

The Career Effects of Union Membership

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Abstract

We provide a comprehensive assessment of the margins along which unions impact workers' careers. To perform our analysis, we combine exogenous variation in union membership take-up with detailed administrative data and two novel field surveys. We find that the career effect of union membership differs greatly depending on the age at which workers enroll. In addition, we show that focusing on a restricted set of outcomes, such as wages and employment, generates a fractionalized understanding of the multidimensional career effect that union membership has on workers. Finally, we show that individual-level union membership matters above and beyond firm-level union density and that union-provided goods contain a substantial private goods component.

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1 Introduction

Unions represent one of the most powerful labor market institutions in the world, and they have played a pivotal role in shaping the dynamics of labor markets for more than 200 years. Through the monopolization of labor supply, unions can restrict the supply of labor to firms in order to improve workers' rights, conditions, and compensation. However, despite a consensus on the role of unions - to maximize worker welfare - there is little agreement on union success in serving worker interests and shaping their careers.

This paper provides a comprehensive assessment of the margins along which unions impact workers' labor market careers. First, we examine the channels through which union membership affects workers: monetary compensation, job security, work environment, career advancement, and welfare usage. Second, we study whether unions influence workers differently across their careers. Finally, we examine if the potential worker-level effects of unionization primarily operate through the firm, or if union members gain more than non-union workers at the same firm. For identification, we exploit government-induced changes in union dues subsidies in Norway, which led to significant changes in the net price of union membership for some workers but not for others. These changes impact workers of all ages and therefore provide an ideal setting for examining whether the career effects of unions differ across the life cycle of workers.

The core contribution of this paper is to move beyond the existing union literature by causally identifying the multidimensional career effects of unions, examining whether the effects differ across the a worker's lifecycle, and investigating whether unions affect worker level outcomes primarily through affecting firm outcomes or whether there are any worker level effects beyond that. We demonstrate that the effect of union membership differs greatly depending on the age and career stage at which workers enroll. In addition, we show that focusing on a restricted set of outcomes, such as the contemporaneous union wage premium, generates a fractionalized understanding of the multidimensional career effects that union membership has on workers. Specifically, unions not only affect workers' monetary compensation but also their career advancement opportunities, job security, work environment, and welfare utilization. Finally, we document a considerable private goods component of union membership, illustrating that it is important to study the worker-level effects of unionization in order to fully capture the impact of unions on workers.

To perform our analysis, we use linked employer-employee matched data from Norway, including information on union membership, union dues, and each worker's occupation. A unique personal identifier enables us to combine these data with information from various population-wide administrative registers, such as the central population register, the education register, the tax and income register, the social benefit registers, and the residency and workplace location registers. Consequently, we can construct an extensive panel covering the universe of Norwegian workers and much of their demographic, education, labor, welfare, and employer information.

In addition to the rich register data, we conduct an extensive survey of more than 5,000 work-

ers in Norway. The survey asks about workers' ranking of core job amenities, their perceptions of unions' ability to influence these amenities, and whether they believe that individual union membership matters beyond the presence of a union at the workplace. Finally, the survey examines the price sensitivity of union membership through hypothetical scenario analyses, asking if workers would reconsider joining (leaving) the union if the union dues decreased (increased) by a randomized amount.¹

After providing descriptive evidence on the dynamics of labor union membership in Norway—both through the administrative data as well as the detailed surveys—we identify the causal effect of union membership on individuals' careers. The main challenge in the identification of causal union membership effects is that union membership is not randomly given to individuals but represents an active choice made by individual workers. We overcome this selection issue by exploiting exogenous price reductions in the cost for workers to join labor unions. Assuming that union membership is a normal good, a drop in the price of union membership should generate an increase in the quantity demanded. Thus, individuals who were not union members will become more likely to join a union following these price changes as the monetary cost of enrolling declines.

The price changes in union membership fees that we exploit come from a series of national government subsidy reforms that provide direct tax credits to individuals who choose to join labor unions. These tax deductions led to significant changes in the net price of union membership among workers whose union dues subsidies were previously bounded by a tax deduction cap at their firm. By construction, this depends directly on the firm's industry-occupation mix at baseline (Barth et al., 2020b). This generates variation in the incentive to join a union depending on the firm at which the worker is employed and, therefore, different union enrollment probabilities across individuals. Using an instrumented difference-in-differences design in which we compare individuals more versus less exposed to subsidies over time as a continuous function of the subsidy bite, we can recover the causal effect of union membership.

We present four core sets of results. First, we document a substantial wage premium of approximately 0.08 log points associated with individual union membership. This effect is slightly smaller than the typical 0.1-0.2 log point effect that has been found in previous studies (e.g., Farber et al. (2021); Sojourner et al. (2015); Card et al. (2004)).² However, in contrast to prior literature, we show that the union membership wage premium varies greatly across a worker's career. While individuals enjoy large union wage premiums at the beginning of their working lives, this premium monotonically declines until age 45 at which point it ceases to be economically meaningful or statistically significant. Overall, union membership flattens the age-wage profile relative to non-union

¹We use the price sensitivity questions as a means to externally verify that changes in membership price are likely to generate shifts in membership probability.

²While the 0.1-0.2 log point effect corresponds to the typical finding in the literature, there are also studies finding effects close to zero (e.g., DiNardo and Lee (2004)) and effects that are considerably larger than 0.2 (e.g., Fortin et al. (2023) find effects of around 0.35 log points).

workers. Part of the differential wage effect across the life cycle is driven by the union's impact on individuals' work hours.

Second, we uncover substantial heterogeneity in how union membership influences other key dimensions of a worker's career across the life cycle: job protection, advancement opportunities, and work environment. For job protection, we show that unions provide considerable security to older workers while there are smaller gains for workers at the beginning of their careers. With respect to career advancement, which we measure through switches to better-paying within-firm occupations, we again find that unions provide considerable benefits to more senior workers while there are limited benefits accruing to young workers. At the same time, we find that unions reduce the probability of workers switching to other firms that are paying higher average wages. This lock-in effect makes the longer-run impact of unions on worker careers ambiguous since it may cause workers to miss out on beneficial outside opportunities. In terms of work environment as measured by sick leave take-up, we identify a strong negative union membership effect among young workers. This implies that unions may offer protection to young workers from the hazardous and less-promotable tasks typically assigned to new labor market entrants. For older workers over age 55, the effect on sick leave take-up is positive, a plausible interpretation of which is that older workers feel more secure in their jobs to take (longer) sick leave at the end of their career without worrying about a potential layoff. Taken together, the effect patterns uncovered in this paper suggest that unions play an important role at the hiring stage through monetary compensation and work environment and at the separating stage through promotion facilitation and job protection.

Third, by examining the effect of union membership on individuals' use of the national welfare system, we find that workers are considerably less dependent on short-term transfers from the government when they are union members. This effect has a U-shape over worker age, with mid-career workers reducing their dependence on government transfers the most. This result highlights another important dimension of the union debate that has previously been overlooked in the literature: not only may unions affect workers through wages and work conditions, but they may also affect government welfare expenditures and workers' reliance on—and use of—the social insurance system.

Finally, by instrumenting both for individual union membership as well as firm-level union density, we show that both firm-level union density and individual-level union membership matter for a worker's labor market outcomes. Though the marginal returns to individual union membership decline as firm-level union density increases, membership still matters through most of the firm-level union density range, with a non-negligible private-good component of membership for as high as nearly 80% union density. This result is consistent with our findings from the survey and adds to a relatively less well-established empirical literature on the public-private nature of union-provided goods.

The main contribution of our paper is to combine exogenous variation in union membership

with rich register data to identify the career effect of union membership across the life cycle of workers on key career dimensions and document the extent to which the worker-level effects of unionization primarily operate through the firm level or if union members gain more than non-union workers at the same firm. The paper breaks new ground in our understanding of unions and their impact on workers and helps advance key strands of research within economics.

First, there is an impressive literature that causally identifies the union wage effect through quasi-experimental research designs, using anything from regression discontinuity designs and propensity score matching techniques (e.g., DiNardo and Lee (2004); Lee and Mas (2012); Frandsen (2021); Sojourner et al. (2015); Card and De La Rica (2006); Bryson (2002)) to instrumental variable methods based on Right-to-Work laws in the United States and changes in national union dues subsidies in Norway (e.g., Fortin et al. (2023) and Barth et al. (2020b); Dodini et al. (2022)).

Overall, these studies provide important insights into the union wage premium, but they do not explore how the wage premium may vary for union members depending on where in their careers they are at the time of enrollment, they focus almost exclusively on wage effects, and they do not explore the channels through which these wage effects may operate.

Among these papers, Barth et al. (2020b) represents the most relevant paper for our analysis, using similar identifying variation from the change in tax deductibility of union dues to examine value added and wages in Norwegian manufacturing at the firm level. They find that increases in firm-level union density increase wages and productivity as measured by nominal value added per worker. Our paper addresses a fundamentally different set of questions.

First, we significantly broaden the scope of the margins along which unions influence individual workers. This includes quantifying the effects of unionization on employment, earnings, promotions, job protection, and work environment. Most centrally, it also includes quantifying the overall gains from union membership by examining the career effects jointly, thereby providing a framework for assessing and analyzing the multidimensionality of union effects.

Second, through our heterogeneity analyses over age, we observe substantially different effects of union membership based on a worker's career stage. This complements an emerging literature on the lifecycle effects of labor market shocks and policy reforms, highlighting that a focus on mean impacts misses a great deal (e.g., von Wachter (2020); Arellano-Bover (2024); Rinz (2022); Cotofan et al. (2023); Salvanes et al. (2024)). This is particularly important with respect to the growing literature on the equality-enhancing effects of unions (e.g., Card et al. (2020)), highlighting that there are clear dimensions on which we might expect the opposite effect.

Third, by instrumenting both for individual membership and leave-one-out firm-level union density, we show that individual-level union membership status matters above and beyond firm-level union density. This allows us to significantly expand the scope of the union literature, directly contributing to a long-standing debate on the public versus private goods component of unions for which we have very limited causal evidence (e.g., Hildreth (2000); Budd and Na (2000)). This

analysis highlights the importance of studying the worker-level effects of union membership in order to fully capture the impact of unions on workers.

In addition to this literature, there is an emerging literature exploring non-wage effects of unions on individual workers, including work hours (e.g., Finnigan and Hale (2018)), pensions (e.g., Frandsen and Webb (forthcoming)), health insurance (e.g., Hagedorn et al. (2016)), and maternity leave (e.g., Park et al. (2019)). These studies highlight that union membership may impact individual workers on multiple dimensions, all of which may feed into the reduced-form union wage effect that has been documented in prior work. We develop this literature by examining the impact of union membership on a large number of career outcomes for the same sample of workers using a unified empirical framework, including work environment, job protection, promotion potential, and welfare usage. By tracing the effect of union membership on a rich set of career outcomes across the life cycle of workers, we are able to provide a more nuanced understanding of labor unions and their impact on workers.

In terms of policy implications, our results highlight that the effect of union membership differs greatly depending on the age at which workers enroll and that focusing on a restricted set of outcomes generates an incomplete understanding of the multidimensional career effect that union membership has on workers. This is of particular significance in light of policymakers' objectives of understanding the overall effect of unions on workers and the economy, especially given the recent surges in labor activity in the US (NLRB, 2022). While our focus in this paper is on unions, these results also allude to a more general policy implication: that age-neutral labor market policies, institutions, and regulations, may affect individuals differently across their careers. Furthermore, our documentation of a substantial private return to union membership (in addition to the public goods provision) suggests that union membership is likely below the optimum for employed workers and that free-riding in this setting may be limited.

2 Background

2.1 Unions in Norway

The rights and regulations of employers, employees, and unions, are governed by the national *Working Environment Act* (WEA). According to the WEA, each worker has the legal right to join a union, irrespective of who they work for, and enrollment must be done on a voluntary basis; closed-shop union agreements are not allowed. Similar to many other continental European countries, the Norwegian labor market is characterized by high coverage of national sectoral collective bargaining agreements that cover both union members and non-union workers. However, the ability of firms and local unions to adjust individual wages and work conditions over and above the sectoral agreements is very high (Blandhol et al., 2020).

The most common wage determination process in Norway is a two-step bargaining procedure. In the first step, sectoral collective bargaining agreements are established to set minimum wage

guidelines; failure to reach an agreement at this stage can result in strikes or lockouts. These agreements are renegotiated every 2-4 years and are generally extended to include all individuals at firms who participate in the negotiations (including non-union workers). Firms are obligated to participate in the national collective bargaining agreements if at least 10 percent of the firm's workforce requests it. In the second step, firm-level negotiations take place in which local unions and employers discuss not only firm-specific wage increases for union members but also individual-specific wage increases. These negotiations typically take place annually. Non-union employees do not have the right to participate or bargain in these local negotiations. This process covers 50 percent of the private sector workforce.

A further 30 percent of the private sector is not covered by any industry-wide collective bargaining agreement at all, and all their bargaining takes place at the firm level. Thus, for 80 percent of the private sector workforce (the 50 percent covered by the two-step bargaining process and the 30 percent not covered by any sectoral agreement at all), individual firms and local unions can have a substantial influence on wages and work conditions. For the remaining 20 percent, all bargaining takes place at the industry level in a process separate from the typical two-step process.

While the national and sectoral wage agreements have played a key role in setting worker wages in the past, firm-level negotiations now account for more than 70 percent of total negotiated wage increases, and the sectoral-level minimum wage decisions are oftentimes set too low to be considered binding (Bhuller et al., 2022).³

It is important to note that employers are legally obligated to recognize and negotiate with local unions if they are present at the workplace, irrespective of the number of members it has. Hence, in contrast to the private sector in the US in which firm unionization requires a majority support through a union election, and in contrast to Germany in which a firm either is covered by a union agreement or not, unions can operate in Norwegian workplaces as long as there is a non-zero support for the union, and they do so on top of the national collective bargaining agreements that have been established. As such, unionization in Norway is better viewed as a continuous measure of worker power ranging from 0 (no worker at the firm is a member of the local union) to 100 (all workers at the firm are members of the local union). Union density at a firm is particularly meaningful during the firm-level negotiations where firm-level union bargaining power is leveraged to extract concessions from firms; a strike threat from a union representing 90 percent of the employer's workforce bears greater weight than a strike threat from a union representing only 10 percent of the employer's workforce. In this regard, Norwegian unions are relatively similar to those in Sweden, Denmark, and the United Kingdom, in which both central and local negotiations occupy a large part of the process (e.g. Dahl et al. (2013); Bhuller et al. (2022)).

³Our supplemental empirical analyses examine heterogeneity in the effects of individual union member when a worker's current firm has higher vs lower union density as well as when the firm is a direct participant in one of the sectoral collective bargaining agreements.

The annual local firm-level negotiations take place between local unions and employers and cover firm-specific wage increases and other amenities for union members as well as individual-specific wage increases for union members. In particular, prior to each annual negotiation, union members are encouraged to submit individual wage and benefit requests to their local union. The local union will then review the requests and discuss these with the employer on top of the union-wide wage and benefit discussions that they have. Non-union employees do not have the right to participate or bargain in these local negotiations. In addition, only members are allowed to utilize the consultation and legal support that the unions offer (for example in the event of dismissals, injuries, or promotions), and only members will be able to receive compensation from the union if a strike or a lockout is initiated. Note that workers must have been members of the union for three months before they can use the services of unions and be included in the local negotiations.

Taken together, the regulatory framework surrounding the unionization environment in Norway implies a substantial private goods component of unionization at the workplace and that there likely are worker-level effects of unionization that are not captured by firm-level analyses. A more comprehensive understanding of this issue is imperative for better understanding the public good character of unions and possible free rider problems. We turn to this question in Section 5.3.

2.2 Union Tax Deductions

Union membership is not free, and prospective members must make a monthly payment to the union to benefit from its services. These payments are used by the union to finance a wide variety of programs and activities, including (but not limited to) the salaries and benefits of the union leadership, the legal representation offered by the union, lobbying activities, the strike fund, and potential campaign programs.

Baseline union dues in Norway are commonly set during the union's annual meeting. Some unions collect a percentage of each worker's pay, others allow the percentage to vary on a sliding scale, and others may set dues to a specific level. On average, dues typically range from 1 to 3.5 percent of a worker's pre-tax income. Most union payments are facilitated through a "dues checkoff" mechanism in which the employer agrees to deduct the union dues from the worker's paycheck directly (provided the worker has decided to become a member) and transfer that amount to the union. These transfers are explicitly shown on the wage statement that the worker receives each month.

To encourage organized labor, the Norwegian government provides a tax deduction for union dues. This deduction acts as a subsidy for union membership and is automatically entered on an individual's tax return, making the price subsidy very salient to the worker. Beginning in the early 2000s, the government increased the maximum allowable tax deduction for union dues multiple times, effectively quadrupling the maximum from 2001 through 2010. At the same time, average membership fees rose much more slowly, such that the subsidy value of total membership fee rose from 7 percent in 2001 to more than 20 percent in 2012 (Barth et al., 2020b).

For our empirical analysis, we exploit the changes in the union dues subsidy as an instrument for individual union membership. These changes reduce the cost of joining a union, but only for workers whose subsidies were previously bounded by the tax deduction cap. As such, workers employed at firms that had high union dues prior to the reform are more intensely treated by the changes in the deduction schedule relative to workers employed at firms with lower baseline dues.

2.3 Conceptual Framework

The conceptual framework underlying our analysis can most concisely be introduced through a thought experiment. To this end, consider three workers at different stages of their careers (entry stage, mid-career stage, and retirement stage) that recently have been hired at the same firm. Each of these workers may have different preferences for specific work amenities simply because they are at different stages in their careers and, therefore, have different needs and wants. These amenities include wages, the work environment, promotion possibilities, job security, and other amenities. Each of these amenities can be negotiated over with the employer.

Assume that a single labor union operates in the firm, and there is free entry and exit into the union as long as the worker pays a membership fee. This corresponds to the norm for many countries in the OECD and Europe where closed-shop union agreements are typically illegal. Each of the three workers may be more or less sensitive to the membership fee, and each will join the union if and only if their utility from the total package of amenities under union membership (net of their disutility of paying union dues) exceeds the utility of the amenity package of non-membership. At a fundamental level, this decision rule implies that there must be a private goods components associated with union membership. If not, then there would not be a sufficient private utility return to union membership to offset the utility cost of union dues.⁴

Next, consider the union's objective. The union is interested in recruiting as many of these three workers as possible while maintaining its existing membership base. Attracting members requires spending union resources to improve the various job amenities of these workers. The union faces two constraints to its activities. First, the union cannot push for amenity premiums that are too generous as this could jeopardize the employment security of existing members. Second, the union's resources are restricted to what it receives in union dues. This means that unions must carefully allocate their limited resources across amenities and worker types to maximize new membership without pushing the firm's profit below a minimum threshold.⁵

⁴In equation form, the utility of worker type T is given by $U_T[w,e,p,s,x]$, where w, e, p, s and x represent wages, the work environment, promotion possibilities, job security, and other amenities. T represents worker type, with $T=\{\text{entry stage, mid-career stage, retirement stage}\}$ in our example. A worker will join the union if and only if $U^T[\text{Member}] - \text{Dues}^T[\text{Member}] \geq U^T[\text{Non-member}]$.

⁵The objective function of the local union can therefore be defined as maximizing the number of workers who receive a net positive utility gain from union membership subject to a budget constraint and a normal profit constraint: $\text{Max} \sum_{i=1}^n \delta_i (U^T[\text{Member}] - \text{Dues}^T[\text{Member}] \geq U^T[\text{Non-member}])$ subject to (1) $\sum_{T=t}^s \sum_{A=a}^b BC_{T,A} \leq \sum_{i=1}^n \text{Dues}_i$ and (2) $\pi \geq \pi_0$. δ_i is an indicator function taking the value of 1 if the net union benefit is positive for worker i . (1) requires that the total aggregate bargaining cost (BC) across all worker types T and amenities A

For the union, suppose some amenities are more costly to secure on behalf of the youngest worker, while other amenities are more costly to obtain for the older workers. For example, the union may find that pushing for higher wages for entry-level union members requires few conversations with management and relatively little time, but bargaining for wage increases for union members near retirement requires more effort and resources. This may be because the union can more easily appeal to the outside options of recent labor market entrants and their closest competitors when negotiating with the firm leadership. Alternatively, the union may find it easier to encourage the firm to retain a more experienced, mid-career worker than the entry-level worker in the case of a negative demand or performance shock (because they have a track record that can be called upon). Altogether, the differences in costs by worker age and type of amenity, coupled with the fact that workers value these amenities differently, mean that the union has an array of actions it can take to minimize the cost of trying to recruit all three of the new workers.

Based on the above framework, there are three key aspects that will affect the union's decision of how to allocate their scarce resources and efforts to maximize union dues through membership. First, union membership is a multi-attribute good that can influence a worker's career on several dimensions over and above wages (e.g., job security, work environment and/or worker voice, promotion possibilities, etc.). While we are not the first to make this claim, existing models of union behavior typically focus only on employment and wages, treating all other amenities as exogenously set.

Second, different types of workers have different preferences over these amenities, such that a union's bargaining activity focused on particular amenities can move a worker's utility by different magnitudes depending on the worker's type. For example, a senior worker may prefer job security over wage gains and young workers may prefer promotion possibilities over job security. This allows for different union utility premiums for different worker-amenity cells. Heterogeneous worker preferences for union amenities have been discussed at length in prior work and are typically resolved through arguments based on the insider-outsider framework (Lindbeck and Snower, 1988) or the median voter theory (Farber, 1978) such that the problem becomes one of maximizing the utility of a representative worker. However, these simplifications do not hold once we allow for unions to provide different premiums to different worker types.

Third, there are different costs to the union of raising premiums for different worker types and amenities. For example, a union may need to use less time and resources to secure worker protection concessions from the firm when bargaining for workers close to retirement because they have a track record that can be called upon in negotiations and the legal framework facilitates differential treatment of senior workers in terms of job protection. Bargaining heavily to prioritize

cannot exceed the total resources that the union has at its disposal captured by the total amount of dues at the start of the negotiations. (2) states that the profit of the firm cannot be shifted down below a critical level (π_0) as this would compromise the operations of the firm and the employment stability of existing union members.

younger workers' job security may require more time and effort as it deviates from norms around seniority. A union may more easily be able to push up wages for new entrants by appealing to the outside options of recent labor market entrants and their closest competitors. Direct wage bargaining costs for individual discussions of worker roles and promotions may be low, while amenities that involve the legal system or that require industrial action responses may be more costly to secure. Prior models of union behavior have, to the best of our knowledge, typically abstracted away from this aspect of the union's optimization process.

Taken together, the above discussion highlights (a) that worker types may differ in their amenity preferences across the lifecycle, (b) that it may be differentially costly for the union to provide membership premiums to workers depending on amenity and worker type, and (c) that unions seek to minimize the cost required to provide union benefits that exceed the utility cost of union dues for the largest number of workers. When deciding on how to allocate their scarce resources and efforts to maximize union membership (and, consequently, dues), unions may therefore target and be differentially successful in providing various amenities to different worker types depending on the relative costs of securing certain amenities and workers' preferences for them. Even absent flexible individual local bargaining (as in Norway), unions can always choose to focus their efforts on particular classes of workers as they negotiate over the terms of collective or firm-level agreements, particularly by career stage (e.g. through larger wage increases for entry-level workers, tenure-specific wage gains or job protections, or age-specific retirement benefits). Compared to this framework, existing models of union behavior often abstract from the idea of union membership as a multi-dimensional good, have not allowed unions to provide different premiums across worker types (and thereby removed the issue of heterogeneous compensation preferences of workers), and have not considered that there may be amenity-specific premium costs to unions.

3 Data and Descriptive Evidence

3.1 Data

We leverage population-wide administrative data on the universe of workers in Norway. Our main data source is the linked employer-employee register. These data provide us with information on each worker's employer, work characteristics, work location, establishment, occupation, and contractual hours.⁶

We link the employer-employee data to the income tax register, which provides detailed information on earnings. Earnings are defined as pre-tax income (income from labor and self-employment) excluding any government transfers (such as parental leave, sick leave, and unemployment benefits). We also construct a measure of hourly wages, obtained by dividing labor earnings by hours worked. To calculate work hours, we note that we do not have information on the exact number of work hours before 2015. Rather, we have categories of work hours. To convert

⁶To ease computational constraints, we estimate our models on a 50% random subsample of workers.

these to actual hours, we use the midpoint of each category except for the highest category (30+ hours) which we assign 37 hours.⁷

In addition to earnings, wages, and hours, we use the employer-employee data to construct measures of job promotions. First, we generate an indicator variable that takes the value of one if a worker shifts to an occupation located higher up on the wage distribution. Since we include firm fixed effects in our estimation, the outcome examines the impact on within-firm vertical occupation moves. Second, we construct a variable that takes the value of one if the worker shifts firm to one whose average earnings are higher than their current firm.

Acknowledging that unions may impact workers' involvement with the country's social insurance system (through, for example, its effect on work environment and job protection), we also incorporate information from the tax and transfer registers in Norway. This allows us to collect information on the individual use of the most common short-term welfare programs in the country. These include sick leave, unemployment benefits, cash payments, and housing and education support. The combination of these programs is a summary measure of the total amount of short-term transfers an individual received from the government in any given year.

Finally, crucial to our analysis is the ability to observe individual-level union information over time. We obtain this data from a register-based union membership data set constructed by the national tax authority, which provides detailed information on how much workers pay in union dues each year.

The government changes to the maximum allowable tax deduction for union dues that we exploit occurred primarily between 2003 and 2010. We have complete data on individuals and their occupations going back to 2001, and we, therefore, restrict the main analysis to the years 2001 through 2015 (the last year for which we have data).

In addition to the rich individual-level administrative data, we conduct a survey on a sample of workers in Norway. The survey provider screens workers on union membership, age, and work history, ensuring that we obtain a sample of approximately 300 union members and 300 nonunion members (all of whom are currently working) in each age bracket for which we conduct the analysis. In total, our survey sample consists of 5,200 workers. The full survey is provided in the Appendix.

In the survey, we collect information on the workers' ranking of core career amenities (monetary compensation, job protection, promotion facilitation, and work environment), their perception of unions' ability to influence these amenities, and whether workers believe that individual union membership matters above and beyond union presence at the firm (i.e., whether there are perceived private-good components to the union-provided benefits). Finally, we collect information on workers' price sensitivity to union membership by asking whether workers would reconsider

⁷This assignment is based on the observed distributions of hours from the data on detailed work hours we have access to beginning in 2015.

joining (leaving) the union if the net-of-subsidy union dues decreased (increased) by a specific amount. We randomize this amount in 500 NOK intervals across workers, from 500 to 2500 NOK (approximately 50-250 USD). We use these responses to validate our first-stage effect for the price sensitivity of union membership and demonstrate that workers consider union-provided benefits across all these amenities to contain substantial private-good components.

3.2 Descriptive Evidence

To fully understand the career effects of union membership across the life cycle of workers, it is instructive to first understand who enrolls in and utilizes labor unions.

We begin by describing the overall union membership rate and the age distribution of union members. As noted in Section 2, workers may value different aspects of the work environment differently across their careers, and a union’s ability to aid a worker may differ depending on where in the career that worker is. Thus, the costs and benefits of union membership may differ across the life cycle, something that may generate variation in the share of workers who join unions across different ages.

The results from this exercise are shown in Figure A2. Four observations are worth noting. First, few workers join unions at the beginning of their careers, with only 15 percent of 20-year-old workers being members. Second, the probability of joining a union rapidly increases over the first ten years of a worker’s career, with approximately 50 percent of the workforce being members of unions at age 30. Third, the union membership probability continues to increase beyond age 30, though the age gradient is considerably flatter. Fourth, union membership peaks at age 60, with almost 70 percent of the workforce being members at that age. Interestingly, the peak unionization rate at age 60 has remained constant over the past 20 years. The hump-shape in union membership propensity aligns well with the evidence for the U.K. documented by Blanchflower et al. (2022), while changes in this pattern over time might explain changes in job satisfaction in the U.S. (Artz et al., 2022).

We next explore whether union membership represents a permanent state for a worker (Figure 1). This is a question that has been difficult to explore in the past. However, from a policy perspective—and from the perspective of our empirical method—it is important to understand the extent to which individuals appear marginal to union membership. Panel A shows that 40 percent of the workforce never joined a union during this sample period and that 20 percent of the workforce spent their entire working lives during our sample period as members of labor unions. The remaining 40 percent is distributed relatively equally across the intensive margin of the share distribution, revealing a substantial degree of inflows and outflows from unions over the course of workers’ careers. The results in Panel B reinforce this observation, showing that only one-third of

those who ever enroll in a union remain in a union for the duration of their working lives.⁸⁹

Finally, we descriptively investigate the union wage premium across the life cycle of workers. The results from this exercise are shown in Panels A and B of Figure 2. First, young workers that are union members have far higher earnings than those not in a union, with a difference of nearly 40 percent. Second, while the age-wage profile for non-union workers is relatively steep during the first 20 years of their careers, the age-wage profile for union workers is much flatter. As a consequence, by the time individuals reach age 40, there is no longer a wage gap between union and non-union workers. Third, while the age-wage gradient slopes downwards for non-union workers after having peaked at age 45, the age-wage gradient remains flat for union workers. Acknowledging that many of the correlations in Panel A are likely driven by endogenous worker selection into unions, we re-estimate the age-wage relationship but control for gender, immigration status, industry, education level, and year. The result, shown in Panel B, shows that accounting for observable characteristics has a limited impact on the overall pattern in Panel A.

In addition to examining the descriptive wage pattern of union and non-union members over the life cycle, we also provide descriptive information on individuals' use of the public welfare system as a function of union status. Panels C and D of Figure 2 suggest that union members receive less (nearly 4,000 NOK) in direct transfers from the government at the start of their careers relative to nonunion members. This gap narrows during their 30s and early 40s and closes entirely by age 50. These gaps persist after controlling for gender, immigration status, industry, education level, and year.

3.3 Survey Evidence

Before estimating the causal effect of union membership on workers, it is helpful to examine workers' own perceptions of unions. To this end, this subsection provides a series of descriptive plots based on results from the survey we introduced in Section 2.

First, Figure 3 shows that workers are very price-sensitive to union membership; nearly 60 percent of the surveyed union members under age 40 would consider leaving the union if the monthly net-of-tax union dues increased by 500 to 1000 NOK (50-100 USD). A similar proportion of nonunion workers would consider joining a union if the net-of-tax union dues decreased by 500 to 1000 NOK. Even if we interpret these results as an upper bound of the true price sensitivity of membership, this implies a considerable price elasticity.¹⁰

⁸To further explore the union-switching behavior of individuals, Panels C and D of Figure 1 provide information on the share of workers switching into and out of unions each year by age.

⁹We also examine whether certain industries and sectors are more represented among union members than others, and if there are significant trends across industries over time (Figure A1). The public sector represents the most unionized sector in the economy. In the private sector, there is a considerable spread in union representation across industries. While all industries have experienced a slight decline in union density over the past 30 years, the relative ranking of these industries as measured by union membership has remained stable. Notably, the downward trend in union density after 1993 begins to level off for many industries with the expansion of tax subsidies for union dues in Norway.

¹⁰A change of 500 NOK per month coincides with a 6,000 NOK change per year. A rate of 50-60% reconsidering

Second, Figure 3 also reveals that there is a steep age gradient associated with the price sensitivity of membership; young workers are more price-sensitive to union membership than older workers. For example, while 55 percent of union workers aged 25 through 29 would consider leaving the union if the price increased by 500 to 1000 NOK, only 20 percent of union workers aged 60 through 64 years old would do the same. This result also aligns well with the nonunion workers' response to why they do not join unions: more than half state that the cost of union membership is too high (Figure 7). This result suggests that using changes in union dues as an instrument for a worker's probability to unionize likely is associated with a strong first stage. Empirically, the age gradient of price sensitivity to union membership holds when we consider the costs of joining a union relative to the earnings of workers over the age distribution as well as the base rates of unionization over age, which we explore in Section 5.2.

Third, we elicit workers' relative preferences over different job amenities. Figure 4 shows that the average union worker considers monetary compensation to be the most important career component of their jobs, followed by job security, work environment, and lastly promotion possibilities. There is also notable age heterogeneity in amenity rankings. Specifically, young workers assign a higher value to promotion possibilities than older workers, older workers assign a higher value to job security, and mid-career workers assign a slightly higher value to the quality of the work environment. The differences across age are economically meaningful in promotion possibilities and job security, while they are very small with respect to work environment. Older workers assign considerably more value to salaries than young workers. The ranking of amenities for union members and nonunion workers is nearly identical.

Fourth, we ask union members to rate a union's ability to positively affect job amenity X on a scale of 0-100 (Figure 5). Workers' perception of unions' ability to influence the four core job amenities largely aligns with the workers' individual ranking of these amenities. Interestingly, there is very little evidence of differences in workers' perceptions of the unions' ability to influence these amenities across age groups.

Finally, we elicit perceptions of the public-good components of union membership by asking what portion of the union-induced benefits related to work amenity X they believe can be obtained by non-members (Figure 6). Union members perceive union-provided career benefits to contain a substantial private-good component across each of the four amenity bundles we examine. Interestingly, members perceive wages and salary to contain a higher public good component than the other three dimensions, but still attribute as much as 40 percent of any union-induced salary benefits to a worker's individual membership status. This perception does not vary significantly

their union membership choice at a change of 6,000 NOK implies approximately 8-10% reconsidering at a 1,000 NOK change. In the first stage estimates for our instrument, a 1,000 NOK decrease in net union dues predicts an increase in union membership of approximately 11 percentage points, implying a very similar sensitivity to these survey responses.

across the ages of workers with the exception of workers aged 25-29.¹¹

4 Empirical Method

4.1 Identification Challenge

Union membership is not exogenously given but is a result of endogenous selection. To overcome the selection issue, we exploit increases in the cap on the allowable tax deduction for union dues in Norway that took place between 2002 and 2010, with additional minor increases between 2011 and 2014. These increases led to significant changes in the net price of union membership for some workers (Barth et al., 2020b; Dodini et al., 2022). These changes reduced the monetary cost of becoming a union member for workers whose ability to deduct their union dues from their taxes was previously bounded by the deduction cap. Panel A of Figure 8 shows the evolution of the maximum deduction over time. The deduction cap was relaxed from 900 NOK in 2002 to over 3,800 by 2010, an increase of almost 400 percent.

Increases in the maximum dues deduction cap affect workers differently depending on their baseline gross dues. To illustrate this, let D denote the baseline union dues, τ the tax rate, and c_0 and c_1 the initial and new cap respectively. Net-of-subsidy union dues in period i are $(1 - \tau)D$ for workers whose dues are below the cap, and $D - \tau c_i$ for workers whose dues are above the cap. Those below the old cap ($D < c_0$) experience no change after the policy. Those above the old cap but below the new cap ($c_0 < D < c_1$) experience a decrease in their net-of-subsidy union dues of $\tau(D - c_0)$, with the total change increasing linearly. Workers whose dues were above the new cap ($D > c_1$) receive a fixed subsidy decreasing their net union dues of $\tau(c_1 - c_0)$.

Panel B of Figure 8 provides an illustrative example of these gaps between base dues and net dues after the subsidy went into effect assuming the top marginal tax rate of 42%. As the deduction cap increased over time, the vertical distance between base dues and net dues increases over time, representing the effective subsidy. Our empirical approach is akin to an instrumented difference-in-differences design in which we compare individuals over time as a function of the subsidy bite.

4.2 Technical Implementation

A worker's union dues depend predominantly on the job in which they are working, namely, their occupation and industry. We, therefore, impute a union dues amount for each worker in our data by calculating the mean union dues paid by workers in their occupation-industry cell in each year. For workers in a union, this eliminates concerns about heterogeneous selection into differently-priced unions and individual determinants of union dues.¹² For non-union workers, this allows us to assign counterfactual union dues (the dues they would most likely have paid if they had been members). We then roll these individual values up to the firm level and construct average

¹¹As part of an extension, we conducted a second survey of union members and ask if they believe that their union prioritizes some members over others. Approximately a quarter of respondents indicated that their union does prioritize the interests of some members over others.

¹²However, this imputed value is highly predictive of actual union dues paid in the raw data among union members.

firm-level effective union dues by taking the average of the imputed union dues across all the firm's workers in each year.

There are two types of endogenous responses to the change in maximum deductions to be aware of. First, it is possible that firms and unions endogenously respond to the subsidy legislation by altering the occupations they decide to employ workers in, or by changing the union dues directly. Second, union membership as induced by this policy change may generate differential sorting across firms. To overcome both of these issues, we fix each worker's imputed "baseline" union due, D_{fb}^0 , at the first firm in which they appear in the data at or after age 25.¹³ For most people, this base year is 2001. We then adjust for inflation forward to nominal NOK.

We define the net-of-tax union dues $NetDues_{ft}$ as the baseline union dues at the firm minus the effective subsidy to unionization from the tax deduction in a given year t . This subsidy is equal to the base tax rate multiplied by the lesser of the legislated maximum deduction ($MaxDeduction_t$) and the worker's imputed base union dues ($\overline{D_{fb}^0}$).¹⁴ This is our instrument.

$$NetDues_{ft} = \overline{D_{ft}^0} - T_t * (\min\{\overline{D_{ft}^0}, MaxDeduction_t\}), \quad (1)$$

Using this instrument, we estimate the following equations (base year fixed effects suppressed for simplicity):

$$y_{iocaf,t+1} = \alpha + \beta \hat{U}_{it} + \gamma_t + \zeta_{ab} + \eta_a + \iota_{ocb} + \kappa_{oc} + \lambda_{fb} + \phi_f + \delta_{i\bar{U}} + \epsilon_{itocaf}, \quad (2)$$

$$U_{itocaf} = \tau + \pi ND_{ifb} + \gamma_t + \zeta_{ab} + \eta_a + \iota_{ocb} + \kappa_{oc} + \lambda_{fb} + \phi_f + \delta_{i\bar{U}} + \mu_{itocaf}, \quad (3)$$

where Equation 3 represents the first-stage and Equation 2 represents the second-stage.

In the first-stage equation, U_{itocaf} represents the union membership status of individual i in age group a at time t in occupation-industry cell oc and firm f . The instrument, ND_{ifb} , is assigned to individuals based on the first firm the person appears in, and we always include fixed effects for both current as well as baseline characteristics. Specifically, t captures year fixed effects, a (a_b) is age (at baseline) fixed effects, oc (oc_b) represents occupation-industry fixed effects, f (f_b) are firm fixed effects, and $\delta_{i\bar{U}}$ is an indicator for whether the person was an "always-taker" of union membership. We account for always-taker status for two reasons. First, always-takers are employed in the same firms, occupations-industry cells, age groups, and years as marginal union members, so always-takers will contribute to variation in the fixed effects for all of these cells. Thus, their inclusion in the sample may be important. Second, while always-takers contribute to variation in the fixed effects, they do not contribute to identification in the first stage because

¹³We impose the age 25 condition because we want to characterize the career outcomes of workers after they are likely to have completed education and entered more permanent aspects of their work life. When we relax this assumption, our estimates are less precise but consistent.

¹⁴We apply the base tax rate to isolate changes in the guaranteed *statutory* subsidy from changes in the *realized* subsidy that may depend on marginal tax rates.

there is no variation in union membership among this group. Not accounting for always-takers means that the estimated first-stage coefficient of the instrument will be smaller because there is no variation in the union membership choice of always-takers, leading to proportionately larger but noisier second-stage estimates.¹⁵

In the second stage equation, $y_{itocaf,t+1}$ represents an outcome of interest for individual i at time $t + 1$ and β measures the effect of union membership on that outcome using ND_{if_b} as an instrument. We use the outcome the next year to capture the effect of the union with a full year of membership, as individuals could choose to join a union partway through the year, leaving limited time to measure effects in the same year. We cluster the standard errors on the individual level, as this is the level of treatment assignment. However, our results are robust to clustering at the base firm level as well (see Table A7).¹⁶ When implementing our estimation procedure with interactions for age group a to uncover heterogeneous treatment effects over age, we interact dummy variables for age group a with the instrument ND_{if_b} to serve as instruments for the interaction between union membership U_{itocaf} and a , resulting in eight combined instruments for eight endogenous interactions estimated separately (Wooldridge, 2010).

4.3 Identifying Variation and Threats to Identification

Identifying variation in the instrument comes from differences in the occupation-industry mix of each worker’s base firm combined with changes in the tax policy over time. The base industry and occupation composition of the firm determines which firms are bounded by the maximum deduction in the minimization function and by how much as the maximum deduction changes. Workers whose base firms have high imputed union dues are more intensely treated with the subsidy when the deduction caps are relaxed over time, so there is a larger relative decrease in their net union due. Changes in the net price of union membership are therefore exogenously loading on some workers and not others for reasons unrelated to labor market or firm conditions over time, and the variation is induced only through the tax policy. In addition, our instrument also rules out any endogenous firm transitions that may be correlated with unionization or the net price of union membership at their current firm because the instrument is constructed for the worker’s base firm, and we non-parametrically control for both the base firm and current firm. Identifying variation is not confined to particular industry and occupation groups; Tables A2 and A3 show that exposure to the instrument is widespread across these dimensions.

The key assumptions underlying our empirical method are that (1) workers respond to changes in union membership price (the relevance criterion), (2) the only channel through which the union

¹⁵Thus, not accounting for always-takers generates slightly larger point estimates, which we show in Figures A6 and A7. However, these estimates are also less precise, and in nearly every case, are not statistically distinguishable from our more precise estimates that include the always union indicator.

¹⁶Because treatment is at the individual level (Abadie et al., 2017) but the instrument is determined by a combination of individual and base firms, the level of clustering may be an arguable point. