formal decision, also send a signal to the labor market. In this case, wages of workers who have applied for recognition are higher compared to those who have not, but are below those who have successfully applied. The steady-state unemployed rate of this type of workers is also below that of workers who have not applied, but above the unemployment rate of those whose degrees have already been approved. From an empirical point of view, however, it is difficult to systematically test these predictions since the true signalling effect from applying for recognition is likely to be confounded by unobserved labor market shocks that incentivize people to do so.

From a policy point of view, these considerations give rise to a number of interesting predictions on the economic effects of reducing the costs for the recognition of foreign credentials. Reducing application costs, both monetary and non-monetary, results in an increase in the share of workers with foreign credentials who apply for recognition, and, hence, a higher share of workers who signal that their productivity is above the threshold level y^* . Consequently, more workers are hired in the high-productivity sector, output is increasing there and relative prices for the high-productivity intermediate good are falling. In contrast, the low-productivity sector hires less workers, total production there is declining and prices of the low-productivity intermediate good are increasing. Wages

for workers with approved foreign credentials who are employed in the high-productivity sector are falling since their supply is increasing and their average productivity is decreasing. In contrast, wages of workers without an approved credential are increasing. The effects on wages for workers who have an approved foreign credential but are hired in the low-productivity sector are ambiguous. Finally, output and the total wage sum are increasing, while the total unemployment rate of the economy is declining. Note, however, that we are not able to test these theoretical predictions empirically, since the policy rules for occupational recognition in Germany remained unchanged throughout most of our sample period.²

3 Institutional Setting

Occupational recognition refers to the assessment of the equivalence of foreign professional qualifications with their German counterparts. In a formal procedure, foreign qualifications are compared with the corresponding German qualifications, applying a set of formal criteria such as content and duration of training. The result of a successful procedure is documented in a certificate which confirms that the applicant has the same legal status as holders of the corresponding German qualifications. The application for recognition must be submitted to different authorities, depending on the type of qualification. The responsible authorities are the Chambers (Industry, Skilled Arts, Agriculture, Lawyers, Auditors, Physicians, Dentists, Pharmacists), where the responsibility depends on the respective vocational and professional law and the federal state where the applicant wants to work. In addition, there are so-called *training occupations* which are not regulated and for which the recognition is not compulsory.³ For many mid- and high-skill professions, however, the recognition is compulsory. The application process is usually subject to a fee, which ranges between 100 and 600 Euros, depending on the federal state and chamber where the individual applies. In addition, the applicant typically has to bear other costs, for instance for translations and authentications. In our survey, 31 percent of the respondents apply to one of the Chambers, the rest to other authorities

²With effect from 1 April 2012, the German government introduced new legislation (the so-called *Anerkennungsgesetz*) that harmonized and simplified the evaluation procedures for foreign occupational credentials and extended them to so far ineligible target groups.

³For these cases, a single central chamber has been established for all of Germany.

(*Zeugnis- und Anerkennungsstelle, Bezirksregierung*). The average duration between applying for recognition and receiving the final result is 6 months, with a standard deviation of 16 months. Among immigrants who hold a foreign certificate and could therefore, in principle, apply for occupational recognition, only 35 percent actually do so. Excluding people with a certificate who state that they do not need recognition, the main reasons put forward for not applying are the belief of having no chance of obtaining recognition (24 percent of the sample), the complexity of the system (18 percent), and problems with the provision of the necessary documentation (7 percent). Monetary costs, in contrast, seem to constitute only a minor obstacle to applying (4 percent).

4 Empirical Framework

In our data set, we observe individuals receiving occupational recognition at different points in time. We use this variation to compare labor market outcomes of individuals with recognition to those of individuals who have not yet received recognition at the same point in time. We focus on a group of individuals who eventually all receive full occupational recognition to minimize possible selection effects.

With this approach, we follow a similar research design as Bratsberg et al. (2002) and Arai and Thoursie (2009). In our first specification, we use the following fixed effects regression to obtain an overall estimate of the impact of recognition:

$$y_{it} = \beta_1 \text{CertRecog}_{it} + \beta_2 \text{Applied}_{it} + \lambda_i + \lambda_p + \lambda_t + \varepsilon_{it}, \quad (1)$$

where y_{it} denotes a specific labor market outcome of individual i in period t . In particular, we examine the impact of occupational recognition on an immigrant's probability of being employed, the log hourly wage rate, and the probability of working in a regulated occupation. The first two outcomes provide general insights into the effects of occupational recognition on immigrants' labor market performance, and are important when viewed in the context of the rather poor employment and wage outcomes of immigrants documented in much of the migration literature (for Germany, see, for example, Algan et al., 2010). The latter outcome is more specific to our setup and provides an insight into the mechanism through which occupational recognition affects labor market outcomes.

The main regressor of interest, CertRecog_{it} , is a dummy variable taking the value

one if individual i has a foreign qualification that was recognized before or in period t , while Applied_{it} is a dummy variable taking the value one if individual i has applied for recognition before or in period t . We are interested in identifying β_1 , the causal effect of occupational recognition on labor market outcomes, which would be straightforward if participation in the recognition process was uncorrelated with the unobservable determinants of these outcomes. However, applying for recognition is a necessary condition for obtaining recognition and starting the application process is likely to be correlated with changes in individual unobservables such as the preference for working or the incentive to earn money. To deal with this fundamental issue, we include the dummy for having applied, Applied_{it} , as another regressor in our specification. Conditional on applying, the time until the decision depends on factors outside the control of the individual, such as the workload of caseworkers in the recognition office or their effectiveness in handling applications. Thus, the date of decision is exogenous conditional on having applied, which allows us to identify the causal effect of occupational recognition on labor market outcomes.

