The effects of international migration on native workers' unionization in Austria

by

JOSÉ-IGNACIO ANTÓN
RENÉ BÖHEIM
RUDOLF WINTER-EBMER

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Corresponding author: rudolf.winterebmer@jku.at

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José-Ignacio Antón[†], René Böheim[‡] and
Rudolf Winter-Ebmer[§]

[†]*Johannes Kepler University Linz*

[‡]*Johannes Kepler University Linz, WIFO, and IZA*

[§]*Christian-Doppler Laboratory at Johannes Kepler University Linz, IHS, IZA, CReAM,
and CEPR*

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Abstract

We analyze the effects of increased immigration of foreign workers on the union-
ization rates of native workers in Austrian firms over the period 2002–2012. Our
results suggest that lower union density of natives' in firms with more foreign
workers is driven not by natives leaving unions, but by the different composition
of turnover depending on the share of foreigners in the firm.

JEL classification: J51, J61, J63.

Keywords: migration, unions, turnover, hiring.

1. INTRODUCTION

Union membership rates in Organization for Economic Co-operation and Development (OECD) countries decreased from about 25 to 18% from 1990 to 2010 (OECD, 2016).[1] Over the same period, the share of the foreign-born population increased from about 7 to 12% (OECD, 2016). The impact of immigration on the union membership rates is typically considered to be negative.[2] Economic theory suggests a negative effect of ethnic diversity on both the provision of public goods, solidarity, and preferences for redistribution (Razin *et al.*, 2002 Alesina *et al.*, 1999 Luttmer, 2001 Vigdor, 2002 Facchini *et al.*, 2016). This negative effect could also extend to social institutions, such as trade unions.

Lee (2005) argues that increased heterogeneity of workers erodes the solidarity among workers, which makes it more difficult for trade unions to recruit workers. Similarly, Hechter (2004, p. 431) suggests that "immigration should vary inversely with unionization" since class-orientation in politics has been superseded by status-orientation. In addition, native workers could stop being trade union members, or do not become members in the first place, if, for example, trade unions are seen as undermining the workers' bargaining power by supporting the free entry of foreign workers.

However, the share of foreign workers might have no or even a positive effect

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[1]These numbers refer to Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

[2]Recruitment rates of foreign workers are typically lower than for native workers (Defreitas, 1993). Evidence from e.g., Dunlop (1958) or Ferguson (2016) suggest that unions find it difficult to recruit members when confronted with a racially heterogeneous workforce. Penninx *et al.* (2006) analyse the relationship between trade unions and foreign workers in several European countries.

on natives' union membership rates. For example, if trade unions increase their efforts to recruit foreign workers, such recruitment drives could also have positive effects on the membership rates of native workers. In contrast, for example, if unions are perceived as protecting natives against competition from foreign workers, natives might decide to become trade union members. In this fashion, the so-called "compensation hypothesis" argues that those countries more exposed to international competition due to the process of globalisation reach an increasing demand for insurance and protection against those new risks (see, for instance, Rodrik, 1998 Agell, 1999 Agell, 2002 Mayda and Rodrik, 2005).

The available evidence on the impact of immigration on union membership is mixed, exclusively based on aggregate data. Lee (2005) and Dreher and Gaston (2007) estimate a negative association, but Brady (2007) estimates a positive impact of immigration on union membership rates. Moreover, Brady (2007, p. 89) opines that "the relationship between immigration and unionization is not robust, and the safest conclusion is that there is no relationship". Potrafke (2013), Potrafke (2010) or Magnani and Prentice (2003) look at the impact of globalisation as such - where migration is only a part of this constructed variable - on union density and find no conclusive evidence.

We explore the impact of immigration on union membership among native workers in Austria over the period 2002–2012. Austria is an example of a country with a centralized bargaining system where almost all workers are covered by collective agreements (Aiginger and Guger, 2005), typical of an "European continental socio-economic model". Unionisation rates in a country where almost all workers are covered by centralised wage bargaining could be unimportant, but the bargaining power of unions is perhaps not independent of the size of their rank and

file; bargaining power will react to the financial strength of the union, but also to the spirit of a rising or declining union. Schnabel (2013) stresses for Germany, a labor market which is similar to that of Austria, that younger workers with more formal education are less likely to join trade unions than older workers or workers with lower formal education.

Austria experienced an impressive increase in immigration and an astonishing decline in union density over the last decades. The share of foreigners rose from less than 2% at the beginning of the 1970s to roughly 11% in 2012 (Statistics Austria, 2016). This figure is about 16%, if we consider also naturalizations, and it is about 19%, if first- and second-generation foreigners are also considered.

At the same time, the percentage of employees affiliated to an union declined from about 68% in 1960 to about 27% in 2012 (OECD, 2016). This decrease is unparalleled in developed countries and the de-unionization in Austria surpasses by far the extent of de-unionization seen in e.g., the United Kingdom, the United States or Germany (OECD, 2016).

Gächter (2000, p. 84) describes the Austrian trade unions' stance towards foreign laborers as protectionist, insisting that "trade unions never accepted that foreigners might have a right to maintain in the country". Gächter (1995) claims that since Austria's trade unions were central to policy making they were able to design laws to guard native workers against competition from foreigners. In consequence, Austria's trade unions opposed, for example, the free movement of labor following the EU enlargement in 2004 (Krings, 2009).

