The Impact of Labour Immigration
on Union Membership[*]

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Abstract

Trade unions play a key role in the political economy of many Northern European countries. The liberalization of labor mobility in the EU has led to concerns about the future of this model. One reason is that labour immigrants are less likely to unionize, which might undermine union strength. We leverage individual level, population wide administrative data from Norway in a natural experiment framework to identify the effect of an immigration supply shock on natives' propensity to unionize. The main theories of unionization lead us to expect negative consequences for union density. We find that native workers that were exposed to the supply shock experienced a significantly weaker earnings growth and were more likely to leave the labour market, but their propensity to unionize were not affected.

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1 Introduction

Trade unions are important agents in the Norwegian political economy.[1] Unions and employer organizations are centralized at the national level, where centralized, coordinated wage bargaining determines wage growth intervals which sets limits for local wage bargaining. Consultations between unions, employers, and the government on labour market relevant issues are frequent, and it is politically difficult for the government to oppose agreements from previous tripartite consultations. This institutional model has been characterized as a stabile, institutional equilibrium with support across the political spectrum, and some argue it is of key importance for the economic success of the Scandinavian economies (Barth, Moene, and Willumsen 2014).[2]

To what extent is labour migration a threat to the institutional equilibrium in the labour market? While the benefits from immigration has the potential to be net positive in aggregate, the net benefit will be reduced or reversed if immigration has negative effects on well-functioning institutions in the receiving country (see Borjas (2015) for a discussion). The rapid increase in labour immigration to Norway over the last decades, in particular since the 2004 EU expansion, has raised concerns regarding potential negative effects on the organization of the labour market and its institutions.[3] These concerns are not solely raised by the unions themselves, as concerns have been raised by employer organizations and conservative politicians as well.[4] In this paper we study the relationship between immigration and union density, more specifically whether immigration influences natives' propensity to unionize.

The concerns regarding negative effects of immigration on union density builds on two theoretical models. The main model of why workers join unions–so-called social custom

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[1]See Barth, Moene, and Willumsen (2014) for an introduction to the Scandinavian model.

[2]See Acemoglu, Robinson, and Verdier (2012) for a more critical view of the Scandinavian model. There is also a large comparative political science literature on the political economy consequences of unions and wage bargaining (see e.g. Korpi 2006).

[3]The trade unions density has fallen significantly in many OECD-countries during the last two-three decades. As an average for OECD it has fallen from approximately 41 per cent in 1990 to 30 per cent in 2015. In Norway, the trade union density is generally higher and the reduction has been smaller; from 58 per cent in 1990 to 52 per cent in 2015 (OECD 2016), but the decline varies across industries.

[4]See e.g. the speech by Gerd Kristiansen (2014), then leader of the Norwegian Confederation of Trade Unions (LO), quotes from Svein Oppegaard (VG 2011) of the Confederation of Norwegian Enterprise (NHO), and quotes from Michael Tetzschner (Dagbladet 2011) of the Conservative party.

theory–emphasizes the importance of the behavior of co-workers (Booth 1985; Naylor and Cripps 1993; Visser 2002). Unionization is a social act and your propensity to join a union strongly depends on whether co-workers are union members. As we document below, immigrants are less likely to unionize, which according to social custom theory implies that natives will also become less likely to unionize. A second, not mutually exclusive, type of argument emphasizes the importance of union strength as an incentive to unionize. The willingness of workers to pay their membership fee should at the margin be influenced by whether they believe that the union can improve their situation on the labour market. Union density is one indicator of union strength and often found to be correlated with the existence of several types of pro-labour policies (e.g. Korpi 2006). Moreover, at least in the absence of sector-wide tariffs, the ability of unions to get their wage demands accepted will be related to the pool of non-unionized workers (Wallerstein 1989). Thus, falling density due to immigration weakens both social and instrumental incentives to unionize. We elaborate on these points below, but also discuss the counterargument that stronger competition in the labour market positively influences natives' incentive to unionize.

In order to identify the empirical effect of immigration on union density, we study the consequences of the immigration wave to the Norwegian construction sector due to the EU expansion in 2004. The EU expansion implied that workers from ten additional countries got access to the Norwegian labour market, which led to a rapid increase in labour immigration from (in particular) Poland, Lithuania, and Latvia. We exploit that some vocational educations in the construction sector are better protected from labour immigration due to licensing demands, which allow us to construct a control group of workers in the construction sector. We rely on population wide register data to document that labour immigrants are less likely to unionize, and that inflows of immigrants are strongly related to licensing demands.

We conduct two types of analyses to study the effects of the immigration supply shock on natives. First we follow workers with and without licensing protection before and after the 2004 EU expansion, and estimate the impact of the immigration shock using a differences-in-differences design and an instrumental variables approach. In this analysis

we include individual job-spell fixed effects, which implies that we identify the effect of the shock from variation within individuals' job spells. These analyses capture what happens to those who remain in their job, but misses the effects on those who change jobs or exit the labour market. In the second analysis we therefore identify the population of workers employed in the construction sector in 2003, the year prior to the EU expansion, and follow these workers year-by-year until 2013. Together, these analyses give a rich picture of how native workers were affected by the increase in labour immigration.

Our results show that the immigrant supply shock had negative effects on the earnings growth and the probability of employment for workers who were exposed to the shock. We also find a relative decline in union density among exposed workers employed in the BaC industry before the shock, but this decline is purely an effect of a higher propensity to exit the labour market in this group. We find no evidence of falling union density among those who stayed in the labour market.

2   Immigration and Union Density

We emphasize two potential effects of immigration on natives' union density. First, trades that experience an influx of immigrants tend to experience falling union density because immigrants are less likely to organize (see Table 1 and Figure 2 below). There are economic and cultural reasons for immigrants' reluctancy to join unions,[5] but irrespective of the reasons, lower unionization among immigrants implies that native workers in these trades will have a higher share of non-unionized co-workers. A large literature, building on Akerlof (1980), emphasizes the importance of organized co-workers to explain the decision to join a trade union.[6] When a large share of co-workers are union members, the social motive for joining the union is strong and free-riding has a reputation effect. Importantly, shocks to union density will be persistent and even reinforce over time, and can thus change institutional equilibria. The social motive for joining unions has empirical support, as workers typically highlight social reasons as important for why they decided to join a

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[5]See Cools, Finseraas, and Rasmussen (2018) for an analysis of the immigrant-native gap in unionization.