To control for other confounding factors that may be driving individual labor market outcomes, we additionally include a number of fixed effects in our empirical specification. First, we include individual fixed effects (λ_i) that control for all time-invariant characteristics of each immigrant. Their inclusion accounts for much of the personal characteristics associated with better labor market outcomes and the selection into the occupational recognition process. Furthermore, we add time (month \times year) fixed effects (λ_t) to account for general changes in labor market conditions, for example due to seasonal variation or business cycle fluctuations. Finally, we include a full set of months since migration fixed effects (λ_p) which capture the dynamic evolution of immigrants' labor market outcomes as a result of their ongoing assimilation into the host country's economy.

While specification (1) provides a useful summary measure of the average impact of occupational recognition on employment and wage outcomes in our sample of immigrants, it conceals valuable information about the dynamic process with which the effects of recognition evolve over time. As an extension, we therefore introduce individual dummy variables for the months around the recognition decision, which allow us to distinguish

between short- and long-term labor market effects. More specifically, we use the following regression model:

$$y_{it} = \sum_{q=-12}^{48} \delta_{t-q} \text{CertRecogMth}_{i,t-q} + \delta_{t-49} \text{CertRecog}_{i,t-49} + \beta_2 \text{Applied}_{it} + \lambda_i + \lambda_p + \lambda_t + \varepsilon_{it}, \quad (2)$$

where the dummy variables $\text{CertRecogMth}_{i,t-q}$, which equal one if individual i 's qualification was recognized in period $t - q$, now capture the effect of occupational recognition in specific months around the recognition date. We create these dummy variables starting twelve months before the recognition date and ending 48 months thereafter. All dummy variables are equal to one only in the relevant time period and zero otherwise. For example, $\text{CertRecogMth}_{i,t-10}$ is equal to one when the successful recognition was ten months before period t , so that the corresponding estimate δ_{t-10} measures the effect of recognition ten months after it was obtained. $\text{CertRecog}_{i,t-49}$ is a dummy variable for individuals having a foreign qualification that was recognized before or in period $t - 49$. Thus, this variable picks up the long-run average effect of recognition on labor market outcomes during all months more than four years after the recognition date. This setup leads to a well defined reference period that includes all periods that are at least twelve months before the recognition date. In these month, none of the just explained dummy variables is equal to one and therefore, all these dummy variables measure the effect of occupational recognition relative to the effect in this reference period.

Our dynamic setup and, in particular, the inclusion of separate dummy variables for the twelve months prior to recognition also allow us to check our exogeneity assumption. If the coefficients on the occupational recognition dummies are to be interpreted as causal effects on immigrants' labor market outcomes, one should not observe any significant point estimates for months prior to the actual recognition date.

For both estimation models, we add a small set of time-varying control variables. We include age squared in the spirit of Mincerian wage equations.⁴ We also use a proxy of German language proficiency to capture to some extent differences in the assimilation process of immigrants. Given the extensive use of fixed effects, we do not expect a large influence of these control variables on our point estimates but they should help increase

⁴We already implicitly control for linear age effects by including individual and time fixed effects.

their precision.

Finally, to check the robustness of our results, we use the same estimation model but vary the sample of included individuals. Our baseline sample includes only individuals who arrived in Germany at an age of at least 18 and who received full occupational recognition at some point during the sample period. In some specifications, we further restrict the sample to individuals who are at least 25 years old or migrated to Germany only once, and exclude individuals who, at any point in their lives, were self-employed or worked in the government. By imposing these restrictions, we can avoid some of the ambiguities regarding an immigrant’s employment status which arise in the register data since we do not observe if a person is in school, migrated temporarily to another country, or works in employment not covered by social security.

5 Data

The basis of our empirical analysis is a novel survey data set, the IAB-SOEP Migration Sample⁵, which has been linked to the German social security data of the IEB (the so-called *Integrierte Erwerbsbiografie*). The latter comprise the universe of workers in Germany covered by the social security system.⁶ The IAB-SOEP Migration Sample is restricted to individuals with a migration background, hence including both first and second generation immigrants. More information on the survey and on the way it was linked to the social security records is provided in the appendix.

The linked IAB-SOEP Migration Sample is particularly suited for our analysis for two reasons. First, the survey component contains a detailed set of information on occupational certificates obtained both before migration and after arrival in Germany. In addition, there is a full module devoted to the process of requesting recognition of foreign credentials, including information about the month and year when the application process was initiated and the month and year when a final decision (denial, partial recognition, full recognition) was obtained. Second, the social security component of the data allows us to observe an immigrant’s entire work history after arrival in Germany. Linking the information about the precise timing of the recognition process to the spell structure of

⁵The survey has a panel structure and was started in 2013. In our analysis we use both the first and most recent second wave.

⁶Civil servants, self-employed and military personnel are thus excluded.

the registry data, we can observe each individual’s labor market outcomes before, during, and after the application process at monthly intervals.

All our outcome variables are taken from the registry data. Employment represents an indicator for having worked at least one day within a given month. Wages represent log gross average hourly wages per month and are right-censored at the social security contribution ceiling.⁷ To classify occupations as regulated or non-regulated, we proceed as follows. Each 8-digit occupation in the German system is officially classified as an occupation that either does or does not require the formal recognition of foreign credentials. Since occupations in the registry data are aggregated to the 3-digit level, we first transform the 8-digit classification into a 3-digit classification. We follow the approach implemented by Vicari (2014) in which each 3-digit occupation is assigned an index that measures the extent to which formal recognition is required. The index represents the share of 8-digit subcategories in each 3-digit category that require the recognition of foreign credentials, thus ranging from zero (no subcategories requiring recognition) to one (all subcategories requiring recognition), where each 8-digit occupation is weighted by its relative size among the working population. We use this continuous index to construct an indicator for regulated occupations, which takes the value one if the index is higher than the median value of all occupations (0.781), and zero if the index is either below the median or an individual is not working.⁸ As mentioned above, we restrict our analysis to the sample of immigrants who eventually receive full recognition. Out of this group, we further select all individuals who migrated to Germany at 18 years or older and for whom we have valid information about the recognition of foreign credentials. We consider as immigrants those who are foreign-born, thus improving upon previous studies using German registry data, which, due to data limitation, define migration status based on nationality. Our final estimation sample consists of 107 individuals.