Using matched employer-employee data from administrative records (Zweimüller et al., 2009), we estimate the impact of the number of foreign workers in a firm on the union density of native workers. Earlier work in this field relied on cross-

country data and explored the effect of the immigration inflows on union membership at large. We use an instrumental variables estimation approach to address the endogeneity of the number of foreign workers in a firm, drawing on the shift-share approach popularized by Card (2001), and use the predicted share of foreigners by district based on past settlement patterns as an instrument.

We make two contributions and (i) provide evidence on the micro-level dynamics of trade union membership and an inflow of foreign workers, and (ii) we address the endogeneity of the presence of foreigners in firms in our estimates. We estimate that more foreigners in a firm are associated with a lower union density of natives at the firm level. This pattern is however not due to native workers leaving unions, but to the different separation rates and hiring practices of firms which appear to have adjusted their demand to the increased supply of foreign workers.

2. Data and methods

2.1. Data

Our empirical analysis is based on data from the *Austrian Social Security Database* (ASSD). This dataset comprises labour market and demographic information on all private sector workers from 1972 to 2012 through the combination of different administrative tax, labour market and population registers available in Austria (Zweimüller *et al.*, 2009).

Information on the unionization status of workers is from tax statements and are available from 1994 to 2012. The main channel through which Austrian employ-

ees pay their union dues is through their employers who deduct the corresponding payment and transfer it to unions. In rare cases, dues are paid directly by the workers to the unions; in these cases, we do not know whether a worker is a union member or not. However, each union member has an incentive in declaring the union dues paid to the tax authorities as they can be deducted from the tax base.

The unionization status of workers is derived from the combination of the information available in different registers. If a worker, in any register, is reported to have a non-Austrian citizenship, we consider that individual as a foreigner, irrespective of any eventual naturalization process. This wide definition of the foreigner status is in line with the possible channels through which migration might affect union density, which are closely related to ethnic and cultural heterogeneity rather than linked to the actual legal status or nationality of the population with a foreign background.

The analysis is carried out at the firm level. We focus on the period 2002–2012, during which union density declined and the share of foreign workers increased. See Figure 1 for an illustration. We estimate the union density of native workers aged 18–64 years old in middle and large establishments. Not only in these establishment union density is more relevant but also our approach for identifying who belongs to an union—based on the contributions transferred by employers to unions on behalf of workers and reflected on the payslips—are more less prone to measurement error.

We select firms that have 50 or more employees in any year of the period of interest. Besides private households who employed persons and extraterritorial organizations, we exclude the public sector and focus on private-sector firms.

More than 90% variation of union density at the firm level is observed between

firms rather than within firms. In order to exploit the variability of union density within establishments controlling for the time-invariant firm heterogeneity, we use an econometric specification in changes rather than levels of all the years between 2002 and 2012. Aiming to reduce the eventual sample bias one incurs by selecting only surviving firms during the entire period of interest, we split the lapse 2002–2012 into two different sub-periods, 2002–2007 and 2007–2012, respectively, and focus on changes. The final sample involves 7,432 different firms, which accounts for 19,983 firm-year observations and 1,544,815 different employees.

In order to deal with the possible endogeneity of the share of foreign workers in firms, we employ an instrumental variables approach. The construction of the instruments builds on the settlements of foreigners in the past and the net inflows of foreigners by nationality according to Austrian Censuses by Statistics Austria.

2.2. Empirical approach

The main empirical specification of the association of the share of foreigners and the union density of native workers is:

$$\Delta \text{unionization}_{it} = \alpha + \beta \Delta \text{foreign share}_{it} + \Delta X'_{it}\gamma + \delta_t + \varepsilon_{it}, \qquad (1)$$

where *unionization* represents the percentage of native workers unionized in the firm i in time t, *foreign share*$_{it}$ denotes the percentage of foreign workers in the firm, X'_{it} is a vector of time-varying firm characteristics (share of women, share of white-collar workers, share of workers aged 16–29, share of workers aged 45–64, average years of experience, average years of tenure and district-level unemployment rate), δ_t, a time dummy variable indicating the sub-period (2002–2007 or 2007–2012) ε_{it},

a random perturbation and α, an intercept.

The main focus of the analysis is on the unionization patterns of natives, as, in this way, we get rid of the potential impact of the arrival of foreigners on union density due to compositional effects in the case that foreigners exhibit remarkably different affiliation rates to unions. As a robustness check, we present estimations of the effect of the presence of foreigners in firms on the overall union density below.

In order to identify the channels through which the presence of foreigners influence natives' unionization, we explore the effect of the share of foreign workers on union density among workers who stay in the firm and focus on separation and hiring rates. We estimate regression models similar to the one in equation 1 where the left-hand side variable is replaced by the change in union density among workers who remain with the firm, the separation rate of natives and unionized natives, and the hiring rate of natives and unionized natives. The last four rates are defined as follows:

$$\text{separation rate of natives}_{it} = \frac{\text{No. of native leavers}_{it}}{\text{No. of natives at the beginning of the sub-period}_{it}}$$

$$\text{separation rate of unionized natives}_{it} = \frac{\text{No. of unionized native leavers}_{it}}{\text{No. of unionized natives at the beginning of the sub-period}_{it}}$$

$$\text{hiring rate of natives}_{it} = \frac{\text{No. of native newcomers}_{it}}{\text{No. of natives at the beginning of the sub-period}_{it}}$$

$$\text{hiring rate of unionized natives}_{it} = \frac{\text{No. of unionized native newcomers}_{it}}{\text{No. of natives at the beginning of the sub-period}_{it}}$$