[6]See Booth (1985) and Naylor and Cripps (1993) for theoretical contributions, and Visser (2002) and Ibsen et al. (2017) for empirical applications.

union (Visser 2002, 406). Thus, the weakening of the social norm or custom of unionization might influence natives' propensity to unionize.

Second, the decline in union density can weaken instrumental incentives to unionize. Although the social motive might be the most important for joining a union, we expect instrumental motives to matter as well. Unions provide social insurance and equalize risks. On the margin, the willingness to pay the membership fee is likely to be a function of the expected material benefits from being a union member. Strong labour unions have been able to implement social insurance and labor market regulation, which is usually considered to be to the benefit of labour (e.g. Korpi 2006). Falling union density is often interpreted as a decline in union strength (Korpi and Shalev 1979; Garrett and Lange 1986). Since the ability to influence employers and policies is a function of organizational strength, declining density will weaken the incentive to unionize. In addition, the power of unions in wage bargaining will also depend on the share of the work force they represent (Wallerstein 1989; Ahlquist 2017). Thus, immigrants that do not organize weaken union strength and thereby the instrumental incentive to unionize. Moreover, a newly hired non-unionized immigrant might have a stronger negative effect than a newly hired native that do not organize, since ethnic, linguistic and religious heterogeneity is often considered as an obstacle to worker unity and union organization (e.g. Korpi and Shalev 1979).

There is, however, a potential case to made for a positive effect of immigration on the instrumental incentives to unionize. Immigration constitutes a labour supply shock for workers with similar skills as the immigrants. In textbook models of labour markets, the supply shock should, in the short run, decrease relative wages for workers with similar skills (Borjas 2003), and potentially increase the risk of unemployment as well. These relative, short-run, negative wage effects of immigration have been empirically identified in the Norwegian labour market (Bratsberg and Raaum 2012; Bratsberg et al. 2014; Finseraas, Røed, and Schøne 2017). For a given level of union strength, labour market competition might improve the instrumental incentives to unionize, as higher risk of income loss makes workers more willing to pay the membership fee to receive the insurance that unions

provide (Blanchflower et al. 1990).[7]

This argument is controversial, however, because unions might be perceived as less effective, and their demands will be less credible, when competition for jobs is fierce. When unemployment is increasing, employers are dealt better hands.[8] Moreover, unions in the Norwegian BaC industry are so called "open shop" unions, which means that wage agreements cover all employees in firms that are covered by a tariff agreement, irrespective of union member status (see the Appendix for a description of the wage-negotiations regime). The open shop model weakens the importance of instrumental incentives for being a union member. Finally, a recent review of the empirical literature concludes that union density tends to be pro-cyclical, i.e. it falls when unemployment increases (Schnabel 2013). There is also micro-level evidence against the argument that risk of unemployment is important, as Schnabel and Wagner (2005, 16) finds no relationship between previous unemployment experiences and the propensity to be a union member in German panel data.

The empirical literature on the effect of immigration on union density is relatively scarce. Studies from the US labour market tend to find negative effects of immigration and ethnic diversity on union density (e.g. Ferguson 2016, but see Burgoon et al. 2010), while the cross-national literature produces divergent results (compare e.g. Brady 2007 and Lee 2005). Antón, Böheim, and Winter-Ebmer (2016) is the paper most similar to ours in motivation and empirical approach. They study the effect of immigration on unionization using Austrian register data. Using an Instrumental Variables approach with prior, geographical distribution of immigrants to instrument for immigrant share, they estimate substantive negative effects of immigration on union density. The negative effects are not driven by natives leaving unions, but are driven by changes in who is hired and who is leaving firms who experience the change in immigrant share.

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[7]Fall in absolute wages will work in the opposite direction if demand for union protection is a normal good. However, in line with the labour economics literature, we argue that immigration influences relative, not absolute, wages.

[8]See Ashenfelter and Pencavel (1969) for a theoretical discussion.

3 The EU Expansion, Licensing Demands and Labour Immigration

Immigrant inflow to Norway has increased substantially over the last 20 years (see Bratsberg, Raaum, and Røed 2017).[9] In the mid-1990s, the total gross inflow of immigrants was about 15000 a year, while in 2012 inflows reached about 65000. All types of immigration (refugees, family reunions, and labour immigration) increased over this period, but the most important increase was due to labour immigration after 2004. Although Norway is not a member of the European Union, it has been member of the European Economic Area (EEA) since 1994. Prior to 2004, labour immigration to Norway was nonetheless not large and fairly stable over time. From 2004, the EEA was expanded with ten new member countries, including Poland. The expansion led to a rapid increase in labour immigration from a couple of thousand inflows in 2004 to about 25000 in 2012. Most of the labour immigrants came from Poland, and the majority entered the building and construction (BaC) industry, which has thus experienced a positive labour supply shift.

The EU expansion provides us with an exogenous source of variation in immigration over time. Next, as in Bratsberg and Raaum (2012), we exploit licensing and certification demands to get variation in the immigration shock within the BaC industry. Occupational licensing occurs when the law (or insurance companies) requires that all workers in an occupation need a specialised vocational education to execute the tasks that fall into the profession.[10] For example, insurance companies and public building inspectors demand that plumbing and electric work is performed by workers with proper credentials, national approved licenses are necessary to operate heavy machinery, and particular certificates are needed to handle dangerous materials or to install lighting and light-signalling systems for roads, railways, airfields and harbour facilities. The implication is that workers with vocational educations that demand licensing and certification are protected from labour immigration.

The effect of licensing on the inflow of labour immigrants is easy to observe in our

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[9]Bratsberg, Raaum, and Røed (2017) provide a detailed description of immigration over the 1990-2015 period. Our description is heavily influenced by their account.

[10]We rely on the Norwegian Occupational Regulations Database (NORD) to identify these educations (Alecu and Drange 2016). We are grateful to Ida Drange for sharing their data set.