Table 1 shows a number of descriptive statistics for our estimation sample (column (1)), as well as those immigrants in the survey who only got partial recognition (column (2)), were denied recognition (column (3)), or did not apply at all (column (4)). Focusing first on the full recognition sample, we see that there are 47% male individuals who are

⁷Note that in the context of this study, right-censoring is a relatively minor issue since immigrants in Germany tend to earn wages well below the censoring limit.

⁸Table 4 in the appendix reports the ten 3-digit occupations with the highest (Panel A) and lowest (Panel B) share of regulated occupations.

on average 43.5 years old at the end of our panel in December 2013. The schooling level of these immigrants is relatively high with almost 11 years of education (excluding tertiary education). The table also provides information about the typical recognition process. On average, immigrants enter Germany for the first time when they are 30.5 years old. After that, they take about 1.2 years before making an official recognition request. One of the reasons for this delay is the demanding recognition process since various documents and their translations and authentications must be delivered to the authorities. Finally, after on average four months, successful immigrants get to know the result of their application. However, as indicated by the large standard deviation of 6 years, there is a wide range of waiting times, leading to variation that is important to identify our parameters of interest.

Table 1 also provides information about each group's labor market outcomes, both during the first year after migration to Germany and for all available time periods. In general, we see large changes in the employment rate between the first year and subsequent periods, particularly for those who receive full recognition whose employment rate increases from 18.3% to 63.9%. Hourly wages increase by less, for the full recognition group from 7.4 Euros in the first year to 7.7 Euros in later years, but note that the latter figures average across periods with and without occupational recognition. When looking across immigrant groups, we see a high level of heterogeneity. Those immigrants who obtain full recognition are positively selected in terms of schooling and initial wages relative to all other groups. They also tend to be younger when making their request than those immigrants whose application is eventually denied. Overall, the substantial differences in observable characteristics between the different immigrant groups justify the decision to focus on the sample with full recognition in our empirical analysis.

6 Main Results

In this section, we present our estimates of equations (1) and (2). We first show the average impact of recognition on employment, wages and the propensity to work in a regulated occupation, and present a number of robustness checks based on different estimation samples. We then graphically show the results from our dynamic specification.

6.1 Average Impacts of Recognition

Table 2 reports the results based on equation (1). The estimates in column (1) show that obtaining full occupational recognition increases an immigrant’s probability of being employed by 26.7 percentage point. This is a large effect, suggesting that occupational recognition helps immigrants find and maintain jobs, both because it serves as a signal of high human capital levels and because it gives them access to labor market segments that were previously unavailable to them. The point estimate for having applied is negative and statistically not significant, suggesting that there is no positive signalling effect from having applied for occupational recognition itself. However, since this variable is likely to also pick up any unobserved time-varying shocks that induce immigrants to start the application process, its interpretation as the causal effect of applying is problematic. Column (2) shows the corresponding results for the log hourly wage rate. Full recognition increases average wages by around 11.6 percent, which suggests that recognition enables immigrants to better utilize (and demand higher rewards for) their human capital in the host country’s labor market. Column (3) shows that the probability of working in a regulated occupation (identified as an occupation with a share of sub-occupations that require formal recognition above the median value of 0.781) relative to working in a non-regulated occupation or not working at all increases by 13.9 percentage points after recognition.

6.2 Robustness Checks

Table 3 shows a number of robustness checks in which we vary the underlying estimation sample. Column (1) repeats the baseline results of Table 2. In column (2), we exclude individuals who we do not observe for more than three consecutive years in the registry data. The estimated effects of full recognition on employment, wages and the probability of working in a regulated occupation remain very similar. In columns (3), we impose the additional restriction with respect to our baseline sample that the immigrants still have to be observed in the registry data by the end of the observation period. We do this to avoid any biases resulting from differential sample attrition, for example due to return migration. Again, this restriction leaves our point estimates of interest relatively unchanged. In column (4), we restrict the sample to those at least 25 years of age, again

with no important consequences for our results. Columns (5) and (6) then impose further restrictions with respect to the sample underlying column (4) with little effect. Column (7) introduces the restriction that the occupational recognition had to take place after the arrival of the immigrant in Germany. Note, that applying for recognition from abroad was possible, giving rise to an additional source of selection if only those individuals who already obtained recognition while abroad moved to Germany who had already secured an attractive job or faced particularly good job prospects. Again, we see little changes in our point estimates, which also holds for our most restrictive specification reported in column (8) which combines all previous sample restrictions and is estimated on a reduced sample of only 76 immigrants. Overall, Table 3 shows that our results are very robust to different sample selection rules, with average employment effects of around 25 percentage points, wage effects of around 11 percent, and impacts on the probability of working in a regulated occupation of around 12 percentage points.

6.3 Dynamic Effects

We now turn our attention to the results from the dynamic specification given in equation (2). The estimation sample corresponds to that in column (8) of Table 3. For better readability, we summarize the estimates of the period-specific effects δ_{t-q} graphically, together with the corresponding confidence intervals. Figure 1 displays the effects of occupational recognition on the employment outcomes of immigrant workers in the twelve months before and 48 months after recognition. In the months after recognition, the difference in the probability of being employed relative to those whose application is still under consideration increases rapidly, reaching 30.1 percentage points after twelve months. After the first year, the employment gap continues to grow albeit at a slower rate, peaking at 47.5 percentage points 38 months after recognition. This pattern suggests that occupational recognition increases the labor market opportunities of immigrants relatively quickly following the positive decision, and that their employability keeps improving even in the long run, possibly due to faster rates of human capital accumulation in the higher quality jobs immigrants are now able to access. Reassuringly, there is no discernible difference in employment rates between those who obtain recognition within the following year and those who do not, as indicated by the insignificant set of parameter estimates

prior to the recognition date.