(2)

2.3. INSTRUMENTAL VARIABLE

The presence of native workers might be correlated with unobservable factors which affect unionization patterns at the firm level. In addition, union density itself could have an impact on the presence of foreigners in the firm, if e.g., foreigners select themselves into unionized firms. In consequence, the unobserved error is likely to be correlated with the share of foreigners in the firm. Ignoring such an endogeneity leads to biased estimates. In absence of a natural experiment, we resort to an instrumental variables approach. We use a version of the "shift-share" instrument, proposed by David Card (Altonji and Card, 1991 Card, 2001). The approach consists in calculating the predicted share of foreigners in a certain geographical location in a certain year based on the distribution of foreigners across these locations in a previous year and the total net flows of foreigners since. The rationality behind the instrument is that foreigners from a certain origin tend to locate in the same location because of already existing social networks.[3]

Let M_{jkt} and M_{jk0} be the stock of foreigners from country j in district k in period t and 0 (the base year). The predicted stock of foreigners in district k and year t, $\widehat{M_{kt}}$, is given by

$$\widehat{M_{kt}} = \sum_j M_{jk0} + \sum_j \frac{M_{jk0}}{\sum_k M_{jk0}} \left(\sum_k M_{jkt} - \sum_k M_{jk0} \right). \tag{3}$$

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[3]There is empirical evidence of the impact of previous settlements of foreigners on the location of later arrivals, mainly due to social networks. See, e.g., Bartel (1989) Munshi (2003) Bauer *et al.* (2007) Jaeger (2007) G. S. Epstein (2008) Bauer *et al.* (2009) G. S. Epstein (2010) Rathelot and Safi (2014). This sort of instrument has been widely used in the literature. For instance, for the Austrian case, one can find examples in Winter-Ebmer and Zweimüller (1996) and Winter-Ebmer and Zweimüller (1999), who use lags of the share of foreigners, and Halla *et al.* (2017) who use a similar Card-type instrument.

The predicted share of foreigners in each district $\widehat{m_{kt}}$ is given by

$$\widehat{m_{kt}} = \frac{\widehat{M_{kt}}}{N_{kt} + \widehat{M_{kt}}},$$ (4)

where N_{kt} is the stock of natives in period t.

The base year for our baseline analysis is 1971 and the censuses of 1981 and 1991 are used for examining the robustness of our results. The geographical units are the districts, which represent the second-level administrative division of Austria, after states.[4] only three origin countries can be considered, Turkey, former Yugoslavia, and others. Turks and persons from ex-Yugoslavia comprised more than two thirds of foreigners up to the late 2000s. The instrument is based on the population aged 16 and above. The use of an instrument overcomes estimation problems which might arise from the imprecise measure of foreigners' country of origin.

The resulting variable—the predicted percentage of foreigners by district according to Card's shift-share approach—is used to instrument the share of foreign workers in each firm (*foreign share$_{it}$*). The exogeneity of the instrument requires that past economic shocks which affect unionization are not persistent and do not impact on current unionization behaviour. This seems plausible since the base year and the period of analysis are separated by three decades. Also, as argued by Halla *et al.* (2017), the allocation of foreigners just before 1971—inspired by international agreements with Turkey and Yugoslavia and a system of quotas by region and sector—is far from being clearly linked to labour market conditions.[5]

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[4]As there have been several administrative reforms since 1971, two districts (Murtal and Rust) are excluded from the analysis, resulting in a total of 118 districts, including Viennese ones. Note that this number of districts is greater than 50 which is the number of clusters typically considered to be the lower limit for the use of clustered standard errors at the district level (Bertrand *et al.*, 2004 Angrist and Pischke, 2009).

[5]Halla *et al.* (2017) also sustain the absence of a relationship between the foreigners' share

The relevance of the instruments in the first stage is formally addressed with the Kleibergen-Paap rk Wald F-statistic, which is robust to clustering (Kleibergen and Paap, 2006).[6]

Figure 1 shows both the decline in the unionization rate of native employees and the rise in share of foreign workers during 2002 and 2012. Figure 2 captures the correlation between union density and the proportion of foreign workers in the firm in our sample, both in levels and changes (in the left and right panels of the graph). There is a negative relationship between natives' union density and the share of foreigners in the firm if look at levels, but this is not evident when we consider year-on-year changes. Table 1 tabulates descriptive statistics of our sample.

3. RESULTS

3.1. FIRM LEVEL ANALYSIS

We present our first set of estimation results in Table 2.[7] Column 1 presents results from an OLS regression. The main result is a small positive and statistically insignificant association between the change of the share of foreign workers and the change of the share of unionized native workers (relative to all workers) in a firm.

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in 1971 and the long-term political preferences of the population by community (proxied by the results in the last election in which the National Socialist Party run, in 1930). They argue that local attitudes towards foreigners are not an important driver of foreigners' allocation across the Austrian territory.

[6]Even if the strength of the instruments is assessed in an econometric specification based on changes and involving firms, it is also worth mentioning that the correlation between the actual and the predicted share of foreigners at the district level is above 0.60 in the period of interest.

[7]Estimations including 2-digit industry indicators produce qualitatively and quantitatively the same results.

Other associations obtained from this OLS regression are a negative association between the change of the share of female workers and the change of the share of unionized natives. We also find a strong negative association between the change of the share of white-collar workers and the change of the share of unionized natives. As discussed in the previous section, it is likely that these estimates are inconsistent due to an endogeneity problem associated to either omitted variables or two-way causality (the share of foreign workers in a firm is as endogenous as the share of unionized natives).

The results from three different IV-approaches are tabulated in columns 2–4. Details on the first stages are shown in the Appendix (Table A.1). The estimation results when we use total unionization rates in firms are almost identical to the ones presented here (Table A.2). All IV-specifications use past distribution patterns of foreigners as the basis for estimating the predicted share of foreigners by district according to (2001) shift-share approach. They differ in the period which is used for estimating this shift-share value. The specification in column 2 is estimated using the 1971 census, the specification in column 3 is based on the 1981 census, and the specification in column 4 is based on the 1991 census. Overall, the choice of base period does not change the estimated coefficients (the coefficients' 95% confidence intervals typically overlap), however, the specification of column 2—where the base period was more than 30 years earlier—is estimated with the greatest F-value of the three specifications.

In contrast to the OLS specification of column 1, the results from the IV-specifications all indicate a negative and large impact of foreigners on the share of unionized workers in a firm. We estimate that a one percentage point increase in the share of foreign workers in a firm results in a 1.1 percentage point reduction

in the number of unionized workers. Both reverse causation and omitted variables bias could explain the difference to the OLS results. Unionisation in a firm could lead to a larger share of foreigners in the firm, thus causing reverse causation. Firms in old industries are typically more unionized and could at the same time attract more foreigners, because foreigners are likely to possess the required skills. Alternatively, highly unionized firms might want to recruit more foreigners in order to weaken the union. A simple case for an omitted variables bias is a firm's economic situation, if it is bad, both unionization and the attractiveness for foreigners could be reduced, which will result in an upwardly biased OLS estimate.

The other estimated coefficients differ only little from the OLS results, but for the changes in white-collar workers and for the share of younger workers (aged 16 to 29). For these two variables, we obtain a strong negative impact on the share of unionized native workers.

We analyse these impacts in more detail by separate estimations on several subsamples. The results are tabulated in Table 3.[8] In the first two columns, we present the estimated impact for men and women separately. The point estimates for men are more pronounced than for women, however, the confidence intervals are relatively large and we cannot rule out that the effects are the same. However, in both cases, more foreign workers in a firm lower the share of unionized native workers.

In columns 3 and 4 of Table 3, we present the results when we analyse white-collar and blue-collar workers separately. When we distinguish between these two types of workers, we find that the negative association between foreigners and

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[8]The results from either using shift-share instruments based on 1981 and 1991 or using all workers in the firm are qualitatively similar and can be seen in the supplementary Tables (S.1) and (S.2).

unionization of native workers is entirely due to white-collar workers, as we fail to reject the null hypothesis for blue-collar workers. One reason for this result may be a union goal for redistribution (Alesina *et al.*, 1999): more immigrants may increase the number of less-qualified workers; thus, increasing the need for redistribution. As higher paid white-collar workers potentially lose from redistribution, they might oppose that.

We split the sample into different age groups, 16–29, 30–44, and 45–64 years of age, and estimate the effect of foreign workers on native union members. The results are tabulated in columns 5–7 of Table 3. These results indicate that the negative impact is strongest for the oldest group of workers.

The negative impact of foreign workers on unionized native workers could be caused by firms substituting away from unionized natives to foreign workers, i.e., we would observe an increase in the separation rate of unionized native workers and, possibly, in a lower probability of hiring unionized workers (or fewer workers joining the union after a job move). Alternatively, the relative decrease of unionized workers could also be caused by an overall increase in the firms' workforce which would not affect the separation rate. A decline of the share of unionized native workers could also arise from remaining workers quitting the union.

In Table 4, we present evidence for these channels. Our focus is on native workers. However, to some extent, hiring and separation of natives (which are right-hand-side variables) might capture the same phenomenon (the shift in the migrant-native composition of the firm workforce) However, as the hiring and the separation of native workers mirrors the changing composition of a firm's workforce, which is possibly induced by the flows of foreign workers, we re-estimate these specifications using all workers in a firm. In Panel A, we present the results

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when we use all workers in our sample and in Panel B we restrict the dependent variable to native workers only. We first investigate if the hiring of foreign workers leads to workers quitting the union. We do this by estimating the impact of foreign workers on the share of unionized workers who were employed by the firm in the first and the last period in our sample. In other words, to examine the extent of workers quitting the union, we restrict the calculation of the dependent variable to workers who were with the firm over a longer period. Both estimation results do not allow the rejection of the null hypothesis of no impact, i.e., we do not find sufficient evidence to conclude that the hiring of foreign workers caused unionized workers to cease their union membership.

The definition of the dependent variable in column 1 rules out, by construction, important changes of firms' workforces. These dynamics are examined in columns 2–5 of Table 4. In columns 2 and 3, we present estimation results of the impact on separations and hirings and in columns 4 and 5 on the separation and hiring of unionized native workers. The results from these estimations indicate that there is indeed a change in the workforce away from unionized native workers, both by more separations and an overall reduction in the hiring of unionized workers (both natives and foreigners). In both cases, the estimated impact of foreign workers is sizeable.

3.2. DISTRICT LEVEL ANALYSIS

One possible shortcoming of these analyses is perhaps our choice of the unit of analysis. Firms are not closed economies and larger inflows of foreigners to firms might cause greater outflows of natives with certain characteristics—for instance,

the most likely to join unions—to other firms. In that case, if unionized natives switch from firms with a high share of foreigners to establishments with a low presence of foreigners, the impact of migration on natives' union density would be dispersed across the whole economy and the estimated effect of the arrival of foreign workers on unionization in the firm-level analysis would be a biased estimate of the national-level impact.[9]

According to Dustmann *et al.* (2005) Dustmann *et al.* (2007), one can conceptualize this issue as an omitted-variable problem, which one can deal with using two possible strategies. The first one consists in introducing native outflows at the relevant level of analysis in the econometric model. However, this variable is likely to be correlated with economic shocks at the firm level—just as in the case of foreigners' inflows— and to find an instrument for this variable is far from straightforward. The second possibility is to aggregate at a higher level at which native outflows are not likely to happen. In this respect, we resort to Austrian districts (*Bezirke*), administrative subdivision of Austrian States (*Länder*), at which adequate migration data are available. However, previous research has not identified any average displacement effect of native population by the arrival of foreigners even at a lower geographical level (municipalities) (Halla *et al.*, 2017).

We have run such regressions using different instruments and periods of analysis. We also distinguish between changes in natives' and all workers' union status and use changes between 2002 and 2007 and between 2007 and 2012.[10] While most of the coefficients are negative, they are typically smaller than those in Table 2; none of them is statistically significant. Moreover, the instruments are not strong

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[9]See the discussion on the effect of immigration on native outflows in Card (2001) Card (2009) Dustmann *et al.* (2005) Peri and Sparber (2011).

[10]Full results can be received on request and are in an appendix S3 for the referees.

enough at this level of aggregation. As we have only 238 district level observations, an interpretation is difficult: results are smaller, similar to the firm levelresults, but not statistically significant.

4. CONCLUSIONS

Trade unions differ in their approaches to foreigners (Wrench, 2004) which might be linked to their success in recruiting workers. We analysed Austrian trade union membership data since Austria had both a strong increase of foreign workers over the past decades and a strong decline in trade union membership.

Using instrumental variable estimations, we estimate a strong negative impact of the number of foreigners in a firm on the native workers' unionization rates. Our analyses indicate that the negative correlation between foreign workers and trade union membership of native workers is not being caused by native workers quitting their unions. In contrast, the results suggest that the lower membership rates are the result of workplace reorganisations. These reorganisations result in the selective hiring of younger workers, including foreign workers, who are less likely to join a union.

Penninx and Roosblad (2000) stress that trade unions face three dilemmas when confronted with a sizable number of foreign workers, whether to oppose or cooperate with the recruitment of foreigners; whether to recruit foreigners as regular members or to offer separate forms of affiliation short of full membership; and if they should undertake special measures to support special needs foreigners might have in the labor market. Our results suggest that as long as trade unions do not accommodate the declining membership numbers—due to union members

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who leave the workforce—by recruiting more members among foreign workers, trade union density will continue to fall even further.

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Figure 1: Union density among natives and share of foreign workers in Austria, 2002–2012.
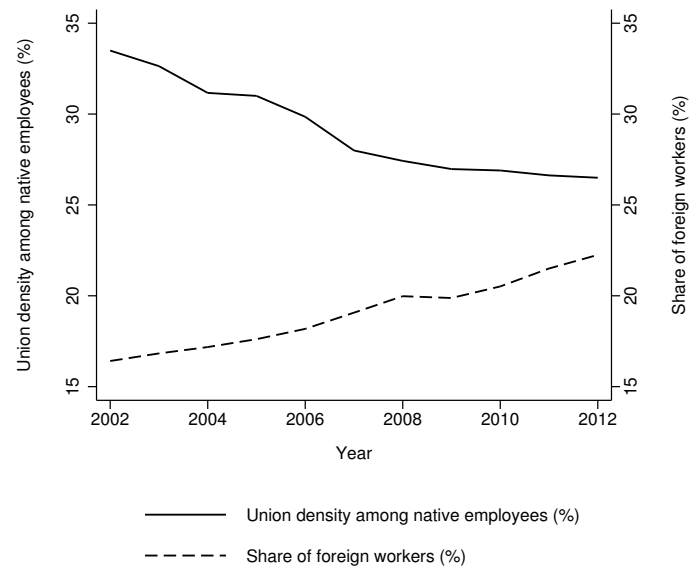
Source: Authors' analysis from ASSD.

