

# Do unions care about low-paid workers?

Evidence from Norway<sup>\*</sup>

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## Abstract

One of the core objectives of unions is to raise the wages of the lowest paid. Utilizing a panel of individual matched employee-employer data covering the Norwegian private sector in the period 2000-2014, I investigate how workplace union density is related to individual low-pay risk. By exploiting changes in tax deductions for union members in Norway as a source of exogenous variation, a negative effect of increased union density on low-pay risk is identified within jobs. The results further suggest that the effect of local bargaining power on individual low-pay probability was larger among immigrants than among natives.

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# 1. Introduction

*“Upgrading pay for the lowest paid groups in the trade must be an objective.”* (Riksvtalen 2022, p. 8).

The citation above is retrieved from one of the largest collective agreements within the hospitality sector in Norway and represents a core mission statement internalized by many Norwegian trade unions. Throughout their existence, unions have been known for opposing inequality, and perhaps mainly through raising the wages of those at the bottom of the wage distribution.

In many countries, a growing share of low paid employees is an important driver of increasing inequality. The extent to which the low pay segment has expanded over time, however, varies substantially across the most advanced economies (McKnight et al. 2016). These developments have shed new light on factors both contributing to and counteracting the prevalence of low pay. While megatrends such as skill-biased technological change, globalization and immigration have been shown to explain several dimensions of increases in inequality,<sup>1</sup> they explain less of why the development in inequality has evolved at different speed across countries. To gain more insight into these differences, attention has been turned to institutional factors, and in particular to the dimensions of the institutional framework that are distinctive to specific countries (Doucouliagos 2017). There are large variations in both regulatory frameworks and the strength of collective institutions across countries, with correspondingly different implications for labor market outcomes.

In Norway, wage bargaining is coordinated at the central level, but industry-wide negotiations are usually supplemented by local negotiations at the establishment level. This aspect of the bargaining system implies that the final wage outcome is likely to depend on the local bargaining strength of the union, as well as the objectives it brings to the negotiations. Unions in Norway, and those affiliated with the Norwegian Confederation of Trade Unions (LO) in particular, are known for their explicit agenda to raise the wages of the lowest paid. At the central level, these policies are reflected in the demands and priorities in the industry-wide negotiations. It is less clear how unions use their bargaining strength to achieve their goals at workplace level.

The time period the data cover is characterized by a huge increase of immigration to Norway. Following the EU enlargements in 2004 and 2007, Norway emerged as one of the countries in Western Europe with the highest relative rates of immigrants from new EU member states in Central and Eastern Europe (Friberg 2016b). The inflow of new migrants represented a massive shock to parts of the Norwegian labor market. The supply shock quickly exerted downward pressure on wages (Bratsberg & Raaum 2012), and the term ‘social dumping’<sup>2</sup> was frequently used in the public debate. Given the vulnerable position of many immigrants in low-wage occupations, the gain from having a

union in the workplace, in terms of reduced low-pay risk, may have been more pronounced among immigrants than among natives.

Utilizing a high-quality matched employer-employee dataset covering the entire Norwegian private sector in the period 2000 to 2014, this study raises two questions. First, I ask whether local bargaining power, as measured by workplace level union density, has an effect on the individual's probability of being low paid. As such, the study explicitly tests a stated ambition among Norwegian trade unions to raise the wages of those at the bottom of the wage distribution at establishment level. By exploiting exogenous variation in public subsidization of union membership in a 2SLS regression, the estimated effect may be given a causal interpretation. Second, I investigate whether the potential reduction of low-pay probability attributable to the bargaining power of the union is heterogeneous among immigrants and natives, respectively. Possible heterogeneity may provide policymakers with valuable knowledge about how institutions in the labor market handle immigration and the consequences at workplace level.

The focus in the study is on the reduction of low-pay risk. The analysis will thus not reveal whether the potential effect of union bargaining strength is a result of a broad wage improvement benefiting all workers in the workplace, or if it is due to a wage compression strategy. However, the findings of the study will shed light on the role of local union density in elevating workers from below the low-wage threshold, an important aspect in understanding the dynamics of wage inequality.

The remainder of the paper is organized as follows: Section 2 reviews related literature on how unions alter labor market outcomes in terms of wages and low pay. Section 3 is a description of the Norwegian wage bargaining system, union wage policies and the implications for the extent of low pay. In Section 4, I describe the data, define low pay as the term is used in the study, and present some descriptive statistics. In Section 5, I outline the empirical methodology and discuss identification, while Section 6 documents the results. Section 7 provides a discussion and some concluding remarks.

## 2. Related Literature

*What unions do* has been the subject of extensive research for decades. The review by Freeman & Medoff (1984) acts as the leading reference in the literature, drawing a map of the core functions of unions from both a theoretical and an empirical perspective. On the one hand, unions negotiate with employers over various aspects of the employment contract, and thus use their bargaining power to pursue their goals at the given bargaining level (i.e., workplace, industry, nationally). The effectiveness of these negotiations is influenced by several factors, including the relative bargaining power of the parties, potential conflict outcomes, and worker support for the union (Oswald 1985). On the other hand, unions represent a political force through their role as large collective organizations

and may be able to gain benefits not as easily achieved through bargaining, through the political process.

Unions thus play a multifaceted role in the labor market, extending far beyond wage bargaining. They serve as a voice for workers, advocating for improved working conditions, job security, and fair treatment in the workplace (Freeman & Medoff 1984). Unions also play a crucial role in providing legal representation for workers, offering support in cases of disputes with employers (Budd 2004). Furthermore, they engage in political lobbying, influencing labor market policies and regulations at the national level (Hirsch 2008). Unions also contribute to skill development and training of workers, enhancing their employability and career progression (Bryson 2004).

Although the objectives of unions vary across countries and environments, a common goal seems to be some form of wage standardization, which often translates into a wage-compressing effect in their environments. Specifically, union wage policies are often guided by ‘a fair day’s pay for a fair day’s work,’ implying that wages are attached to jobs rather than to individuals’ attributes (Bryson 2014). The empirical literature has contributed to our understanding of this objective by establishing a relationship between norms, values, and attitudes on the one hand, and union membership on the other hand. Across OECD countries, union membership is shown to be associated with support for redistribution (see, e.g., Finseraas 2009; Checchi et al. 2010). In a sample of twenty-one European countries over the period 2002–14, Mosiman & Pontusson (2017) showed that union membership is associated with support for redistribution among low-wage workers and even more so among high-wage workers.

Parallel to this exploration of union objectives, a large strand of empirical literature has established a relationship between unions and labor market institutions, and the wage structure, i.e., on wage differentials across industries, firms, skills, gender, age, migratory background etc.<sup>3</sup> Research from the US has shown that de-unionization has been an important factor in explaining the rise in wage inequality, mainly through the diverging impact on wages in the lower and middle part of the wage distribution (Card 1996, 2001; DiNardo & Lemieux 1996; Firpo et al. 2009; Farber et al. 2021). Card et al. (2004) showed that union wages tended to be compressed relative to nonunion wages in both United States, the United Kingdom and Canada, but that the equalizing effect of unions on wages varied depending on factors such as skill level and sector. Studies using data for OECD countries suggest that unions compress wage differentials across countries and over time (Rueda & Pontusson 2000; Pontusson 2013; Vlandas 2018). The presence of unions and collective agreements is also shown to be associated with reduced low-pay risk within countries, even for non-union members (see Benassi & Vlandas 2021 for Germany, Jordfald et al. 2021 for Norway, Schmitt 2008 for the US).