Figure 2 displays the corresponding dynamic pattern for log hourly wages. Here, it takes around one year before the recognition of foreign credentials translates into positive wage effects. However, from then onwards, the wage differential relative to those without occupational recognition keeps increasing, leveling off in the very long run at a log difference of 0.331 or 39.2 percent. The reason for the delayed onset of significant wage gains from occupational recognition could be due to employers' initial skepticism regarding the equivalence between foreign and native credentials, which only with time is overcome and, in conjunction with faster rates of human capital accumulation in the higher quality jobs now accessible to the immigrants, reflected in higher wage rates. Again, there is no evidence of a significant wage gap in the months prior to the recognition date, lending credibility to the claim that the subsequent positive wage effects are indeed causally related to the occupational recognition.

Finally, Figure 3 documents how the propensity to work in a regulated occupation evolves over time, both before and after the recognition date. Initially, there is a noticeable and steady increase in the share of workers with successful recognition who work in a regulated occupation. The relatively slow speed of adjustment may reflect the difficulty of locating a suitable job in the regulated market segment. After about one year, further shifts into the regulated sector take place more slowly, with the gap relative to workers without recognition leveling off at around 22 percentage points in the long run.

As a robustness check for our dynamic estimation, we used the synthetic control method proposed by Abadie et al. (2010) as an alternative estimation strategy. In contrast to our original approach, each immigrant who receives recognition (the treatment) is here matched to a set of other immigrants who never applied for recognition but whose employment and wage outcomes in the period prior to recognition are similar to that of the treated immigrant. We obtain a synthetic control group for each treated immigrant and then average the dynamic treatment effects in each pre- and post-treatment month across all treated individuals in the sample in those months. The thick black lines in Figure 4 show the resulting dynamic impacts of occupational recognition on employment (left figure) and hourly wages (right figure) between 12 months before and 48 months after

recognition.⁹ The overall patterns are very similar to those obtained in our fixed effects regression approach, with substantial and relatively quick increases in both employment and hourly wages in the months immediately after recognition, and continuing divergence at a slower pace in the long run. At around 20 percentage points, the long-run employment effect in the synthetic control approach is smaller than in our regression approach, although the difference is not statistically significant. To assess the statistical significance of these dynamic effects, we perform 30 placebo estimations in which, for each iteration, we randomly pick for each treated immigrant an untreated immigrant from his or her donor pool, assign the same hypothetical recognition date as for the treated immigrant, find a suitable synthetic control group for this placebo immigrant, and then aggregate all dynamic impact estimates across all placebo immigrants. As illustrated by the thin gray lines in Figure 4, our estimated employment and wage effects of occupational recognition are unusually large relative to the distribution of dynamic placebo effects, suggesting that they actually pick up real employment and wage effects.

7 Conclusion

In this paper, we analyze how the formal recognition of immigrants' foreign occupational credentials affects their subsequent labor market outcomes. We use a new linked survey-social security data set that explicitly asks participants about details in the timing of their recognition process and includes comprehensive information about their work histories in Germany. In our panel data setup, we control for individual fixed effects and exploit the variation in the timing between application beginning and recognition outcome to identify the causal effects of occupational recognition.

Overall, the evidence from our dynamic specification suggests large and long-lasting positive effects of occupational recognition on labor market outcomes. Recognizing immigrants' foreign credentials may thus be a highly effective way of tapping into their human capital and fostering their integration into the host country's economy. The results also suggest that part of the often substantial employment and wage gaps between natives and immigrants may be due to the lack of formal recognition of the latter's occupational

⁹Note that we use hourly wages rather than log hourly wages since otherwise it would be difficult to find potential control individuals who were earning positive wages in precisely the same periods as the treated individuals.

training. The large positive wage effects furthermore indicate that foreign credentials, once declared equivalent to native ones, are indeed valued in the German labor market, mitigating fears of a watering-down of occupational standards.

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Table 1: Descriptive Statistics by Recognition Outcome

	Full recognition	Partial Recognition	Denied Recognition	Non-Applicant
Immigrants				
Male %	46.7 (50.1)	53.8 (50.8)	30.6 (46.7)	43.5 (49.7)
Yrs. Schooling	10.7 (1.8)	10.4 (1.5)	9.9 (1.4)	10.6 (1.7)
Age Dec 2013	43.5 (9.4)	41.3 (8.7)	45.0 (7.9)	44.2 (11.0)
Age at first Migration	30.5 (7.6)	28.6 (7.1)	32.4 (8.2)	32.1 (9.6)
Age at Request of Recogn	31.7 (7.7)	31.2 (9.2)	35.5 (7.9)	
Time Request to Result (Month)	4.0 (6.0)	7.9 (15.3)	5.8 (10.4)	
Observations - First Year In Germany				
Employed %	18.3 (33.0)	9.5 (22.0)	12.2 (25.2)	21.3 (33.1)
Hourly Wage	7.4 (3.6)	5.2 (2.4)	5.5 (2.4)	6.1 (4.1)
Observations - Average Over Time				
Employed %	63.9 (26.9)	49.3 (31.0)	54.6 (23.8)	56.5 (31.3)
Hourly Wage	7.7 (4.3)	5.9 (3.4)	4.4 (1.7)	6.5 (3.9)
Immigrants	107	26	36	322

Note: Figures depicted are means with standard deviations in parentheses. Figures in upper panel are based on individuals, figures in the lower two panels are based on monthly observations.