Figure 2: Correlation between union density among natives and share of foreigners at the firm level in Austria, 2002, 2007, and 2012.
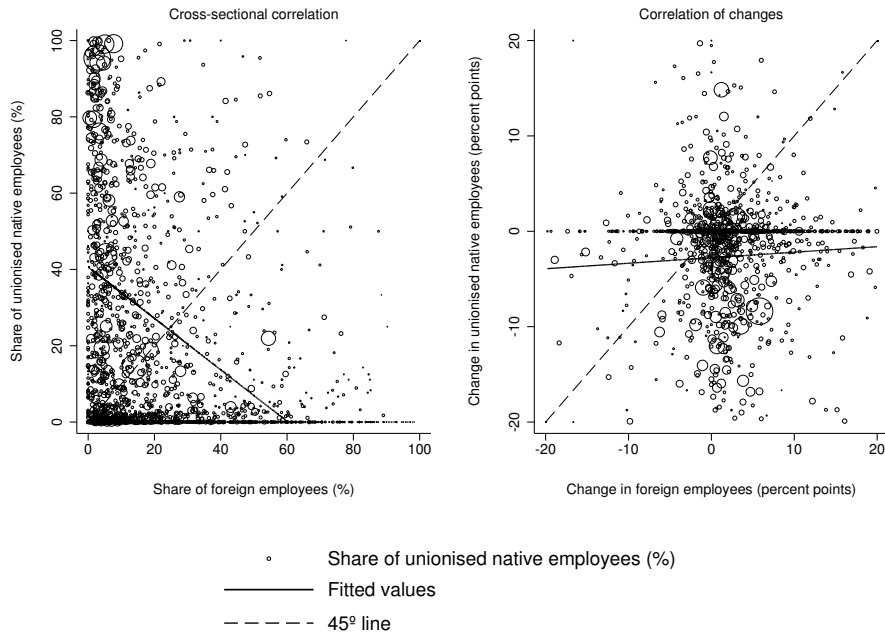
Notes: For clarity, the figure is based on a 10% random sample of the data. Data are weighted by the number of native workers at the firm in the left panel and by the number of native workers at the beginning of the sub-period in the right one.
Source: Authors' analysis from ASSD.

Table 1: Descriptive statistics.

	Mean	Standard deviation
Share of unionized workers	0.168	0.263
Share of unionized natives	0.164	0.258
Share of unionized male workers	0.174	0.271
Share of unionized female workers	0.113	0.224
Share of unionized white-collar workers	0.110	0.211
Share of unionized blue-collar workers	0.219	0.329
Share of unionized workers aged 16-29	0.132	0.250
Share of unionized workers aged 30-44	0.156	0.257
Share of unionized workers aged 45-64	0.193	0.287
Share of foreigners	0.203	0.211
Share of female workers	0.346	0.267
Share of white-collar workers	0.517	0.349
Share of workers aged 16-29	0.251	0.144
Share of workers aged 45-64	0.311	0.157
Average years of experience	16.507	4.820
Average years of tenure	6.307	4.101
District unemployment rate	8.576	2.945
Share of foreigners in the district	0.182	0.745
Predicted share of foreigners in the district (Census 1971)	0.117	0.079
Predicted share of foreigners in the district (Census 1981)	0.111	0.078
Predicted share of foreigners in the district (Census 1991)	0.109	0.065
Share of unionized stayers (5 years)	0.182	0.279
Share of unionized native stayers (5 years)	0.177	0.275
Separation rate (5 years)	0.468	0.206
Separation rate for natives (5 years)	0.461	0.211
Separation rate for unionized workers (5 years)	0.066	0.114
Separation rate for unionized natives (5 years)	0.063	0.110
Hiring rate (5 years)	1.562	14.344
Hiring rate for natives (5 years)	1.400	16.776
Hiring rate for unionized workers (5 years)	0.242	8.139
Hiring rate for unionized natives (5 years)	0.239	8.368
Observations	19,983	

Notes: A lower number of observations involved in the calculations of the union density among specific population groups. Observations are not weighted.

Separation (hiring) rate (for natives) = No. of (native) leavers (newcomers)/No. of workers (natives) at the beginning of the period.

Separation rate for unionized workers (natives) = No. of unionized (native) leavers/No. of unionized workers (natives) at the beginning of the period.

Hiring rate for unionized workers (natives) = No. of unionized (native) newcomers/No. of unionized workers (natives) at the beginning of the period.

Source: Authors' analysis from ASSD.

Table 2: Determinants of the share of unionized natives in Austria, regression in changes, 2002–2007 and 2007–2012.

	(I) OLS	(II) IV-Census 1971	(III) IV-Census 1981	(IV) IV-Census 1991
Share of foreign workers	0.041	−1.175***	−1.089***	−1.378***
	(0.033)	(0.344)	(0.326)	(0.517)
Share of females	−0.068**	−0.140***	−0.135***	−0.152***
	(0.033)	(0.047)	(0.044)	(0.058)
Share of white-collar workers	−0.271***	−0.543***	−0.524***	−0.589***
	(0.028)	(0.083)	(0.079)	(0.116)
Share of workers 16–29	0.037	−0.259***	−0.238**	−0.308**
	(0.029)	(0.096)	(0.093)	(0.140)
Share of workers 45–64	−0.048	0.232***	0.213**	0.279**
	(0.031)	(0.088)	(0.087)	(0.127)
Average experience	0.007***	−0.024**	−0.022**	−0.029**
	(0.002)	(0.010)	(0.009)	(0.014)
Average tenure	0.005***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.002)
District-level unemployment rate	−0.001	−0.002	−0.002	−0.002
	(0.001)	(0.002)	(0.002)	(0.002)
R^2	0.114			
Wald F-statistic of the excluded instrument (first stage)		18.475	14.218	9.217
Observations	12,534	12,534	12,534	12,534

	Year 2002	Year 2007	Year 2012	
Mean of dependent variable	0.328	0.278	0.265	
Mean of independent variable	0.123	0.142	0.165	

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the district level in parentheses. All specifications include a time-dummy for the period 2007–2012 and an intercept. All regressions are weighted by the number of native workers at the beginning of the period.
Source: Authors' analysis from ASSD.

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Table 3: Effects of the share of foreign workers on the share of unionized natives in Austria, regression in changes, 2002–2007 and 2007–2012, results by groups.

	(I) Males	(II) Females	(III) White-collar	(IV) Blue-collar	(V) Aged 16–29	(VI) Aged 30–44	(VII) Aged 45–64
Coefficients	−1.926*** (0.686)	−0.824** (0.332)	−0.951*** (0.267)	0.030 (0.694)	−0.701 (0.569)	−0.898*** (0.298)	−2.020*** (0.478)
Wald F-statistic (first stage)	7.636	53.036	35.245	6.536	14.415	26.666	22.194
Mean of dependent variable	0.347	0.178	0.201	0.420	0.205	0.269	0.380
Observations	12,223	11,972	12,231	9,707	11,574	12,233	11,964

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Results from IV-estimates where the instrument is based on Census 1971 data. Standard errors clustered at the district level in parentheses. All specifications include a time-dummy for the period 2007–2012 and an intercept. All regressions are weighted by the number of native workers at the beginning of the period.
Source: Authors' analysis from ASSD.

Table 4: Effects of the share of foreign workers on the unionization of (native) stayers and turnover and hiring of (native) workers, regression in changes, 2002–2007 and 2007–2012.

	(I) Share of stayers unionized	(II) Separation	(III) Hiring	(IV) Separation of unionized workers	(V) Hiring of unionized workers
Panel A: All workers					
Coefficients	−0.198	3.974***	−1.676	−0.252	−2.930***
	(0.400)	(0.998)	(2.283)	(0.863)	(1.094)
Wald F-statistic (first stage)	12.211	11.857	11.857	11.857	11.857
Mean of the dependent variable	0.340	0.426	0.502	0.102	0.081
Observations	12,276	12,534	12,534	12,534	12,534
Panel B: Native workers					
Coefficients	−0.005	3.318***	−2.879*	0.031	−2.618***
	(0.302)	(0.810)	(1.598)	(0.740)	(0.860)
Wald F-statistic (first stage)	20.670	18.475	18.475	18.475	18.475
Mean of the dependent variable	0.343	0.403	0.443	0.100	0.075
Observations	12,276	12,534	12,534	12,534	12,534

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the district level in parentheses. All specifications include the change in the share of females, the change in the share of white-collar workers, the change in the share of workers aged 16–29 and 45–64, the district-level unemployment rate, a time-dummy for the period 2007–2012, and an intercept. All regressions are weighted by the number of total workers or native workers at the beginning of the period. In both Panels, only firms with natives are used in the analysis. See Table 1 or the main text for the definitions of separation and hiring rates.
Source: Authors' analysis from ASSD.

APPENDIX WITH ADDITIONAL RESULTS

Table A.1: First-stage regression for the share of foreign workers in the firm.

	(I) Census 1971	(II) Census 1981	(III) Census 1991
Predicted share of foreign workers (Census 1971)	0.301***		
	(0.070)		
Predicted share of foreign workers (Census 1981)		0.363***	
		(0.096)	
Predicted share of foreign workers (Census 1991)			0.424***
			(0.140)
Share of females	−0.060***	−0.060***	−0.060***
	(0.020)	(0.020)	(0.019)
Share of white-collar workers	−0.223***	−0.223***	−0.222***
	(0.019)	(0.019)	(0.019)
Share of workers 16–29	−0.240***	−0.240***	−0.241***
	(0.018)	(0.018)	(0.018)
Share of workers 45–64	0.232***	0.232***	0.233***
	(0.020)	(0.020)	(0.020)
Average experience	−0.025***	−0.025***	−0.025***
	(0.001)	(0.001)	(0.001)
Average tenure	0.001*	0.001*	0.001
	(0.001)	(0.001)	(0.001)
District-level unemployment rate	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.001)
Wald F-statistic (first stage)	18.475	14.218	9.217
R^2	0.359	0.359	0.359
Observations	12,534	12,534	12,534
Mean of independent variable	0.119	0.113	0.111
	Year 2002	Year 2007	Year 2012
Mean of dependent variable	0.123	0.142	0.165

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the district level in parentheses. All specifications include a time-dummy variable for the period 2007–2012 and an intercept. All regressions are weighted by the number of native workers at the beginning of the period.
Source: Authors' analysis from ASSD.

Table A.2: Determinants of the share of unionized workers, regression in changes, 2002–2007 and 2007–2012.

	(I) OLS	(II) IV-Census 1971	(III) IV-Census 1981	(IV) IV-Census 1991
Share of foreign workers	0.052	−1.261***	−1.251***	−1.464***
	(0.041)	(0.329)	(0.417)	(0.542)
Share of females	−0.057*	−0.179***	−0.168***	−0.186**
	(0.031)	(0.057)	(0.058)	(0.074)
Share of white-collar workers	−0.291***	−0.572***	−0.634***	−0.690***
	(0.030)	(0.079)	(0.121)	(0.143)
Share of workers 16–29	0.031	−0.321***	−0.331***	−0.390**
	(0.027)	(0.106)	(0.124)	(0.162)
Share of workers 45–64	−0.059*	0.259***	0.245**	0.294**
	(0.031)	(0.089)	(0.113)	(0.140)
Average experience	0.007***	−0.027***	−0.028**	−0.034**
	(0.002)	(0.010)	(0.012)	(0.016)
Average tenure	0.004***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.002)	(0.002)
District-level unemployment rate	−0.001	−0.002	−0.002	−0.002
R^2	0.118			
Wald F-statistic of the excluded instrument (first stage)		25.626	11.589	10.586
Observations	12,584	12,584	12,584	12,584
	Year 2002	Year 2007	Year 2012	
Mean of dependent variable	0.321	0.268	0.248	
Mean of independent variable	0.163	0.188	0.219	

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the district level in parentheses. All specifications a time-dummy for the period 2007—2012 and an intercept. All regressions are weighted by the number of workers at the beginning of the period.
Source: Authors' analysis from ASSD.

Table S.1: Effects of the share of foreign workers on the share of unionized natives in Austria, regression in changes, 2002–2007 and 2007–2012, results by groups using alternative instruments.

	(I) Males	(II) Females	(III) White-collar	(IV) Blue-collar	(V) Aged 16–29	(VI) Aged 30–44	(VII) Aged 45–64
Panel A: IV-Census 1981							
Coefficients	−1.758***	−0.764**	−0.877***	0.266	−0.408	−0.764**	−1.954***
	(0.581)	(0.343)	(0.243)	(0.525)	(0.417)	(0.297)	(0.499)
Wald F-statistic (first stage)	3.932	33.791	16.827	2.541	6.768	12.417	11.005
Panel B: IV-Census 1991							
Coefficients	−2.246**	−0.989**	−1.137***	0.327	−0.740	−1.052**	−2.295***
	(1.059)	(0.431)	(0.369)	(0.726)	(0.652)	(0.456)	(0.701)
Wald F-statistic (first stage)	3.932	33.791	16.827	2.541	6.768	12.417	11.005
Observations	12,223	11,972	12,231	9,707	11,574	12,233	11,964

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the district level in parentheses. All specifications include the change in the share of females, the change in the share of white-collar workers, the change in the share of workers aged 16–29 and 45–64, the district-level unemployment rate, a time-dummy for the period 2007–2012, and an intercept. All regressions are weighted by the number of workers of the group of interest at the beginning of the period.
Source: Authors' analysis from ASSD.

Table S.2: Effects of the share of foreign workers on the share of unionized workers in Austria, regression in changes, 2002–2007 and 2007–2012, results by groups.

	(I) Males	(II) Females	(III) White-collar	(IV) Blue-collar	(V) Aged 16–29	(VI) Aged 30–44	(VII) Aged 45–64
Coefficients	−2.242***	−0.910**	−1.030***	−1.227	−0.745	−1.167**	−2.118***
	(0.836)	(0.451)	(0.282)	(1.767)	(0.559)	(0.453)	(0.540)
Wald F-statistic (first stage)	7.437	23.200	42.489	0.909	11.379	14.728	13.683
Mean of dependent variable	0.331	0.175	0.191	0.376	0.194	0.258	0.368
Observations	12,344	12,064	12,300	10,008	11,574	12,233	11,964

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Results from IV-estimates where the instrument is based on Census 1971 data. Standard errors clustered at the district level in parentheses. All specifications include a time-dummy for the period 2007–2012, and an intercept. All regressions are weighted by the number of total workers at the beginning of the period.
Source: Authors' analysis from ASSD.

Table S.3: Determinants of the share of unionized native and total workers in Austria, regression in changes, 2002–2007, 2007–2012, and 2002–2012, district-level analysis.

	(I) OLS	(II) IV-Census 1971	(III) IV-Census 1981	(IV) IV-Census 1991
Panel A: Native workers (2002–2007 and 2007–2012)				
Coefficients	−0.290	−0.435	−0.311	−0.665
	(0.220)	(0.833)	(0.899)	(1.058)
R^2	0.529			
Wald F-statistic (first stage)		5.667	5.538	6.678
Observations	238	238	238	238
Panel B: Total workers (2002–2007 and 2007–2012)				
Coefficients	−0.196	−0.272	0.019	−0.312
	(0.186)	(0.741)	(0.796)	(0.975)
R^2	0.617			
Wald F-statistic (first stage)		5.104	4.703	5.987
Observations	238	238	238	238
Panel C: Native workers (2002–2012)				
Coefficients	−0.489*	−0.720	−0.872	−1.201
	(0.263)	(0.801)	(0.828)	(0.881)
R^2	0.591			
Wald F-statistic (first stage)		2.911	3.410	4.641
Observations	119	119	119	119
Panel D: Total workers (2002–2012)				
Coefficients	−0.333	−0.350	−0.335	−0.655
	(0.219)	(0.679)	(0.690)	(0.751)
R^2	0.588			
Wald F-statistic (first stage)		2.790	3.251	4.563
Observations	119	119	119	119

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. All models include the share of females, the share of white-collar workers, the share of workers aged 16–29 and 45–64, the district-level unemployment rate, and an intercept. Models in panels A and B includes a time-dummy for the period 2007–2012, too. All regressions are weighted by the number of native or total workers at the beginning of the period. Standard errors clustered at the district level in parentheses.