Most studies on the equalizing impact of unions on wages focus on aggregate levels, such as within countries, sectors, or industries. Less attention has been directed towards how union strength within

the workplace affects individual wage levels in different groups of wage earners. Studies from Norway focused on detecting average union wage premiums find little or no wage advantage associated with individual union membership, but detect substantial wage rises in workplaces with a higher union density (Barth et al. 2000; Balsvik & Sæthre 2014; Bryson et al. 2020). Analyzing intra-establishment wage inequality, Svarstad & Nymoen (2022) show that increases in workplace level union density can contribute to a more compressed wage structure in successive years in a sample of private sector workplaces over a 19-year period. The relationship was especially pronounced in the lowest part of the wage distribution. These results indicate that we should expect unions to have an impact on low-pay risk at local level.

The second question this study addresses pertains to the potential differential impact of workplace-level union strength on the risk of low pay for immigrants versus natives. This question is of significant relevance, given the surge in labor migration to Norway following the EU enlargements in 2004 and 2007. These immigrants, originating from countries with substantially lower wage levels compared to Norway, provided an affordable labor force for employers in industries grappling with labor shortages. Consequently, despite the highly regulated Norwegian labor market, these labor immigrants may have found themselves in a precarious position. Previous research has also demonstrated that immigrant employment in Norway is particularly vulnerable to fluctuations in the business cycle (Bratsberg et al. 2010).

Research on immigrants in the labor market is largely focused on the effects of immigration on wages, the human capital provided by immigrants and their assimilation into society. Peri & Sparber (2009) found that large inflows of less educated immigrants to the United States led to a shift in skill supply among less educated native-born workers, influencing their task specialization and wages. This dynamic also seems to have been at play in Norway, where Bratsberg & Raaum (2012) show that that occupational categories with higher inflows of immigrants experienced significantly weaker wage growth. Dustmann et al. (2009) found that changes in workforce composition, particularly in terms of education levels and age, could explain a significant portion of wage inequality in Germany, but not all. This suggests that while the inflow of less educated immigrants may have influenced wage structures, other factors also played a significant role. Interestingly, Ottaviano & Peri (2012) found that while the negative wage impact of immigration on natives was small, immigrants already in the United States suffered much larger wage losses due to inflows of new immigrants. In a similar vein, Rosso (2019) found that the probability to emigrate decreased with residual wages for Polish emigrants to the UK, consistent with the evidence of higher residual inequality in Poland than in the UK. This suggests that immigrants with lower residual wages, who are likely to be concentrated in low-wage occupations, may be more inclined to emigrate in search of better opportunities.

Less attention has been devoted to the part played by unions in altering wage responses to immigration, in particular at workplace level. It is not self-evident how unions view and react to immigration. They may oppose it because it poses a threat to the native labor force. The influx of labor into the labor market may undermine union power, since the majority of migrants are non-unionized (Avci & McDonald 2000). However, once the migrants have been admitted, unions have a strong interest in policies concerning their rights, to prevent immigration from causing a deterioration in wages or working conditions (Menz 2010; Boräng et al. 2020). In Norway, LO initially endorsed transitional arrangements that imposed restrictions on access to the labor market for individual jobseekers from the new EU member states but made it clear that they welcomed migrants provided that they worked under the same conditions as natives (Hardy et al. 2012).

Studies examining the impact of unions on immigrant wages have yielded mixed results. In a study of 18 countries, including Norway, Boräng et al. (2020) show that since the 1980s, countries with strong unions have extended more social and economic rights to migrants relative to those extended to citizens, than countries with weak unions. In the US, Schmitt (2010) finds that immigrants that are union members earn significantly more than non-union members and are more likely to have a retirement plan. For Ireland, Turner et al. (2014) report that unionized Irish nationals are more likely to earn more than the median hourly wage than unionized immigrants, implying that unionized nationals enjoy greater benefits from membership than unionized immigrant workers. However, unionized immigrants were found to be almost twice as likely as non-unionized immigrants to earn above the median hourly pay. Finseraas et al. (2020) showed that the increase in labor supply in Norway due to the EU enlargement had negative effects on the earnings and employment prospects of native workers facing tougher labor market competition, but no evidence that the increase in immigrant labor had any effects on natives' tendency to unionize. They do not, however, consider immigrant wages. In general, immigrants in Norway have a lower tendency to unionize than natives (Nergaard & Ødegård 2022). Although this may be partly due to attitudes or cultural differences, Cools et al. (2020) show that immigrants in Norway are subject to sorting in the labor market, because they tend to be employed in firms and industries with lower levels of unionization.

This study aims to contribute to the literature by examining the impact of union strength at the workplace level on the risk of low pay for different groups of wage earners, with a particular focus on immigrants versus natives. It also seeks to shed light on the role of unions in shaping wage responses to immigration, a topic that has received less attention in the literature.

### 3. Institutional Context: Unions, Wage Bargaining and Low Pay in Norway

The relationship between different dimensions of union presence and labor market outcomes varies across institutional contexts. It is therefore essential to discuss the implications of union presence in the context of how the labor market is organized in a particular country, sector or industry. Norway is one of the few countries in the OECD without a national legal minimum wage. Wages and other working conditions are instead negotiated between the social partners at industry level. Bargaining takes place at both industry and establishment level, although central coordination plays an important role in ensuring sound macroeconomic outcomes. In an international context, Norway, as well as the other Nordic countries, has a compressed wage distribution and a high minimum wage rate (Eurostat 2016).

Coordination is a key feature of Norwegian wage formation, at both central and local level. Pattern wage bargaining through the so-called ‘front-runner model’ is one of the main coordinating institutions in the Norwegian labor market. The premise of the model is that ‘*wage growth must be adjusted to a level which over time is capable of sustaining the competitiveness of import and export competing industries*’ (Nymoen 2017, p. 13). In practice, this is done by letting the exposed industries bargain first and establish a wage norm based on what is considered a sustainable wage level relative to competing countries. By setting the premise for wage development in the rest of the economy, the norm ensures that wages in the sheltered industries neither exceed nor lag behind the industries competing internationally. The front-runner model has been an essential contribution to keeping wage inequality low across different parts of the labor market. It ensures that the groups that possess the lowest bargaining power (the lowest paid) benefit the most, as they receive the wage growth obtained by groups with greater market power.

Collective agreements also play a pivotal role in the prevention of low pay, by introducing binding industry-specific minimum wage rates. In order for these wage floors to ‘bite’, a certain level of coverage is necessary, as only establishments that are bound by collective agreements are obliged to adhere to wage rates and adjustments. Collective agreement coverage in the private sector is approximately 52 per cent (Nergaard 2022), although the effect of collective agreements in Norway has been strengthened through a system of general application (Eldring & Alsos 2012). The unionization rate in the Norwegian private sector is around 38 percent but it varies a great deal across industries, ranging from just over 70 per cent in electricity, gas, steam, and air-conditioning supply to under 20 percent in accommodation and food service activities (Nergaard 2022).<sup>4</sup> The corresponding organization rate among employers is 73 percent.

As noted, the wage bargaining system in Norway is ‘two-tiered’: the central negotiations are usually supplemented by local wage negotiations conducted at establishment level. How wage growth is

distributed centrally and locally varies across industries. In parts of the private sector, as much as 60 percent of the annual wage growth among blue-collar workers is negotiated at workplace level (NOU 2013:13). Most blue-collar workers in the private sector are covered by so-called minimum wage agreements. These agreements establish an absolute wage floor, which the employer cannot deviate from. Furthermore, the agreements stipulate the negotiation of increments in addition to the minimum wage rates, often based on criteria related to productivity and the financial situation of the establishment (Stokke 2012; Alsos & Nergaard 2021). The final wage outcome thus depends on the result of local wage negotiations between employer and union at each workplace. The local negotiations are not subject to sanctions such as strike or lockout, although some agreements contain provisions allowing unionized workers to lower their productivity during the negotiations to put pressure on their employers. As noted by Moene et al. (1993), peace clauses do not mean that the employees are powerless: 'Workers may engage in work-to-rule actions where they follow work instructions in a pedantic way, decline to work overtime, and generally refuse to co-operate with the firm' (p. 102).

At central level, Norwegian unions commonly include income guarantee provisions in collective agreements, ensuring that wage increments benefit workers in low-wage industries. This is done by demanding nominal rather than percentage increases, and making sure agreements without local wage formation and industries with low average wages receive a higher increase than others (Alsos & Nergaard 2022). However, the values and norms underlying the union wage policies are likely to have an impact on their priorities at every level where bargaining occurs. LO and its affiliated unions have long traditions of promoting equality and fairness by working against low pay. For example, many unions provide guidance in the form of written directions on how to conduct local negotiations for the employee elected representatives.<sup>5</sup>

## 4. Data and descriptive statistics

### 4.1 Data

The primary data sources used in this study are the Norwegian Employer-Employee Register (AA register) and the Register of End of the Year Certificate (LTO register) for the years 2000-2014. The AA register is a basic data register of employment in Norway and contains all jobs in the Norwegian labor market that have more than four contracted hours per week and that last for at least one week. It contains detailed information about establishments<sup>6</sup> and employees. Because employers are legally obligated to report all changes in the stock of employees, the coverage is close to complete.

Information about earnings is collected from the LTO register. Educational statistics are attached, as well as occupation, country of origin, gender, year of birth and several establishment characteristics. Variables such as industry and sector are obtained from the Register of Legal Entities and Statistics Norway's Business and Enterprise Register (VoF). Personal attributes are obtained from the Central



Population Register (DSF). Each individual, workplace and firm has its own unique identifying number, thus allowing the units to be tracked over time.

The dataset is constructed as an individual-year-panel. In cases where an employee has jobs in more than one establishment a specific year, the job with the highest number of days in the calendar year is kept as the most representative job. The sample is restricted to employees in the private sector, working at least 20 hours each week. The restriction is imposed to ensure a certain level of attachment to the labor market, as well as a wage measure less sensitive to measurement errors. Because union density is the preferred indicator of union bargaining strength, most estimations are conducted on a sample of workplaces with at least ten employees. The final sample consists of 2,017,393 individuals within 61,152 establishments, encompassing 3,357,995 unique job spells. The total number of observations in the dataset amounts to 11,830,262.

Earnings is measured as total payments, including base salary, bonus payment, and overtime payments.<sup>7</sup> The hourly wage is constructed from the tax data based on job-specific annual earnings, job spell duration and contracted weekly working hours.

Individual union membership is obtained from data on union membership fees, which are reported to the tax authorities by the unions. Union density is calculated as the yearly leave out mean of workers members of a union within an establishment. Whether an establishment participates in a collective agreement or not is obtained from membership data from the private sector collectively agreed pension scheme ('Fellesordningen for AFP'), whereby all workplaces that are members are also parties to a collective agreement.

#### 4.2 Definition of Low Pay

There is no generally accepted limit for what qualifies as low paid work across countries. There seems to be agreement that low wages should be defined as wages below a threshold designating a socially acceptable remuneration, but it remains difficult to determine what 'socially acceptable' translates into. These difficulties have led researchers to adopt different thresholds, expressed as a proportion of the median or average wage of all workers. Such relative measures have the advantage that they are easy to compare across countries. A relative measure also captures "*a sense of the degree of social and economic inclusion among a country's workforce that is sensitive to societal notions of relative deprivation or relative disadvantage*" (Grimshaw 2011, p. 4). The OECD defines low pay as less than two-thirds of median earnings, and this definition seems to have gained acceptance in research and statistics.

The low pay definition should, however, be adjusted to the purpose of the analysis. The low pay threshold used in this study is relative in nature, but highly country specific. In the following, low pay will refer to an hourly wage level of less than 85 percent of the mean for manufacturing workers. The manufacturing worker is an important point of reference in the Norwegian context, as a representative

of the exposed sector in the front-runner model. Furthermore, the wage level of the manufacturing worker is located close to the middle (median) of the Norwegian wage distribution, making it a convenient measure for monitoring the extent to which the wage distribution remains compressed over time. The definition is applied by the Technical Reporting Committee on Income Settlements (Teknisk Beregningsutvalg, TBU),<sup>8</sup> and is a frequently used point of reference for the income guarantee provisions in collective agreements. 85 percent of the mean annual wage of manufacturing workers amounted to NOK 445 740 (approximately USD 43 950) in 2021 (NOU 2022:4), which is higher than most other definitions of low pay. The rationale behind the choice of definition constitutes the purpose of this study. In order to examine whether the local bargaining power of unions affects the individual propensity to be low paid, the threshold applied should reflect what the unions themselves define as low pay. I will, however, report selected results based on the more conventional two-thirds of median wage-threshold as well, to ensure that the results are robust.

### 4.3 Sample Statistics

Table 1 reports the annual low-pay limits according to the definition of less than 85 per cent of the mean wage of manufacturing workers, as well as the share of workers paid below the threshold in the estimation sample.<sup>9</sup>

Table 1 Annual/hourly low-pay thresholds (nominal) and share of low paid employees. Natives and immigrants. 2000-2014. Private sector fulltime employees in workplaces with more than 9 employees. N=11 830 262.

Year	Low-pay limit, annual wage* (NOK)	Low-pay limit, hourly wage (NOK)	Share below low-pay limit (percent)	Natives below low-pay limit (percent)	Immigrants below low-pay limit (percent)
2000	215 800	111	21	20	31
2001	226 400	116	20	19	31
2002	237 700	122	20	19	31
2003	246 600	126	20	19	30
2004	252 600	130	19	18	30
2005	260 600	134	18	17	28
2006	270 100	139	17	16	27
2007	284 600	146	18	17	30
2008	301 200	154	19	17	31
2009	312 300	160	21	19	36
2010	321 800	165	22	19	39
2011	333 000	171	23	20	39
2012	345 400	177	23	19	39
2013	356 800	183	23	19	38
2014	366 400	188	24	20	41

\*Defined as a less than 85 percent of the mean hourly wages of manufacturing workers. Source: Annual reports, TBU.

As is apparent from the table, there has been an overall increase in the share of low paid employees in the sample during the 15 years from 2000 to 2014, despite the somewhat diverging trends in the first and second halves of the period. For immigrants, the share of low-paid workers remained relatively stable at around 30-31 percent in the early years of the period, before experiencing a noticeable increase from 2009 onwards, reaching a peak of 41 percent in 2014. This upward trend coincides with the aftermath of the EU enlargements in 2004 and 2007, suggesting that the influx of immigrants during this time may have been more likely to occupy low-wage positions. In contrast, the share of low-paid workers among natives showed a slight but steady decrease from 20 percent in 2000 to 16 percent in 2006, before gradually increasing to 20 percent again by 2014. This pattern suggests that while the overall economic conditions may have improved for natives during the early part of the period, the later years saw a reversal of this trend.

Because low pay is measured as a binary state, it is of interest to examine the extent of changes in individual low-pay status. Most model specifications in the following rely solely on within variation, implying that the estimated effect of union density on low pay is exclusively based on variation whereby the individual actually changes to or from low-pay status from one year to the next. Table 2 explores this issue further, by showing transitions in low-pay status in the estimation sample. Although the majority of individuals in the sample remain in one pay category (low paid or otherwise) for the entire period, there are a good number of switches as well. Note that individuals who are only observed in one year are excluded from the matrix.

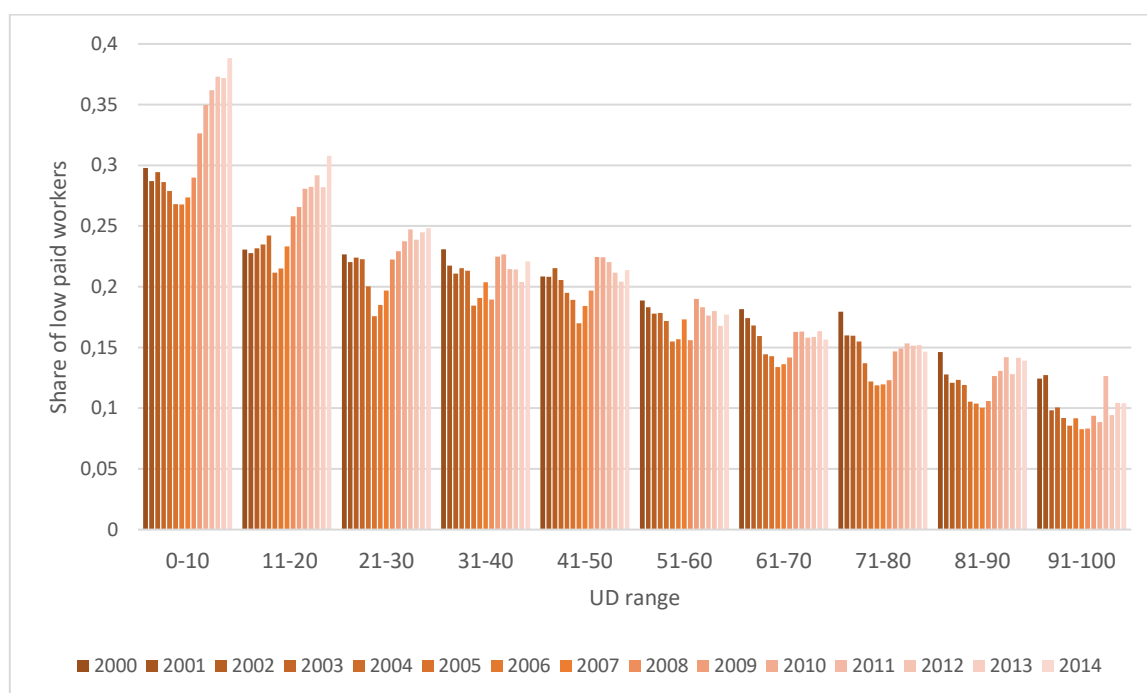
Table 2 Transition probabilities at individual level. Low-pay status. 2000-2014. Private sector fulltime employees in workplaces with more than 9 employees.

Pay status year <i>t-1</i>	Pay status year <i>t</i> (above/below Low-pay threshold)		Total
	Above	Below	
Above	93.07	6.93	100
Below	30.38	69.62	100
Total	78.2	21.8	100

Note: 'Low paid' is defined as a wage level of less than 85 percent of the mean hourly wage of manufacturing workers.

This study focuses on the establishment level. To provide a deeper understanding of the relationship between the share of low-paid workers and workplace-level union density during the period of analysis, Figure 1 presents the annual share of low paid workers in establishments with varying ranges of union density from 2000 to 2014. As depicted in the figure, the inverse relationship between establishment-level union density and the proportion of low-paid employees has progressively intensified during the latter half of the period under consideration.

Figure 1 Mean share of low paid workers by establishment level union density ranges. 2000-2014. Private sector fulltime employees in workplaces with more than 9 employees.  $N=11,830,262$ .



## 5. Empirical Approach

In order to evaluate the effect of union density on the probability of being low paid, I employ a linear probability model (LPM) framework. I acknowledge that other studies have utilized quantile regression methodologies to evaluate the distributional impact of unions on wages (Dinardo et al. 1996; Firpo et al. 2009). However, incorporating multiple fixed effects, as well as executing an instrumental variable (IV) approach, can be quite intricate within a quantile regression context, potentially leading to complexities in the interpretation of results. In contrast, LPM offers a clear, straightforward interpretation of the relationship under study. In the following, I therefore estimate several specifications of the following model:

$$LP_{ijt} = \alpha_i + \gamma UD_{jt} + \mathbf{X}_{it}\boldsymbol{\delta} + \lambda_t + \varepsilon_{ijt},$$

where  $LP_{ijt}$  is a binary variable taking the value 1 if individual  $i$  in establishment  $j$  is low paid in year  $t$  (i.e., hourly wage less than or equal to 85 percent of the mean for manufacturing workers), and 0 otherwise.  $\alpha_i$  denotes time-invariant individual fixed effects, while  $\lambda_t$  represents time-specific effects reflecting shocks, events, and changes of economic environment common to all individuals.

The primary variable of interest is workplace union density ( $UD_{jt}$ ), calculated as the mean share of workers within an establishment that are members of a union, excluding the value of individual  $i$ . Union density is a continuous variable measured in percent.<sup>10</sup> The reason for leaving out the individual's own value is the concern that individual membership status in itself may be the driver of increases in union density leading to switches in low-pay status. However, individual union membership is not in itself likely to be a predictor of low pay risk. The share of workers collectively represented by a union is more likely to impact wages due to the inherent collective nature of union-led wage setting. This influence arises from the enhanced bargaining power that an increased union density confers upon workers, thereby increasing the potential for effective industrial action. Empirical studies conducted in Norway provide robust support for this argument. Barth et al. (2002), for instance, discovered that when controlling for establishment-level union density, the wage differential associated with individual union membership disappears within Norwegian workplaces. This suggests that the effect of unions on wages manifests as a public good, with individual membership delivering a positive wage externality. Consequently, union members tend to earn higher wages than non-members not due to an individual membership premium, but rather because they are, on average, situated within establishments of higher union density. This interpretation aligns with the findings of a more recent study by Bryson et al. (2020).

Identifying the true effect of workplace unionization on the individual's probability of being low paid is challenging. My strategy involves a stepwise exploration of the relationship between the two variables by means of several functional forms, estimators, and sample restrictions. As a starting point, and to provide a benchmark for subsequent estimations, I run an ordinary least squares (OLS)

regression. A drawback of the OLS estimator is that it may provide biased estimates in the presence of unobserved heterogeneity across individuals. Employees maintain a range of capabilities not captured by the data which may or may not contribute to low pay. These capabilities may also vary systematically with the parts of the labor market where low paid employees typically work, which in turn may be a predictor of the level of unionization in the workplace. Failure to control for unobserved variables that are correlated with both low pay and union density may lead to omitted variable bias. I therefore estimate the model equation using a within estimator, allowing for individual fixed effects. Because estimating fixed effect coefficients soaks up all the between-individual variation, both observed and unobserved, the variation left in the data is less likely to be attributed to unobserved differences in capabilities among employees. Utilizing within-individual variation only, i.e., considering how individual changes in low-pay status are associated with changes in union density across time, reduces the threat of omitted variable bias.

A threat to the identification strategy remains, however, if changes in unionization are correlated with job switches. Establishments differ in their ability and willingness to pay employees above or below the low-pay threshold, both within industries and within occupations. If by changing her job (i.e., establishment), an employee goes from being low paid to earning above the threshold, while simultaneously moving from an establishment with a low unionization rate to a highly unionized workplace, the estimated coefficient does not capture changes in local bargaining power. I therefore move on to estimating a model that includes job fixed effects (i.e., a combination of individual and workplace), relying exclusively on changes in low-pay status associated with job variation in unionization across time.

### 5.1 Endogenous Unionization

Even when the same individual is considered within the same establishment, there may still be omitted variables affecting both union density and individual earnings, thereby causing the estimated coefficient on union density to be biased. Changes in the demand and/or supply of workers are examples of such variables. The dramatic increase in the supply of immigrant workers following the EU expansions in 2004 and 2007 is an illustrative case. Most immigrants entered industries already prone to low pay, such as construction, industrial cleaning and the hospitality sector, providing additional downward pressure on wages.<sup>11</sup> As immigrant workers are in general less likely than natives to become union members, shifts in the labor supply may have overestimated the negative relationship between the level of unionization in the workplace and the probability of being low paid. On the other hand, increased relative demand for high-skilled labor due to technological changes may have slowed down wage growth among existing lower skilled employees, while simultaneously *raising* union density, as higher skilled workers are more likely to be union members. This would appear as a positive relationship between low pay and union strength in the workplace.

Further, a shortcoming of the fixed-effects approach to uncovering union wage effects is that it only eliminates the endogeneity operating through the individual (job-)specific effects (Vella & Verbeek 1998, p. 171). Any time-varying endogeneity continues to contaminate the estimates.

To counter the potential remaining endogeneity, I instrument for workplace union density with changes in tax subsidies for union membership during the period of analysis.

### 5.1.1 Public Subsidization of Union Membership

In Norway, employees who pay union fees are entitled to a tax deduction. The deduction is, however, limited upward by a cap. During the 15-year period of the analysis, the size of the cap was increased several times as a result of political priorities by the left-wing government in power for the majority of the years the data cover. These changes in deductions of taxable income led to a significant change in the net price of union membership. Under the assumption that union membership is an ordinary good, price reductions are followed by an increase in the individual demand for unionization. Empirically, this assumption is supported by Barth et al. (2020a), who found strong support for a positive relationship between the subsidy rate and the individual propensity to unionize. As the workforce of an establishment constitutes the sum of employees, the sum of demand changes following the policy adjustments is likely to have an impact on union density within workplaces. Given that the price changes have no impact on individual low-pay status, the subsidy is eligible as an instrument for union density. This identification strategy to tackle the endogeneity of union density was first applied by Barth et al. (2020b).

The instrument is constructed by utilizing data on actual individual payments of union membership fees. As changes in tax rules for union members affect incentives to unionize, also among individuals who are not union members, hypothetical unions based on 3-digit occupational codes and 2-digit industry codes are constructed, in line with Barth et al. (2020b). For each existing union member, I calculate the average membership fee for each hypothetical union each year, excluding the individual's own contribution to the mean. The tax subsidy is then calculated as the product of the marginal income tax (28 percent) and the minimum of the average fee and the cap on tax deductions. That is,  $s = 0.28 \times \min(\overline{fee}, cap)$ . The subsidy is measured relative to the net union membership fee, such that

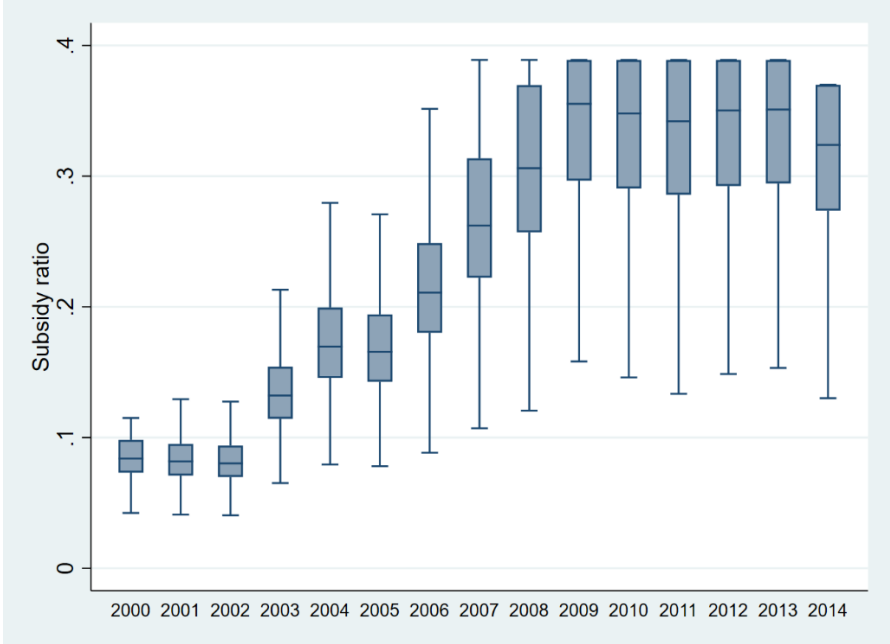
$$S_{ratio_t} = \frac{s_t}{\overline{f_0} - s_t}$$

where  $s_t$  is the subsidy amount in year  $t$ . The average union membership fee in the workplace is fixed at the first year of observation,  $(\overline{f_0})$ , to avoid potential endogeneity arising from price responses from the unions following increases in the subsidy, as well as adaptation of the occupational composition of

workplaces by employers.<sup>12</sup> Because the net union fee may be influenced by low-pay status, I also include the inverse of the historical net union fee as a control variable in all the regressions.

Figure 2 illustrates how the subsidy ratio evolved in the period 2000-2014.

Figure 2 The subsidy ratio. 2000-2014.



Note: The subsidy ratio is calculated as the marginal tax rate (28 per cent) multiplied with the minimum of actual membership payments and the maximum deductible amount, measured relative to the net membership fee.

In order for the instrument to be valid, two conditions must be met. Firstly, that individual union membership does not matter for low-pay risk, and secondly, that the subsidy ratio should not be correlated with individual low-pay status through channels other than union density (comprising the membership decision of co-workers, as union density is calculated as a leave-out-mean).

I explore the first condition in Section 5. Based on theoretical expectations and empirical evidence suggesting that individual membership does not influence low-pay risk, this assumption seems reasonable. For further robustness, I have included an estimated model limited to individuals with consistent union membership in Table 3 (Section 6). By focusing on the union group, I ensure that variations in low-pay risk are solely influenced by fluctuations in union density resulting from coworkers' decisions, with initial union membership treated as a constant.

The second condition may not be immediately apparent due to the earnings-related membership fees charged by some trade unions. However, given the substantial variations in fee calculation methods among Norwegian unions – with some applying fixed, progressive, or capped fees – I believe it is unlikely that a systematic relationship between wage levels and the instrument exists due to these



payment models. The synthetic membership fees are calculated on the basis of all data set members, who are subject to different membership fee schemes, further supporting my assertion.

## 6. Results

In this section, I present the results of the empirical analysis. Table 3 displays estimation results based on different estimators, capturing the relationship between establishment level union density and the individual probability of being low paid in the period 2000-2014.

*Table 3 The effect of workplace level union density on individual probability to be low paid. Private sector fulltime employees. 2000-2014.*

<b>Model</b>	<b>1a</b>	<b>1b</b>	<b>1c</b>	<b>1d</b>	<b>1e</b>	<b>1f</b>	<b>1g</b>
<i>Estimator</i>	<i>OLS</i>	<i>OLS</i>	<i>Within</i>	<i>Within</i>	<i>2SLS</i>	<i>2SLS</i>	<i>2SLS</i>
<i>Low pay-definition</i>	<i>85Ind</i>	<i>2/3M</i>	<i>85Ind</i>	<i>85Ind</i>	<i>85Ind</i>	<i>85Ind</i>	<i>85Ind</i>
Union density	-0.00139*** (-30.85)	-0.00105*** (-35.95)	-0.00108*** (-37.98)	-0.0000808* (-2.29)	-0.00336*** (-18.41)	-0.00723*** (-4.84)	-0.0531*** (-3.54)
Year dummies	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓
Ind. fixed effects			✓		✓		
Job fixed effects				✓		✓	✓
Group of workers							Always members
<i>First stage:</i>							
Subsidy ratio					30.70*** (7.26)	20.21*** (6.07)	16.98*** (7.38)
<i>Weak instrument test:</i>							
Cragg–Donald F:					110419.6	11036.7	5142.1
Kleibergen–Paap F:					412.4	59.27	54.43
R <sup>2</sup>	0.237	0.189	0.603	0.688			
N	11816315	11816315	11413055	10584720	11412278	10584290	2797483