Figure 1: Immigrant share by trades
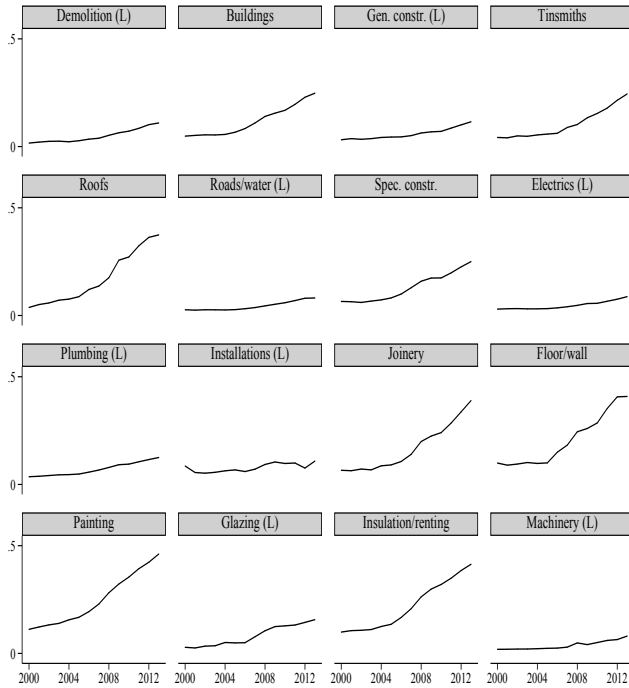
Note: Own calculations. All workers in the BaC industry included. Workers' industry of employment is classified using employer-employee codes.

data. In Figure 1 we graph the development of the share of natives in each of the 16 trades in the BaC industry from 2000 to 2013.[11] The figure shows that the increase in immigrant share after 2004 is large in most of the trades that are dominated by vocational educations without protection compared to the trades that are dominated by protected workers (indicated by an L in the figure). In several of the non-licensed trades, the share of immigrants approaches 50 percent at the end of the period. Clearly, the labour supply shock to these trades was substantial.

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[11]The BAC-industry is defined by standard NACE-codes. A cross walk procedure is employed since the NACE definition is changed in 2009. In the BAC-industry we define 16 business areas, defined by five-digit NACE-codes.

Table 1: OLS regressions. Dependent variable is union membership.

	(1) Union member	(2) Union member	(3) Union member
Immigrant	-.135***	-.079***	-.066***
	(.037)	(.017)	(.015)
Trade FE	No	Yes	Yes
Year FE	No	No	Yes
N	1,689,346	1,689,346	1,689,346

*Note*: Robust standard errors adjusted for clustering on trade in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Labour immigrants in the construction sector are significantly less likely to unionize compared to natives. Table 1 estimates the immigrant-native union gap across the years 2000-2013. The unadjusted gap across these years are almost fourteen percentage points. Adjusting for trade and year fixed effects reduce the gap to about seven percentage points. Another way to illustrate the relationship between immigration and union density is to aggregate the data to the trade level and estimate the relationship between immigrant share and union density within trades over time. Figure 2 visualizes the results from this analysis. Each dot consists of five percent of the observations and is displayed in the figure according to the average union density and immigrant share within that bin, controlling for trade area and year fixed effects. The regression line is the relationship between immigrant share and union density based on the underlying data (not the bins), again with trade area and year FE included. The figure shows a linear, negative correlation between immigrant share and union density.

4 Data and Empirical Strategy

Table 1 shows that immigrants are less likely to unionize and Figure 2 shows that there is a negative correlation between immigrant share and union density at the trade area level. These observations constitute the background for our study of the impact of immigration on the natives that experience the influx of immigrants. We study the impact of the inflow on both labour market outcomes and the propensity to unionize. As indicated above,

Figure 2: Immigrant share and union density
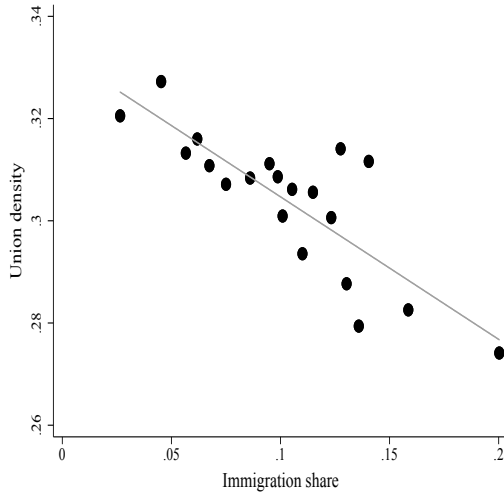
Note: The figure displays the relationship between immigrant share and union density controlling for year and trade FE. The bins represent the mean union density for 20 equal-sized bins of immigrant share (see Stepner 2013). The line is the regression line based on the underlying data.

the crux of our approach is to leverage the EU expansion and the licensing demands to compare construction workers that experienced the labour supply shock with a comparison group within the same industry that did not experience the supply shock.

We conduct two types of analyses to examine how natives were affected and reacted. In both analyses we exploit high quality individual register data with a panel dimension, collected and organized by Statistics Norway. In the first analysis we follow workers in the construction sector over time within their job-spell, while in the second analysis we follow workers who were employed in the BaC industry in 2003 (e.g. the year prior to the EU expansion) on a year-by-year basis until 2013. We describe these analyses closely in the following subsections.

The key dependent variable is a measure of union membership, gathered from the administrative data containing annual union fees. A worker is defined as union member if the fee is positive in the respective year. Additional dependent variables are employment and log hourly wage. Employment is a binary variable taking the value 1 if the individual is registered as wage earner in the administrative employment register in the respective year. Log hourly wage is constructed from information on information on total wage payments in a given job together with information on working time per week and number

of days employed. Descriptive statistics are included in the Appendix.

4.1 Exposed and protected workers

We leverage detailed information about workers' obtained level of education combined with licensing demands to identify exposed and protected workers. The key idea is to identify workers with vocational educations that are in demand in the parts of the BaC industry that are protected. We classify education levels as licensed or not based on whether workers with that education tend to be employed in the licensed part of the BaC industry. We conduct the classifications using data from 2003, i.e. the year prior to the expansion. The Appendix includes a description of how this classification is performed. From the classifications we construct the indicator variable L_i, which is equal to 1 if worker i is exposed to immigrant competition and 0 if not. Throughout, our sample is restricted to workers that have completed one of the 26 vocational tracks that dominate the BaC industry.

4.2 Follow workers within their job-spell

Our first approach is to follow workers employed in the licensed and the non-licensed group over time. We start out with a year-by-year sample of all native male workers aged 21-55 registered as employees in the BAC-industry in the period 2000-2013. We first estimate differences-in-differences (DD) models with the following structure:

$$y_{ijt} = \beta L_i * POST_t + \alpha_{ij} + \gamma_{ct} + \mu X'_{ijt} + \epsilon_{ijt} \qquad (1)$$

where y_{it} is the outcome for worker i in job j in year t. α_{ij} refers to fixed effects for job-spells, while γ_{ct} are county-year fixed effects. X'_{it} refers to a vector of time-varying individual controls that is included in some specifications. L_i is the time-invariant indicator of whether the worker is exposed to the supply shock (the treatment group), while $POST_t$ is an indicator for the years after the EU expansion. β is the DD-estimate. The inclusion of α_{ij} and γ_{ct} absorbs the constituent terms of the $L_i * POST_t$ variable. Standard errors are clustered on the 26 vocational educations we use to construct the indicator L_i.

It is important to realize that the variation that drives β in equation 1 is variation within workers' job spells. Moreover, it is evident that the spell has to cover both the pre- and post-period in order to contribute to the DD-estimate. Thus, the estimate reflects movement in y_{it} from the pre- to the post-period, and is not driven by changes in what type of workers that enter the two groups due to the immigration shock. The estimate is, however, clearly affected by changes in exit patterns, for instance if workers in the licensed area are less likely to change job or leave the labour market. Although changes in exit patterns are a type of variation we would like to capture, we worry that longer spells for the licensed group is correlated with other characteristics of the workers, such as age, seniority, and experience, which might bias β. We will therefore examine how sensitive the estimate is to this set of controls (see e.g. Foged and Peri (2016) for a similar approach). In addition, we will include interactions between L_i and an indictor for the pre-treatment years 2000-2002 to examine how sensitive the estimate is to potential deviations from the parallel trends assumption.

In an additional analysis we use a similar approach to derive an estimate of the relationship between immigration share and the outcomes. More specifically, we estimate the effect of immigrant share using the following IV-set-up:

$$y_{ijt} = \beta I\widehat{MSHA}RE_{bt} + \alpha_{ij} + \gamma_{ct} + \mu X'_{it} + \epsilon_{it} \qquad (2)$$

$I\widehat{MSHA}RE_{bt}$ is the predicted immigrant share in trade area b.[12] The predicted share is from a first stage with $PIMFLOW_{bt} = IMFLOW_t * \frac{ELIS_{b,t=2003}}{ELIS_{t=2003}}$ as the instrument, where $IMFLOW_t$ is the inflow of immigrants to the BaC industry, $ELIS_{b,t=2003}$ is the number of workers in licensed occupations in trade area b in 2003, and $ELIS_{t=2003}$ is the total number of workers in licensed occupations in 2003. That is, we construct a predicted immigrant inflow by distributing all incoming immigrants to the BaC industry as if the licensing share of each trade completely determines the allocation of the incoming immigrants. Our instrument is a variant of the widely used shift share instrument (Bartik

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[12]Ideally we want to construct a measure of predicted immigrant share for each vocational education rather than for the 16 trade areas, but because there is a non-negligible share of immigrants with missing information on level of education, we opt for a trade area share instead.

1991). To interpret β from equation 2 as the effect of immigrant share, we need a set of assumptions (Angrist, Imbens, and Rubin 1996), in particular that the only impact of the licensing demands over this period is running through immigrant share. Since this assumption might be violated, the estimate should be interpreted with caution, yet we include it to provide an estimate of the structural parameter (immigrant share) of interest.[13]

4.3 Follow workers employed in construction in 2003

The second approach is to follow all workers (aged 21-55) employed in the construction sector in 2003, i.e. the year prior to the EU expansion, on a year-by-year basis until 2013. We follow these workers irrespective of their choices after 2003, the idea being that all decisions after 2003 might be endogenous to the immigration shock. Our regression models have the following form:

$$y_{it} = \gamma_t + \delta L_i + \sum_{t=2000}^{t=2013} \beta_t L_i T_t + \epsilon_{it} \qquad (3)$$

where y_{it} is the outcome for worker i in year t, γ_t are year fixed effects, and L_i is the exposure indicator. The β_t coefficients capture, on a year-by-year basis, how workers who were in the licensing area in 2003 differs, on average, from the non-licensed workers pre- and post-2003.

The key assumption in order for this "starting line"-approach to reflect the effect of the immigration shock is that the two groups would have had a similar year-by-year trajectory absent the EU expansion. This is a strong assumption. One concern is that a different composition of the two groups with respect to background characteristics will violate this assumption, for instance if there is an age difference between the two groups. We adjust for initial differences between the two groups by re-weighting the sample so that the two groups are similar on average across a large number of variables, including lagged outcomes and interactions between the variables (Hainmueller 2012). In the Appendix we describe the approach in detail and show that the two groups are balanced when

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[13]See the appendix for a discussion of measurement error of the immigrant labour supply.

the weights are applied. In a sensitivity check we furthermore expand 3 by including individual-level fixed effects, so that we estimate the trajectories over time from variation within individuals.

While both approaches identify effects of the supply shock on exposed workers, the employment-spell approach estimates short-run effects on workers within their employment spells. These estimates are useful because they are closely related to what happens with unionization at the workplace. However, as it is tied to employment spells, the approach fails to account for total and longer term effects of the shock. Therefore, the two approaches complement each other to provide a fuller picture of the consequences of the shock.

5   Empirical Results

5.1   Follow workers within their job-spell: DD

Table 2 presents the results from the job-spell DD analysis in equation 1. Panel A presents the earnings results. The first column presents the baseline estimate, which suggests that exposed workers experience a wage development that is negative compared to the protected workers. According to our estimates, annual earnings growth are on average about 2 percent lower for those in exposed to immigrant competition. Next we allow the exposed and licensed area to have a different trend in the pre-period. Despite that the pre-trend is not significant, the DD estimate decreases to -.022. In column 3 we add the vector of controls. These controls are highly significant, yet the DD estimate barely moves. In the final column, we separate between observations early and late in the post-expansion period. More specifically, the early period is defined as 2004 to 2008, while late is defined as 2009-2013. We find that the late coefficient is five times larger than the early coefficient, thus, exposed workers that remain in their job spell experience the strongest decline in relative earnings.

Panel B shows the corresponding estimates for union membership. The results are easy to summarize: Across the models we find no significant DD estimates and the substantive size of the coefficients are very small. In the final column we find that, if anything, exposed

workers that remain in their job spell are somewhat more likely to unionize, which clearly goes against the social custom hypothesis and is more in line with theories emphasizing the importance of employment risk. However, we cannot rule out the null hypothesis of no differences between the groups.

Table 2: Fixed effects regressions.

	(1) Baseline model	(2) Add pre-trends	(3) Add age controls	(4) Two periods
Panel A: Log of hourly earnings				
$L_i * POST_t$	-.017**	-.022***	-.021***	
	(.004)	(.006)	(.006)	
$L_i * EARLY_t$				-.009*
				(.005)
$L_i * LATE_t$				-.046***
				(.010)
F added var.		0.8	139***	21***
F $L_i * EARLY_t = L_i * LATE_t$				35***
N	635,640	635,640	619,990	619,990
Spells	123,171	123,171	119,740	119,740
Y: Mean (SD)	4.88 (.5)	4.88 (.5)	4.88 (.5)	4.88 (.5)
Panel B: Union member				
$L_b * POST_t$	.002	.002	.002	
	(.007)	(.005)	(.006)	
$L_b * EARLY_t$				-.000
				(.004)
$L_b * LATE_t$				.007
				(.010)
F added var.		0.9	78***	2
F $L_e * EARLY_t = L_e * LATE_t$				1
N	635,763	635,763	620,108	620,108
Spells	123,192	123,192	119,759	119,759
Y: Mean (SD)	.43 (.5)	.43 (.5)	.43 (.5)	.43 (.5)

Note: All models include controls for job-spell and county-year fixed effects. Robust standard errors adjusted for clustering on vocational education in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

5.2 Follow workers within their job-spell: IV

Next, as described above, we derive an estimate of the impact of immigration by using the licensing demands to construct an instrument. The first row presents the OLS estimates, which show a negative correlation between immigrant share and earnings and a small positive (but insignificant) correlation for unions. We expect the earnings estimate to biased towards zero, as it is plausible that immigrants are recruited to trades with a high demand for labour. A similar reasoning leads us to expect a positive bias in the estimates on unionization.

The second stage estimates confirm our expectation with regard to the earnings equation. The immigrant share estimate decreases by 50 percent to -.78. The effect is economically important, as a 1 SD increase in immigrant share decreases earnings by .156 standard deviations. With regard to unionization, however, we find that the second stage point estimate is larger, not smaller, compared to the OLS estimate. As for the DD-analysis, this result is more in line with competition increasing the propensity to unionize, than it is with social custom theory. As above, however, the estimates for unionization are not statistically significant.

Table 3: Instrumental variable regressions.

	Earnings	Unionization
OLS		
Im. share	-.50***	.01
	(.04)	(.10)
IV		
Second stage		
Im. share	-.78***	.04
	(.20)	(.12)
First stage		
Pred. im. inflow	.05***	.05***
	(.01)	(.01)
Reduced form		
Pred. im. inflow	-.04***	.002
	(.01)	(.007)
Kleibergen-Paap F	13	
N	509,469	
Individuals	103,725	
Y: Mean (SD)	4.94 (.5)	
Im.share: Mean (SD)	.10 (.1)	
Pr. imflow: Mean (SD)	.25 (.3)	

Note: All models include controls for job-spell, county-year fixed effects, age, age-sq, seniority, seniority-sq, experience and experience-sq. Robust standard errors adjusted for clustering on vocational education in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

## 5.3 Follow workers employed in construction in 2003

The results so far suggest that despite facing immigrant competition, few of the exposed workers who stayed in their job changed their union membership status. However, the analyses so far captures only one part of the effect of immigration, because the decision to exit the job spell or the BaC industry might depend on immigration. The competition might push some workers to a worse job than the initial one, others might up-grade their skills to avoid competition, while some workers might leave the labour market. Downward movements or movements out of the labour market are likely to be associated with falling unionization, while up-grading might imply increasing unionization if they up-graded to jobs where unionization is more common.

We follow workers employed in the BaC industry in 2003 on a year-by-year basis to examine their response to the increase in immigration, as explained above. Throughout

we re-weight the sample so that the exposed and the protected groups have similar means and standard deviations on a large number of characteristics in 2003.

The results from the regression models (see equation 3) are displayed in Figure 3. The first to note is that the re-weighting of the sample using entropy balancing–which ensures that the groups are balanced in 2003–has the consequence that the groups are essentially balanced also in the years 2000-2002. Next we see that for all outcomes, there is a negative development for the unprotected compared to the protected group: Relative earnings, employment probability, and probability of union membership declines. For earnings and employment, the differences are statistically significant and amounts to about 19 (earnings) 16 (employment) percent of a standard deviation in 2013. Thus, the relative differences are economically important. For union membership, the difference in 2013 is smaller, about 8 percent of a standard deviation, and with a p-value of .14. The estimates displayed in Figure 3 are very similar if we expand equation 3 with individual fixed effects. Since the decline in union membership is smaller than the decline in employment, the development among the unprotected who remain employed has to be positive. The strong dependence of union membership on whether you exit or remain in the labour market probably explains the increasing uncertainty in the unionization trends over time that we see in the figure. In any case, the results are in line with those above. We have also examined whether outcome trajectories are different depending on initial union membership status, however, that does not seem to be the case.

Figure 3: Year-by-year development in the gap between protected and unprotected workers.

a) Earnings   b) Employment   c) Union membership
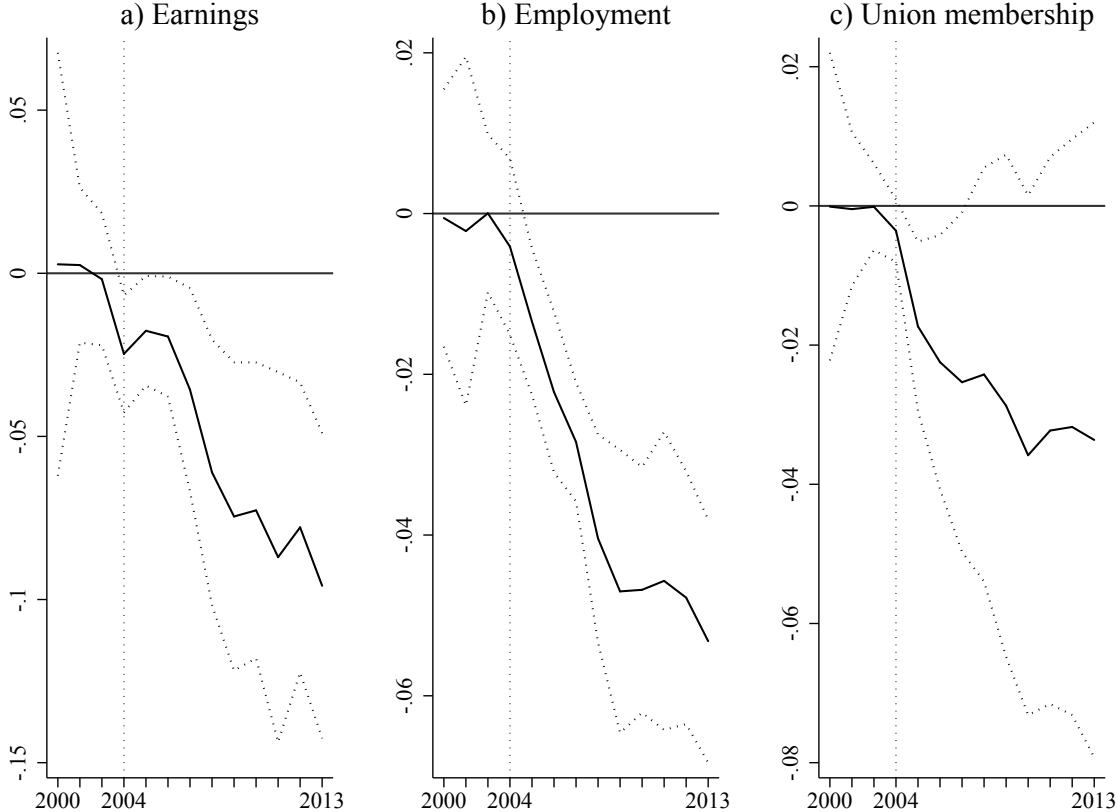
Note: The figures plot the interaction terms between year and L_e (β_t) and the associated standard errors from the regression models in equation 3. All the year estimates are relative to 2003, for which the protected and unprotected group are balanced using entropy balancing weights (Hainmueller 2012). The stippled vertical line indicates the year of the EU expansion.