Table 2: Occupational Recognition and Average Labor Market Outcomes

	Employment (1)	Wages (2)	Regulated Occupations (3)
Applied for recognition	-0.096 (0.059)	-0.011 (0.119)	0.025 (0.061)
Received full recognition	0.267*** (0.061)	0.116** (0.049)	0.139** (0.054)
Individuals	107	90	107
Observations	16,794	8,008	15,937

Note: Data source: IAB-SOEP Migration Sample linked to IEB data. The dependent variable is an indicator for working in column (1), log hourly wages in column (2), and an indicator for working in a regulated occupation relative to working in a non-regulated occupation or being non-employed. Additional controls are individual fixed effects, time fixed effects, time since migration fixed effects, age squared, and German proficiency. The sample only comprises immigrants who eventually receive full recognition and who migrated to Germany at the age of at least 18.

Standard errors in parenthesis are clustered on the individual level: * p<0.10, ** p<0.05, *** p<0.01

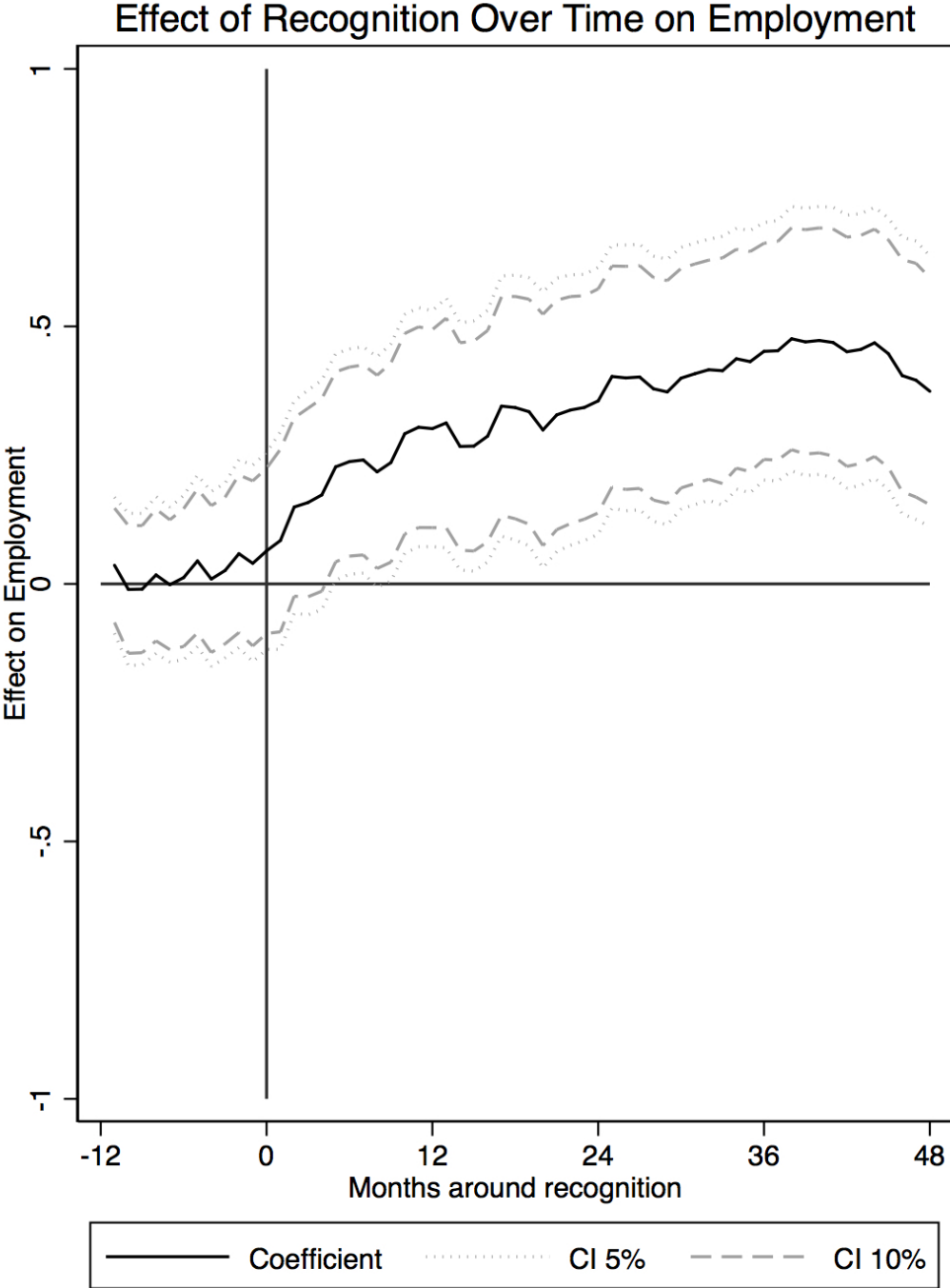
Table 3: Occupational Recognition and Average Labor Market Outcomes - Robustness Checks

	Baseline (1)	(1)+w/o 3yr gaps (2)	(1)+stay (3)	(1)+age >25 (4)	(4)+stay (5)	(5)+w/o 3yr gap (6)	(5)+recog after mig (7)	(6)+(7) combined (8)
Employment								
Applied for recognition	-0.096 (0.059)	-0.043 (0.062)	-0.105 (0.063)	-0.097 (0.066)	-0.103 (0.069)	-0.049 (0.074)	-0.103 (0.069)	-0.049 (0.073)
Received full recognition	0.267*** (0.061)	0.290*** (0.070)	0.236*** (0.063)	0.241*** (0.070)	0.226*** (0.073)	0.263*** (0.082)	0.227*** (0.073)	0.267*** (0.083)
Individuals	107	85	98	107	98	81	92	76
Observations	16794	12875	15376	16004	14800	11812	14466	11544
Wages								
Applied for recognition	-0.011 (0.119)	-0.059 (0.131)	-0.011 (0.119)	0.008 (0.119)	0.010 (0.119)	-0.035 (0.132)	0.010 (0.119)	-0.036 (0.132)
Received full recognition	0.116** (0.049)	0.106** (0.051)	0.110** (0.049)	0.125** (0.052)	0.119** (0.051)	0.112** (0.054)	0.114** (0.050)	0.106** (0.053)
Individuals	90	76	84	89	84	72	81	69
Observations	8008	7238	7765	7763	7537	6855	7394	6712
Regulated Occupations								
Applied for recognition	0.025 (0.061)	0.039 (0.071)	0.044 (0.061)	0.044 (0.064)	0.065 (0.062)	0.077 (0.074)	0.065 (0.063)	0.076 (0.075)
Received full recognition	0.139** (0.054)	0.130** (0.057)	0.145** (0.056)	0.109* (0.058)	0.116* (0.060)	0.122** (0.061)	0.114* (0.060)	0.121* (0.062)
Individuals	107	85	98	107	98	81	92	76
Observations	15,937	12,159	14,557	15,173	14,005	11,123	13,701	10,880

Note: Robust standard errors in parentheses clustered at individual level. Including individual, time and time after migration fixed effects. Additionally controlling for age squared and German language proficiency.

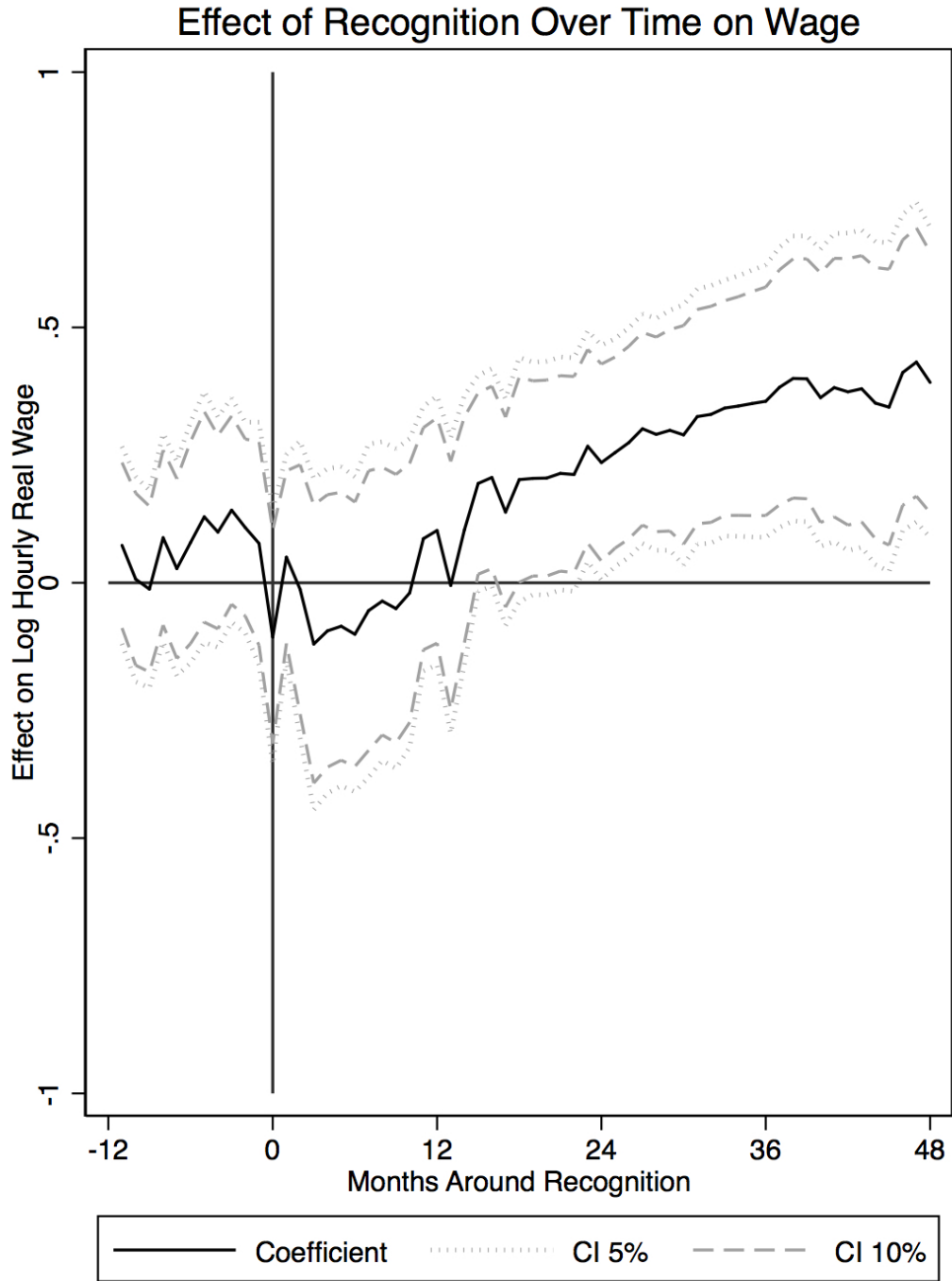
* p<0.1, ** p<0.05, *** p<0.01

Figure 1: Effect of Recognition Over Time on Employment



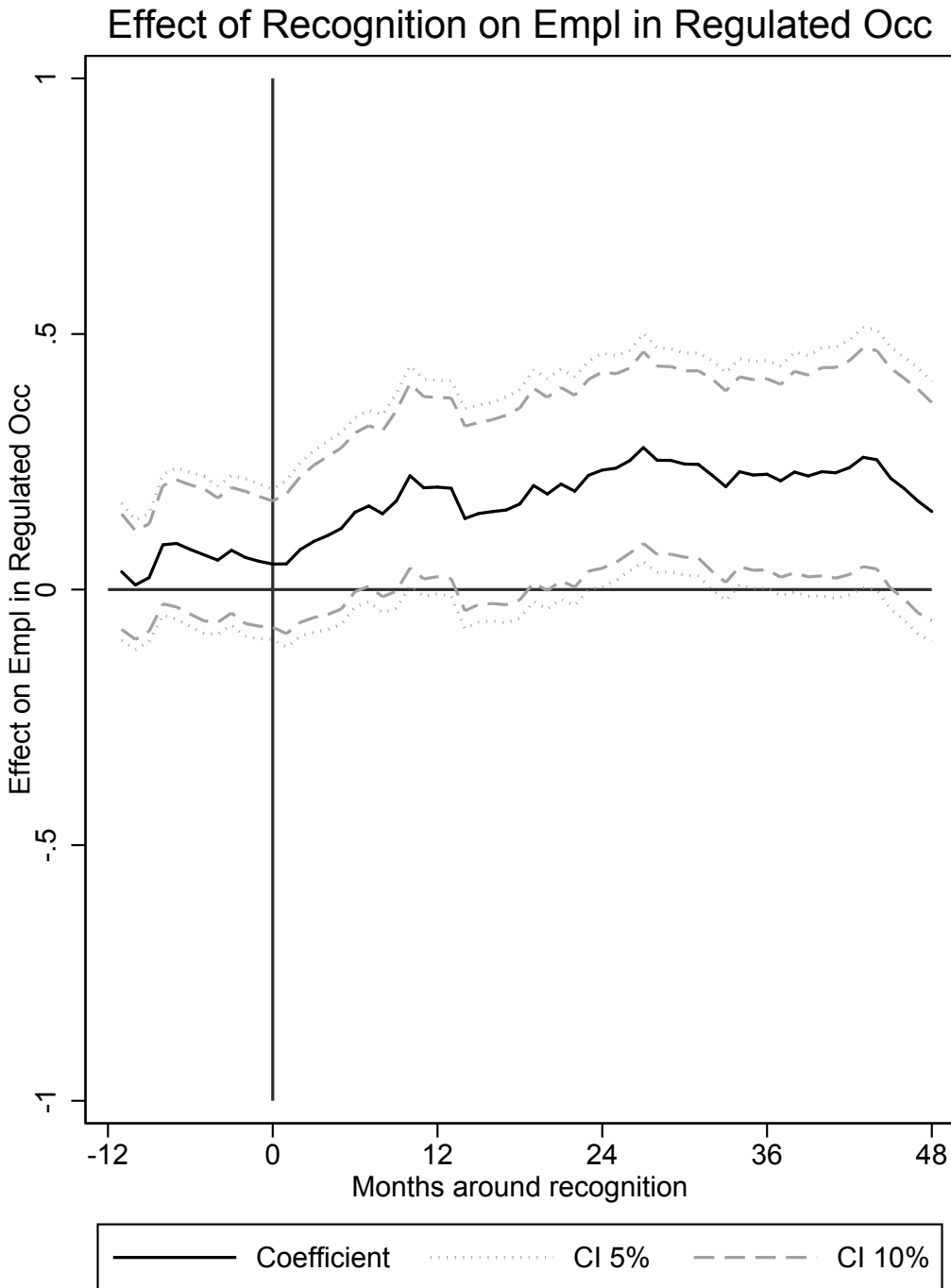
Clustered standard errors at individual level. Including individual, time and time after migration fixed effects. Additionally controlling for age squared and German language proficiency. Selected subsample from all individuals that got full recognition.

Figure 2: Effect of Recognition Over Time on Log Hourly Wage



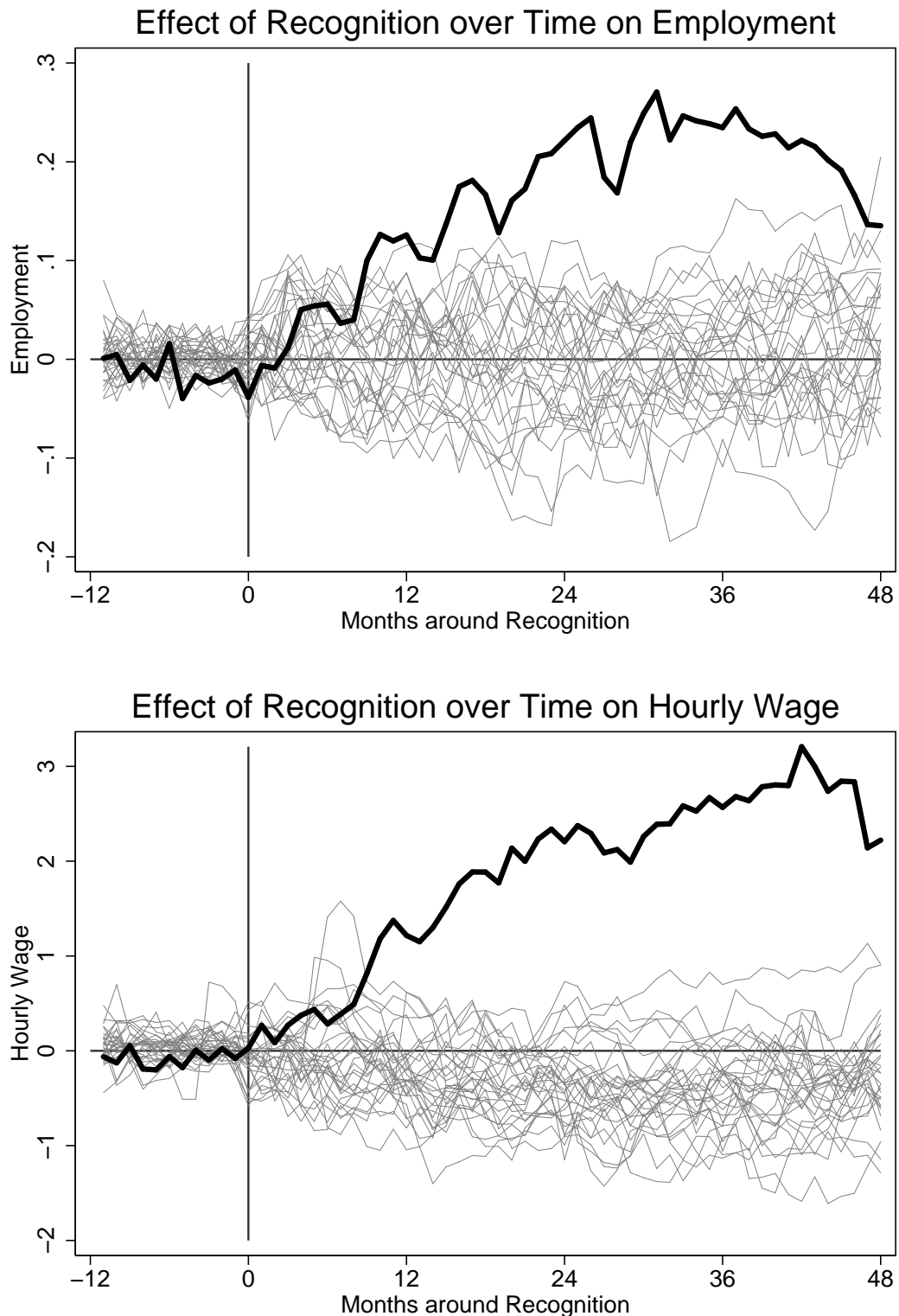
Clustered standard errors at individual level. Including individual, time and time after migration fixed effects. Additionally controlling for age squared and German language proficiency. Selected subsample from all individuals that got full recognition.

Figure 3: Effect of Recognition Over Time on Employment in Regulated Occupation



Clustered standard errors at individual level. Including individual, time and time after migration fixed effects. Additionally controlling for age squared and German language proficiency. Selected subsample from all individuals that got full recognition.

Figure 4: Effect on Employment and Log Hourly Wages - Synthetic Control Approach



Note: Estimates derived using synthetic control approach. Estimation sample as in column (8) of Table 3. For each treated immigrant, we find a set of immigrants who never applied for recognition and who can jointly serve as a suitable control group based on their outcomes in the periods just prior to the treated immigrant's recognition date. The donor pool for each treated unit is restricted to those individuals who are observed in exactly the same periods as the treated unit. The displayed estimates along the thick black lines are the average differentials in employment (left figure) and hourly wages (right panel) in each pre- and post-treatment period between all treated units and their synthetic control groups. The thin gray lines depict 30 placebo estimations, in which we iteratively apply the synthetic control method to randomly picked non-treated immigrants in each treated immigrant's donor pool.

8 Appendix

Linked Survey-Social Security Data

The IAB-SOEP Migration Sample is a new longitudinal survey of people with migration background in Germany, jointly carried out by the Institute for Employment Research (IAB) and the German Socio Economic Panel (GSOEP). Both first and second generation immigrants are part of the survey, with the first generation representing around 75 percent of the sample. The first two waves were conducted in 2013 and 2014, with the former comprising around 5,000 individuals, and the latter adding another 3,800 individuals. Using a personal identifier, survey respondents are linked to the social security data (IEB). Due to data protection, respondents are required to give their prior consent for the record linkage by signing a document. The overall approval rate amounts to about 50 percent.

Table 4: Regulated and Non-Regulated Occupations

	Fraction of Working Pop.	Index of Regulation	Mean Wage	Firm Tenure (in Years)
Panel A. First 10 Occupations with High Regulation Intensity				
Floristry	0.00120	1	4.61	2.65
Drivers (railway)	0.00091	1	9.39	6.85
Health and safety administration, public health authority	0.00040	1	7.99	5.38
Sales (trade)	0.01357	1	5.60	4.64
Artisans	0.00018	1	6.24	5.04
Doctors' receptionists and assistants	0.02018	0.99382	4.90	4.12
Horsekeeping	0.00034	0.99263	5.07	2.05
Funeral services	0.00028	0.98867	7.29	12.17
Sales (retail)	0.00051	0.98697	4.76	6.50
Drivers (road)	0.02793	0.98308	6.93	4.37
Total (first 10)	0.06550	0.99069	6.77	5.65
Total all regulated occupations	0.54356	0.48916	7.88	6.3
Panel B. First 10 Occupations with Low Regulation Intensity				
Managing directors and executive	0.00602	0	11.28	9.21
Legislators and senior officials	0.00071	0	10.84	9.03
Teachers and researcher (University/College)	0.00647	0	14.09	3.56
Musicians	0.00085	0.00641	12.17	7.37
Social sciences/mathematics/humanities	0.00359	0.06476	8.93	5.19
Teachers (Institutions other than schools)	0.00202	0.06908	8.55	6.42
Public relations	0.00069	0.15921	10.21	7.21
Theology and church community work	0.00131	0.17035	12.37	7.56
Editorial work and journalism	0.00263	0.17050	13.41	6.48
Geology, geography and meteorology	0.00030	0.20556	10.53	6.48
Total (last 10)	0.02460	0.00000	10.62	5.87
Total all non-regulated occupations	0.45643	0.26051	8.5	6.0

Note: Data source: IEB data. The distinction between regulated and not regulated occupation is made with respect the median value of the regulation index across all occupation. Panel A refers to the first 10 occupation with the highest vale of the index among the occupation with a value above the median. Panel B Panel A refers to the first 10 occupation with the lowest vale of the index among the occupation with a value below the median.