*Note: The dependent variable is a binary variable equal to 1 if the individual is low paid and 0 otherwise. Low pay in models 1a and 1c-1g refers to a pay level less than the mean hourly wage of 85 percent of manufacturing workers. In model 1b, low pay is defined as pay levels below 2/3 of median wage. Union density is measured in percent. Model 1a and 1b contains the following controls: gender, immigration status, age, age squared, occupation (1-digit ISCO 08), educational attainment level (1-digit ISCED 2011) and industry of current occupation (1-digit SIC 2007). Models 1c and 1d include controls for educational attainment level and industry of current occupation (1-digit SIC 2007), while Models 1e, 1f and 1g control for educational attainment level. The subsidy ratio is calculated as the marginal tax rate (28 per cent) multiplied with the minimum of actual membership payments and the maximum deductible amount, measured relative to the net membership fee. The inverse of the historical net union membership fee is included in the 2SLS-models. Robust standard errors clustered at establishment level, t-statistics in parentheses. \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001*

The first column (Model 1a) shows results from a pooled model estimated by means of OLS, including a set of control variables. The estimated coefficient on union density (UD) is negative and statistically significant at the 0.1 percent level. This suggests that an increase in establishment-level union density by 10 percentage points correlates with a reduction of approximately 1.4 percentage points in the individual's probability of low pay. The second column (Model 1b) replicates this model, but with a dependent variable based on an alternative definition of low pay – two-thirds of the median wage. The estimated coefficient in this model is of similar magnitude to that in Model 1a, which underscores the consistency of the findings, regardless of the specific low-pay definition applied.

Because the OLS estimate may be partly driven by unobserved individual heterogeneity, Model 1c includes individual fixed effects, thus controlling for time-invariant average differences across individuals. Allowing for individual fixed effects causes the estimated UD-coefficient to drop from 0.00139 to 0.00108, indicating that the OLS -estimates overestimate the importance of unionization on the probability of being low paid. The results from Model 1c suggest that a 10-percentage point increase in workplace union density reduces the probability of being low paid by just above 1 percentage point.<sup>13</sup>

We may worry that the changes in union density associated with changes in low-pay status captured by the UD-coefficient in Model 1c may be correlated with individual job changes. The results in column 4 (1d) are from a model estimated with *job* fixed effects, hence only exploiting variation originating from individuals in specific establishments<sup>14</sup> across time. The estimation of this specification completely alters the results. The estimated UD-coefficient now has an absolute value close to zero. This pattern indicates that when mobility across workplaces is considered, there is no systematic relationship between local bargaining power and the individual probability to be low paid.<sup>15</sup>

In Models 1e-1g, union density is instrumented by the ratio between union membership tax deductions and the synthetic union membership price. The first stage estimation indicates a significant correlation between the subsidy ratio and union density. Specifically, a 10-percentage point increase in the subsidy ratio is estimated to increase union density by approximately 1.7-3.1 percentage points.

Utilizing the subsidy ratio as an instrument for union density amplifies the negative association between low-pay risk and union density in models incorporating individual fixed effects, and reinstates it in models with job fixed effects. It's worth noting that the drop in the coefficient from individual to job fixed effects may possibly reflect a decline in the “signal to noise” ratio, a known phenomenon when conditioning on various fixed effects. This could potentially indicate the discarding of relevant variation while retaining measurement errors or irrelevant variation in a world with heterogeneous effects. However, the robustness of the findings across the models gives me confidence in the results.

According to the 2SLS results for Model 1e, which includes individual fixed effects, a 10-percentage point rise in union density decreases the low-pay risk by approximately 3.4 percentage points. Incorporating job fixed effects (Model 1f) results in a larger estimated coefficient, suggesting a reduction in individual low pay probability by 7.2 percentage points following a 10-percentage point increase in union density within the same job spell.

The re-emergence of the effect in the IV specification, despite potential measurement errors in the fixed effects models, strengthens my belief in these findings. Notably, Model 1g, which is estimated for individuals with consistent union membership, implies that the impact of union density on low-pay

risk primarily stems from variations in coworkers' union density, corroborating the validity of the instrument.

## 6.2 Natives and Immigrants

A second area of interest in this study is whether union bargaining strength affects the propensity to be low paid to the same extent among natives and immigrants. Most immigrants entering Norway in the period of the analysis were low-skilled workers arriving from low-income countries with a lot to gain from leaving their country of origin. By way of illustration, in 2007 average hourly wages in Norway were 50 percent higher than in Sweden, almost eight times higher than in Poland and almost fifteen times higher than in Romania (Friberg et al. 2012). Consequently, one might expect that willingness to work for low wages would be greater on average among immigrants than among natives. The potential gains from a union in the workplace would thus be correspondingly larger in the former group. Table 4 shows different specifications of the model equation in Section 5, estimated separately for natives and immigrants.

Table 4 Estimated effect of union density on individual probability to be low paid. 2SLS. Natives, immigrants and immigrants from EU/EEA countries. Private sector fulltime employees. 2000-2014

Model	2a	2b	t-stat	2c	2d	t-stat	2e
Estimator	Within	Within	diff.	2SLS	2SLS	diff.	2SLS
Union density	-0.0000775* (-2.20)	-0.0000952 (-0.90)	-0.16	-0.00987*** (-5.17)	-0.02143** (-3.20)	-1.95	-0.0315** (-2.79)
Year dummies	✓	✓		✓	✓		✓
Controls	✓	✓		✓	✓		✓
Ind. fixed effects							
Job. Fixed effects	✓	✓		✓	✓		✓
Group	Natives	Immigrants		Natives	Immigrants		EU/EEA
First stage							
Subsidy ratio				20.39*** (5.96)	16.64*** (4.40)		15.01** (3.28)
Weak instrument test:							
Cragg–Donald F:				12857.5	515.7		274.8
Kleibergen–Paap F:				35.54	14.31		10.78
R <sup>2</sup>	0.677	0.703					
N	9365655	1219157		9365273	1219017		596065

Note: The dependent variable is a binary variable equal to 1 if the individual is low paid and 0 otherwise. Low pay refers to a pay level less than the mean hourly wage of 85 percent of manufacturing workers. The subsidy ratio is calculated as the marginal tax rate (28 per cent) multiplied with the minimum of actual membership payments and the maximum deductible amount, measured relative to the net membership fee. Union density is measured in percent. All models include controls for educational attainment level. The inverse of the historical net union membership fee is included in all models. EU/EEA include member countries of the European Union or the European Economic Area. The t-stat diff. refers to a test for equality of the union density coefficients in the estimated models between natives and immigrants. Robust standard errors clustered at establishment level, t-statistics in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

The pattern in Table 4, when moving from models including job fixed effects (2a and 2b), and then finally instrumenting union density with the exogenous changes in the subsidy ratio (2c and 2d), is similar to that shown in Table 3. However, the results of the separate estimations reveal a difference between natives and immigrants with respect to how local bargaining power affects the probability of being low paid. Indeed, the results from Models 2c and 2d indicate that the reduction in low-pay

probability resulting from an increase in union density of 10 percentage points is more than twice as large among immigrants as among natives (21 vs. 10 percentage points). While the estimated effect of union density for natives is similar to that in the whole sample (Model 2c in Table 4), the estimated effect seems to differ substantially for immigrants. It should be noted, however, that the 2SLS estimate is somewhat imprecisely estimated in the immigrant sample. A t-test reveals that the differences between the estimated coefficients in the separate samples of natives and immigrants are not statistically significant for models 2a/2b, and only marginally for models 2c/2d.

What might explain why immigrants benefit more than natives in terms of reduced low-pay risk when unions grow stronger in the workplace? One possible interpretation is that immigrants possess lower bargaining power in the first place, and thereby have relatively more to gain from the presence of a strong union in the workplace. Most immigrants entering the Norwegian labor market following the EU enlargements in 2004 and 2007 had few outside options. The majority of them came from poor countries in Eastern Europe and were willing to work for what qualifies as low wages in a Norwegian context. The same cannot be said to the same extent about natives, who were protected by the Norwegian social security network, as well as having a comparative advantage regarding job mobility within the Norwegian labor market. Provided that unions work to promote the conditions of those who need it most, it may not be that surprising that immigrants benefit more from the presence of a strong union.

The difference between immigrants and natives would, however, also result if the share of immigrants below (but sufficiently close to) the low-wage limit, was higher than the share of natives located in the same area of the overall wage distribution. Indeed, an examination of the data reveals that this is the case. 88 percent of immigrants are found to be within close proximity (+/- ten percent) to the low-wage limit, compared to only 15 percent of natives. This suggests that a larger proportion of immigrants are positioned in a wage range where an increase in union density can lift them above the low-wage threshold. Consequently, the greater benefit derived by immigrants from increased union strength in the workplace may be partly due to their initial positioning in the wage distribution, rather than solely a reflection of their comparatively lower bargaining power. This interpretation does not contradict the notion that immigrants have more to gain from the presence of a strong union, but it provides a more nuanced understanding of the mechanisms at play. Specifically, it suggests that the positioning of workers in the wage distribution, and not just their bargaining power, can significantly influence the extent to which they benefit from increased union strength.

Model 2e restricts the sample to immigrants from the EU/EEA, who constituted the majority of the inflow of immigrants following the EU enlargements in 2004 and 2007. Interestingly, the results from this subset of the data not only support the main findings but also indicate an even stronger effect of union density on reducing the individual probability of being low paid. Specifically, the effect of

union density in this group of workers is found to be more pronounced. This suggests that the role of unions in mitigating low-pay risk may have been particularly important for workers from EU/EEA countries, who were a significant part of the labor market shock following the EU enlargements.

## 6.1 Industry heterogeneity

As the tradition for conducting local negotiations may in practice vary across the private sector, Table 5 shows separate 2SLS regressions for five main industries. While the direction of the results is in general accordance with the estimated effect from Table 3, the effect varies a great deal between industries. This is primarily explained by the first stage, i.e., that the subsidy ratio affects membership differently in different parts of the labor market. It is important to note that the instrument recovers the local average treatment effects (LATE), rather than an average treatment on the treated effect (ATT). Consequently, some caution must be shown in interpreting the results. For example, Barth et al. (2022) show that tax subsidies tend to stimulate union membership more in segments of the labor market where density is low in the first place. However, immigrants and low-wage workers are, in general, shown to be among those with the highest elasticity of union membership with respect to the subsidy.

Table 5 Estimated effect of union density on individual propensity to be low paid. 2SLS-estimates. Selected industries in the private sector. Full time employees. 2000-2014.

	(1)	(2)	(3)	(4)
Industry	Manufacturing	Construction	Retail	Services <sup>a</sup>
Union density	-0.0161*** (-3.86)	0.0315 (1.27)	-0.0202*** (-3.83)	-0.0231 (-1.35)
<i>First stage:</i>				
Subsidy ratio	40.83*** (5.10)	27.58 (1.36)	20.00*** (4.34)	14.82 (1.66)
Year dummies	✓	✓	✓	✓
Controls	✓	✓	✓	✓
Job fixed effects	✓	✓	✓	✓
<i>Weak instrument test:</i>				
Crag–Donald F:	10867.5	252.9	584.69	244.40
Kleibergen–Paap F:	26.05	1.839	18.86	2.75
N	2623379	1249871	1823329	859977

Note: The dependent variable is a binary variable equal to 1 if the individual is low paid and 0 otherwise. Low pay refers to a pay level less than 85 percent of manufacturing workers' mean hourly wage. Union density is measured in percent. The subsidy ratio is calculated as the marginal tax rate (28 per cent) multiplied with the minimum of actual membership payments and the maximum deductible amount, measured relative to the net membership fee. Union density is measured in percent. Controls contain educational attainment level (1-digit ISCED 2011). <sup>a</sup> Services includes Accommodation and food service activities, and Administrative and support service activities. Employment activities (Nace 78) is excluded from the sample. The inverse of the historical net union membership fee is included in all models. Robust standard errors clustered at establishment level, t-statistics in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

The lack of a significant effect of union density on low pay risk in the construction industry, despite the influx of immigrants into this sector following the EU expansion, may seem counterintuitive. Several factors could potentially explain this result. Firstly, the first stage is not significant in this

industry, which could undermine the strength of the second stage results. Secondly, it's important to note that workers hired through employment agencies, which played a significant role in supplying labor to the construction industry after the EU expansions, are registered under a separate industry code. These workers, often immigrants, are not included in the sample. Their exclusion may underestimate the true impact of union density on low pay risk in the construction industry. Finally, many of the immigrants entering Norway to work following the EU enlargements often had atypical, precarious employment, and a significant share were posted workers (Friberg et al. 2016a). Some of the most vulnerable immigrant groups are thus not included in the sample consisting of fulltime employees in mid-size and large establishments.

## 7. Concluding Remarks

Unions have been known to compress wage inequality in their environments. In the Nordic countries, it has been an explicit objective of many unions to raise the wages of the lowest paid. At the macro level, unions work to achieve their solidaristic wage objectives by including income guarantee provisions in the collective agreements, demanding nominal rather than percentage increases, and making sure agreements without local wage formation or industries with low average wages receive higher increases than others. However, a significant part of wage formation in the Norwegian private sector happens at local level, i.e., within the workplace. While previous literature has shown that strong unions are associated with lower wage inequality in their environment, particularly in the lowest part of the wage distribution, less is known about the relationship between union bargaining strength and individual low-pay risk within establishments.

Utilizing a panel of individual matched employee-employer data covering the Norwegian private sector in the period 2000-2014, this study has examined the relationship between local bargaining power, as measured by workplace level union density, and the individual propensity to be low paid. The results show that increases in union density have a significant negative effect on individual low-pay risk within job spells. Specifically, an increase in union density of 10 percentage points is estimated to reduce low-pay risk by 7.2 percent. The findings strongly suggest that the objective of Norwegian unions to raise the wages of the lowest paid has been achieved at local level in the sample and period analyzed in the study. Although the results appear robust, the estimated effect varies across industries.

While the results of the study clearly demonstrate that an increase in union density reduces the individual risk of being low paid, the specific mechanisms through which this effect is achieved warrant further discussion. The results do not explicitly reveal whether the reduction in low-pay risk arises from a general wage improvement across the board in the workplace, benefiting all workers, or if it occurs in a wage compressing manner. As the impact on high-wage workers is not considered in this study, I cannot infer what happens to wage compression in the workplace. What I can conclude

from the results is that local union density lifts workers who are below the low-wage threshold. This will of course have an impact on the aggregate share of low-wage workers in the economy, depending on where union density rises, and on the share of workers that are below but sufficiently close to the low-pay limit in those firms. It should be noted that if union density raises all wages in the same proportion, an aggregate overall improvement in union density will not have an impact on the share of low-wage workers, since the manufacturing benchmark will go up as well.

A second finding of the study is that immigrants have comparatively more to gain from strong unions in the workplace than natives. This finding can be interpreted in two ways. On one hand, it could be that immigrants, who generally hold less bargaining power than natives, derive greater benefit from the solidaristic wage policy unions exhibit. This interpretation is supported by the fact that the estimated effect is stronger than the overall effect in the subsample consisting of immigrants from EU/EEA. These migrants were in a particularly vulnerable position in the years following the EU enlargements and may therefore have derived a greater advantage from stronger unions in the workplace.

On the other hand, the analysis also reveals that a significantly higher share of immigrants (88 percent) is located close to the low-wage limit compared to natives (15 percent). This suggests that the positioning of workers in the wage distribution, and not just their bargaining power, can significantly influence the extent to which they benefit from increased union strength. This insight underscores the importance of considering the distributional aspects of wage structures when analyzing the impacts of unionization.

Overall, the results of the study imply that unions may have been important regulators of low pay at the local level in Norway during the period of the analysis. This is important knowledge in the context of the ongoing debate about a statutory minimum wage across the EU. Both unions and employer organizations in the Nordic countries have opposed this suggestion, as the principle that wages are the responsibility of the social partners stands strong in these countries. The principle entails that the social partners, particularly the trade unions, have assumed a responsibility to ensure an acceptable wage floor. However, there are threats to this strategy. Most importantly, bargaining strength requires a sufficient union density level. Although high in some parts of the labor market, the level of unionization is low in many private sector industries in Norway. The evidence presented above shows that union strength has an impact on low-pay risk in a sample where workplace level union density averages around 45-50 percent, indicating that the impact of unions on low pay is not conditioned on very high levels of union density in the workplace. However, in Norway, as in Sweden and Denmark, the greatest decline in union density in recent years has occurred in typical low-wage industries (Alsos & Nergaard 2022). This trend should perhaps be the greatest worry in countries which believe that the

issue of ensuring a sufficiently high wage floor should be resolved between the unions and the employers' organizations.



## Notes

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<sup>1</sup> See e.g. Acemoglu & Autor (2011), Helpman (2018).

<sup>2</sup> The Norwegian government defines social dumping as follows: Social dumping is deemed to be present both if foreign employees are subject to breaches of health, safety and working environment regulations and if they are paid wages that are unacceptably low. <https://www.regjeringen.no/en/topics/labour/the-working-environment-and-safety/innsikt/social-dumping/id9381/>

<sup>3</sup> See Card (2020) for a review of the literature.

<sup>4</sup> The Norwegian union membership rate is low compared to the other Nordic countries, where trade unions have traditionally administered the unemployment benefit funds and thus have had better recruitment opportunities (Ghent system).

<sup>5</sup> The Norwegian Food and Allied Workers Union (NNN), which organizes workers in the food industry, states the following about local negotiations: ‘Traditionally, NNN’s pay policy has been based on the smallest possible pay differences between employees, as this strengthens both cohesion and common solutions.’ (NNN 2022).

<sup>6</sup> Throughout the paper, the terms ‘workplace’ and ‘establishment’ are used synonymously, both referring to the lowest functional unit at a single, physical location that produces or distributes goods or performs services.

<sup>7</sup> Because overtime is included in the wage measure, some robustness checks have been done to make sure the results are not driven by overtime payments. In particular, the hourly wage was compared to that of individuals included in another register source (‘Lønnsstatistikken’, the Earnings statistics), which is a representative sample from the same time period. The Earnings statistics are regarded as more accurate, as they are collected for the purpose of wage negotiations. The calculated hourly wages from the two sources are similar for the individuals included in both samples.

<sup>8</sup> TBU was established in 1967 and plays a central role in ensuring that the social partners and the authorities have a shared understanding of the statistical material underlying the wage negotiations. The committee submits annual reports that form the basis for wage negotiations, including the share of low-paid fulltime wage earners.

<sup>9</sup> Tables corresponding to Tables 1 and 2, using two thirds of median wage-definition of low pay, is reported in the Appendix (A1 and A2).

<sup>10</sup> To explore possible non-linearities in the relationship between union density and the probability of being low paid, results based on a less restrictive version of the model was estimated. The model includes a set of dummies representing different bands of unionization. The point estimates of the dummy variables were monotonically increasing, and the linear specification seems to be a good approximation.

<sup>11</sup> Within the construction industry, wage growth was shown to be lower in trades with rising immigrant employment shares during the period 1998-2005 (Bratsberg & Raaum 2012).

<sup>12</sup> There might be concerns that an increase in public subsidies could lead to a decrease in union services, which are unobserved in the data. This could potentially bias the first stage estimates downwards and second stage estimates upwards. However, it’s important to note that while union services may evolve over the course of several decades, they typically do not change on a yearly basis. They tend to remain consistent over extended periods. Therefore, since the effects are identified by the yearly variation in the subsidy, any long-term changes in the services provided by unions are unlikely to introduce significant bias into the estimates.

<sup>13</sup> The result is robust to restricting the sample to larger establishments.

<sup>14</sup> ‘Job’ is defined as individual within the same establishment. However, the results are robust to a more restrictive definition of ‘job’, namely ‘individual within occupation within establishment’. The fact that there is practically no difference between the two operational definitions indicates that changes in occupation are of little importance for changes in low-pay status.

<sup>15</sup> A possible explanation for the non-existent relationship between union density and low-pay risk may be the potential absence of collective agreements. The right to bargain over wages at the workplace is established in the local agreement entered into by the particular establishment. Furthermore, as highlighted in Barth et al. (2000), wage formation in the uncovered sector differs from that in the covered sector. To explore this possibility, I have estimated Model 1d on a sample consisting only of covered establishments. This restriction does not, however, do much to change the results. The estimated coefficient is insignificant and approximately equal to zero.

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## Appendix

A1 Annual/hourly low-pay thresholds (nominal) and share of low paid employees according to the alternative low pay-definition 2/3 of median wage. 2000-2014. Private sector fulltime employees in workplaces with more than 9 employees. N=11 830 262.

Year	Low-pay limit, annual wage* (NOK)	Low-pay limit, hourly wage (NOK)	Share below low-pay limit (percent)	Natives below low-pay limit (percent)	Immigrants below low-pay limit (percent)
2000	165100	85	14	14	21
2001	175500	90	14	13	22
2002	184600	95	14	13	22
2003	192400	99	14	13	22
2004	197600	101	13	13	22
2005	206700	106	13	12	21
2006	215800	111	13	12	20
2007	227500	117	14	13	22
2008	240500	123	14	13	24
2009	269100	138	13	12	23
2010	278200	143	14	12	26
2011	289900	149	14	12	26
2012	300300	154	14	12	25
2013	312000	160	15	12	25
2014	319800	164	16	13	28

\*The median wage is calculated based on the entire population of Norwegian wage earners. Own calculations.

A2 Transition probabilities at individual level. Low-pay status. 2000-2014. Private sector fulltime employees in workplaces with more than 9 employees.

Pay status year <i>t-1</i>	Pay status year <i>t</i> (above/below low-pay threshold)		Total
	Above	Below	
Above	95.12	4.88	100
Below	43.71	56.29	100
<b>Total</b>	89.24	10.76	100

Note: 'Low paid' is defined as a wage level of less than two thirds of median hourly wage.

A3 Summary statistics on key variables. 2000-2014. Private sector full time employees in workplaces with more than 9 employees.

<b>Variable</b>		<b>Mean</b>	<b>Std. dev.</b>	<b>No. of obs.</b>
Low paid (0/1)	overall	0.21	0.44	11 830 262
	between		0.42	2 017 393
	within		0.28	5.86
Union density	overall	0.44	0.31	11 830 262
	between		0.28	2 017 393
	within		0.13	5.86
Female (0/1)	overall	0.32	0.47	11 830 262
	between		0.48	2 017 393
	within		0.00	5.86
Immigrant (0/1)	overall	0.13	0.33	11 830 262
	between		0.41	2 017 393
	within		0.00	5.86
Age	overall	40.29	11.99	11 830 262
	between		12.50	2 017 393
	within		3.47	5.86
Education (bins)	overall	4.30	1.81	11 830 262
	between		2.09	2 017 393
	within		0.32	5.86
Collective agreement (0/1)	overall	0.55	0.50	11 830 262
	between		0.45	2 017 393
	within		0.24	5.86

Note: Calculated using `-xtsum-` in Stata 17.