Table 4: OLS regressions. Cumulative effects.

	(1) Earnings	(2) Emp	(3) Union
Panel A: Not protected			
Not protected	-3.300***	-0.348***	-0.262
	(0.639)	(0.044)	(0.569)
Constant	125.122***	9.124***	4.089***
	(0.469)	(0.030)	(0.535)
Y mean (st.d)	124 (19)	9 (2)	4 (4)
Observations	42,982	42,982	42,982
Panel B: Immigrant share			
Δ imshare	-0.246***	-0.025***	-0.100***
	(0.036)	(0.004)	(0.017)
Constant	123.361***	8.939***	3.914***
	(0.292)	(0.024)	(0.301)
Y mean (st.d)	124 (19)	9 (2)	4 (4)
X mean (st.d)	13(8)	13 (8)	13(8)
Observations	42,982	42,982	42,982
Panel C: 2SLS, second stage			
Δ imshare	-0.341***	-0.036***	-0.027
	(0.025)	(0.004)	(0.056)
Constant	123.319***	8.934***	3.946***
	(0.119)	(0.020)	(0.252)
Y mean (st.d)	124 (19)	9 (2)	4 (4)
X mean (st.d)	13(8)	13 (8)	13(8)
F first stage	34	34	34
Observations	42,982	42,982	42,982

Note: Robust standard errors adjusted for clustering on vocational education in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Finally we study the cumulative outcomes over the years 2003-2013. That is, we measure the cumulative yearly earnings, total years of employment, and total years of union membership. We regress these outcomes on i) the dummy for BaC employment with a non-protected education in 2003 (Table 4 Panel A) and ii) on the change in immigration share in the trade of employment in 2003 (Panel B). We center the change in immigra-

tion share on its mean so that the constant in panel B refers to the mean outcomes for those with a mean immigration shock. Like before, this approach produces statistically and economically significant effects on earnings and employment. And again we find a negative and insignificant effect on union membership when we compare protected and non protected workers. In Panel B, however, we find those who were employed in trades who experienced larger increases in immigrant share have fewer total years of union membership over this period. A one standard deviation increase in immigration amounts to a decline of about .8 year units, i.e. about 10 months of union membership. This decline is larger than for employment. When we instrument the immigration shock using the licensing demands (Panel C), we find, however, no effect of immigration.

6   Preliminary concluding remarks

Our results are easy to summarize. We find that the increase in labour supply due to the EU expansion had negative effects on the earnings and employment prospects of those workers facing the increase in competition. We find no evidence that the increase in immigrant labour had important effects on natives' tendency to unionize, except for the mechanic decline caused by workers who leave the labour market.

Our results are surprising in light of social custom theory. The exposed workers experienced a rapid increase in immigration into their labour market. These immigrants are less likely to unionize, implying that the native workers experienced a decline in the share of organized co-workers. Moreover, these co-workers increased the religious and linguistic diversity in these labour markets, which potentially makes collective action (such as organizing the work force) more difficult.

We believe that proponents of social custom theory need to take our results seriously. The existing literature tend to rely on cross-sectional regression analyses of samples of workers, while we have population-wide panel data and rely on quasi-experimental variation in the share of organized co-workers. Our design is better able to reduce the risk of conflating the impact of organized co-workers with correlated characteristics of firms or industries, which is a serious concern in most of the existing research.

Our results do not suggest that labour immigration is an important threat to the organization of the labour market. Despite a very large supply shock with observable consequences for those facing the shock, we find no tendency that natives facing this competition leave unions. This does not mean that labour immigration constitutes no threat to unions, after all, we have seen that immigrants are less likely to join unions. However, natives' union membership behaviour are fairly resilient to the disorganization of immigrants, implying that the main task for unions is to organize the newcomers. As Cools et al. (2018) show, immigrants' unionization tend to catch-up with natives' after some years, which is good news for concerned voices.

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Appendix

Wage negotiations in the BaC industry

Trade unions in Norway are generally so called "open shop" unions, implying that wage agreements cover all employees at the firm, conditional on the firm is covered by a tariff agreement, irrespective of union member status.

The main form of wage agreement in the BAC-industry is settlement between federations ("Forbundsvise oppgjør"). These are negations between the main employers' and employees' organizations in the BAC-industry ("Byggnæringens landsforbund" and "Fellesforbundet"). Negotiations and settlements take place every year, but the main settlement is bi-annual. It is only in the main settlement years that the negations are on the level of federations, otherwise there are central negations. Only BaC-firms that have a tariff-agreement are covered by the agreement. According to survey information in 2012, approximately 70 per cent of the BaC-industry firms were covered by a tariff agreement (WLC 2012). Agreements between the federations are followed by local negations.

In 2005, The General Application Act was introduced for the BAC-industry. The purpose of the Act was to ensure foreign employees' the terms of wages and employment which are equivalent to those of Norwegian employees, and to prevent social dumping. The Act was first introduced in the five counties Oslo, Akershus, Østfold, Buskerud, and Vestfold. Then, Hordaland followed in 2006, before the whole country was covered in 2007.

Descriptive statistics

Table A1: Descriptive statistics.

	Obs.	Mean	St.dev.
Follow workers within their job-spell			
L_i	619,990	.56	.49
Union member	619,990	.42	.49
Log hourly earnings	619,990	4.88	.49
Age	619,990	36.39	9.48
Seniority	619,990	5.96	5.77
Experience	619,990	17.38	9.48
immigrant share	619,990	.09	.07
Predicted inflow	619,990	.21	.28
Follow workers employed in construction in 2003			
L_i	551,602	.55	.49
Union member	551,602	.46	.49
Log hourly earnings	551,602	4.87	.50
Employed	551,602	.91	21
Cumulative outcomes			
L_i	42,982	.56	.49
Union member	42,982	4.35	4.38
Log annual earnings	42,982	123	19.19
Employed	42,982	8.96	2.07
Δ imshare	42,982	-.00	7.84

The construction of L_i

The definition of treatment and control groups is based on two sources of data. First, the Norwegian educational register which on a yearly basis records the highest completed level of education of all individuals in Norway. The education code is a six digit code from the Norwegian Standard of Educational Classification (NUS). Second, The Norwegian Occupational Regulations Database (NORD) which registers the prevalence of occupational licensure and certifications (Alecu and Drange 2016). In this database "An occupation is classified as licensed if the right to practise is regulated by the authorities by law or by regulations of the law." (Bol and Drange 2017:139). Occupations are characterized according to the seven digit code of the Norwegian standard of occupational classification (STYRK). The regulations determine the educational demands which must be fulfilled to practice within an occupation.

Our starting sample when constructing L_i consists of all employees with a completed vocational education (skilled workers) that worked in the Norwegian building and construction sector in 2003. We first use the NUS six-digit code to classify education categories into 29 educational groups that are similar with regard to their educational skills and the professional tasks they are supposed to manage. Next, we exploit that each employed individual in our database is characterized by the STYRK code of their occupation as well as the NUS code of their education to calculate the share of workers within the 29 groups who is employed in a licenced occupation. Then, the 29 educations are classified as protected or not protected by licensing according to the following rule: If the share of workers in licensed occupations is higher–within the educational group–than the overall mean share, plus half its standard deviation, then the group is protected. In the opposite case it is not protected. Thus, the treatment group is defined as skilled workers in the BaC sector in 2003 who–according to their vocational education–are not protected by licensing in their labour market. Correspondingly, the control group is defined as all skilled workers in the BaC sector in 2003 who are protected by licensing in their labour market.

Entropy balancing of L_i

We conduct entropy balancing on union membership 2000-2003, log hourly earnings 2000-2003, log annual earnings 2000-2003, age, marriage, seniority, region of residence, and all possible interactions between these variables (except the lagged outcomes). We aimed for balance on two moments; means and variance. Table A2 shows the means in the treated ($L_i = 1$) and the control ($L_i = 0$) group before entropy balancing and the means in the control group after the construction of weights. Next the table shows the standardized difference between the groups before and after balancing. As evident, the sample is balanced on the means across all these variables when weights are applied. The reweighting also achieves very good balance on the variances, results which are not included here.

Figure A1 shows the distribution of the entropy balancing weights (N=43,603 mean=1.12 , median=1 , SD=.51 , min=.00 , max=12.42). The number of large weights is small. We experimented with pruning of these large weights following Hainmueller's advice (2012:), and found that conclusions are very robust to doing so.

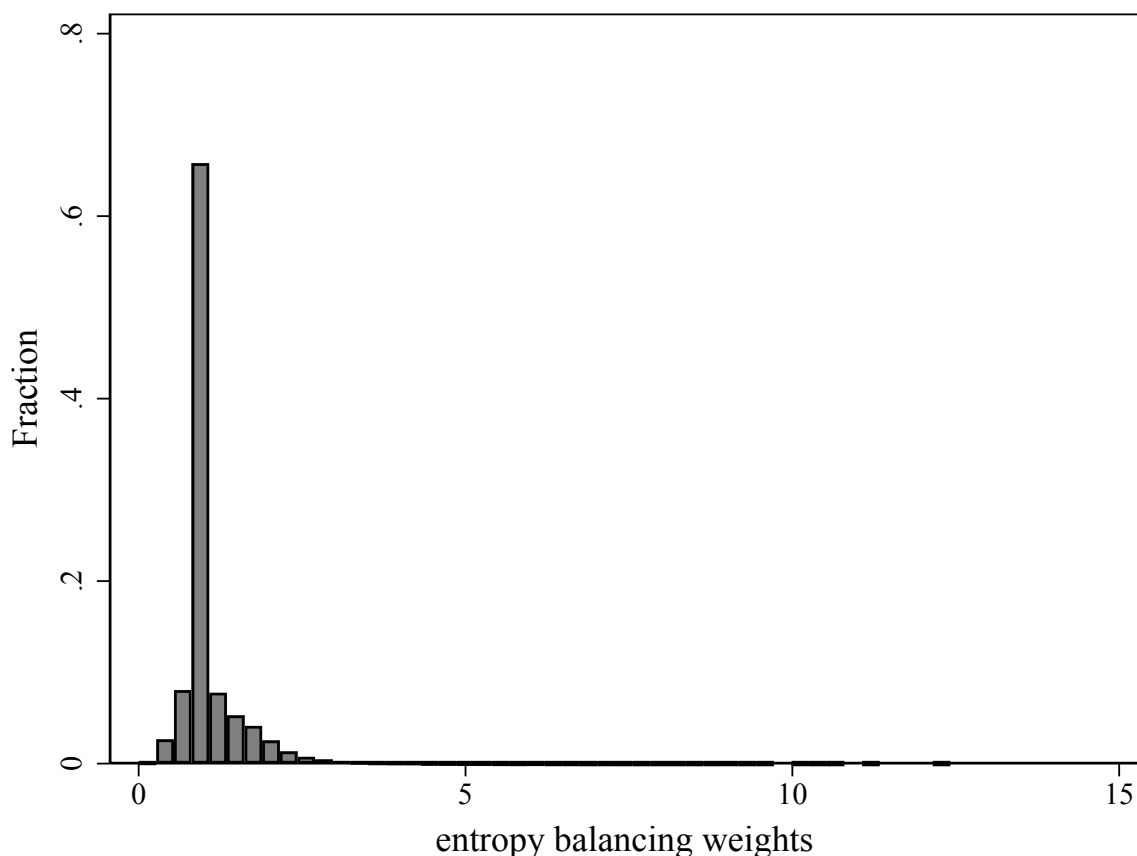Figure A1: Histogram of entropy balancing weights.

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Table A2: Balance pre and post entropy balancing.

	mean treated	mean control pre	mean control post	standardized difference pre	standardized difference post
Union member	0.40	0.54	0.40	-0.29	0.00
Union member 2000	0.41	0.53	0.41	-0.26	-0.00
Union member 2001	0.40	0.54	0.40	-0.28	-0.00
Union member 2002	0.40	0.54	0.40	-0.28	-0.00
Log hourly earnings	4.66	4.72	4.66	-0.11	0.00
Log hourly earnings 2000	3.98	3.93	3.98	0.04	0.00
Log hourly earnings 2001	4.12	4.37	4.12	-0.17	0.00
Log hourly earnings 2002	4.38	4.52	4.38	-0.12	0.00
Log annual earnings	12.64	12.69	12.64	-0.12	0.00
Log annual earnings 2000	12.08	12.33	12.08	-0.13	0.00
Log annual earnings 2001	12.26	12.48	12.26	-0.13	0.00
Log annual earnings 2002	12.46	12.61	12.46	-0.11	0.00
Age	35.79	36.03	35.79	-0.03	-0.00
Married	0.41	0.42	0.41	-0.01	-0.00
Seniority	4.87	5.42	4.87	-0.11	-0.00
Region 2	0.46	0.48	0.46	-0.05	-0.00
Region 3	1.89	2.58	1.89	-0.29	0.00
Region 4	167.55	170.37	167.54	-0.06	0.00
Region 5	22.97	25.80	22.97	-0.11	0.00
h. earningsXunion	1.94	1.98	1.94	-0.02	0.00
h. earningsXage	0.50	0.45	0.50	0.04	0.00
h. earningsXseniority	1.31	1.23	1.31	0.04	0.00
h. earningsXmarried	2.13	2.27	2.13	-0.06	0.00
h. earningsXRegion 2	0.30	0.30	0.30	0.00	0.00
h. earningsXRegion 3	5.11	6.92	5.11	-0.29	0.00
h. earningsXRegion 4	453.08	457.65	453.06	-0.04	0.00
h. earningsXRegion 5	61.88	69.02	61.88	-0.11	0.00
a. earningsXunion	5.22	5.29	5.22	-0.01	-0.00
a. earningsXage	1.37	1.20	1.36	0.04	0.00
a. earningsXseniority	3.53	3.30	3.53	0.04	0.00
a. earningsXmarried	5.76	6.08	5.76	-0.05	-0.00
a. earningsXRegion 2	0.82	0.80	0.82	0.01	0.00
a. earningsXRegion 3	15.00	20.26	15.00	-0.27	0.00
a. earningsXRegion 4	1.96	2.86	1.96	-0.22	-0.00
a. earningsXRegion 5	0.17	0.24	0.17	-0.18	0.00
unionXage	0.05	0.06	0.05	-0.04	0.00
unionXseniority	0.10	0.12	0.10	-0.07	-0.00
unionXmarried	0.18	0.26	0.18	-0.20	0.00
unionXRegion 2	0.02	0.03	0.02	-0.10	-0.00
unionXRegion 3	190.17	210.72	190.19	-0.09	-0.00
unionXRegion 4	16.87	17.21	16.87	-0.02	-0.00
unionXRegion 5	3.81	3.49	3.81	0.03	0.00
ageXseniority	10.00	9.22	9.99	0.05	0.00
ageXmarried	16.33	17.25	16.33	-0.05	-0.00
ageXregion 2	2.23	2.27	2.23	-0.00	0.00
ageXregion 3	2.52	2.74	2.52	-0.05	-0.00
ageXregion 4	0.56	0.61	0.56	-0.02	0.00
ageXregion 5	1.48	1.49	1.48	-0.00	0.00
seniorityXmarried	2.11	2.53	2.11	-0.10	-0.00
seniorityXregion 2	0.33	0.30	0.33	0.01	0.00
seniorityXregion 3	0.04	0.04	0.04	0.01	0.00
seniorityXregion 4	0.13	0.12	0.13	0.03	0.00
seniorityXregion 5	0.18	0.19	0.18	-0.03	-0.00
marriedXregion 2	0.03	0.03	0.03	-0.01	0.00
marriedXregion 3	0.11	0.09	0.11	0.04	0.00
marriedXregion 4	0.28	0.26	0.28	0.04	0.00
marriedXregion 5	0.07	0.06	0.07	0.01	0.00

Measurement error in immigrant labour supply

Our measure of the immigrant labour supply may contain measurement errors for several reasons. First, a non-negligible portion of immigrant labour in recent years has been employed through temporary work agencies (TWAs). Many of these immigrants work in the BaC industry, although they are registered as workers in the TWA industry. In a recent report, Nergaard (2017) estimate that the share TWA workers in the BAC-industry is between 5 and 10 per cent. Second, after the EU expansion in 2004, a relatively large share of the immigrants in the BaC industry were hired by foreign contractors. That is, they worked in the Norwegian BaC industry, but they were employed by foreign firms (Dølvik and Eldring, 2008). As a consequence, they are not registered in the Norwegian employment registers.[14] Third, immigrants in the BaC industry, may work "off the books" to a different extent than native employees do. In a survey of Polish BaC workers in 2010, 26 percent reported that they did not pay taxes (Eldring and Friberg, 2011).

All three possible sources of measurement error will most likely lead to an underestimation of the share of immigrants in the BaC industry. Most directly it will affect the IV-analyses. If registered and unregistered immigrants in the BaC are positively correlated, and if they both have the same effect on unionisation, this will lead us to overstate the effect of immigration on unionisation. Hanson (2006) discusses the distinction between legal and illegal immigration in a US setting, and argues that because the omitted variable in this case is immigrant-related, one could, instead of classifying it as a form of measurement error, argue that the estimated effect is the total effect of immigration (both legal and illegal). Note that in the DD-analyses, the measurement problems will to large extent be reduced, since identification is not based on direct measurement of labour supply of immigrants in the BAC-industry.

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[14]From 2006 to 2011 it was 16.000-23.000 registered individuals each year, coming through a foreign contractor. http://www.arbeidslivet.no/Arbeid1/Arbeidsinnvandring/ Mange-norske-bedrifter-bruker-osteuropeisk-arbeidskraft/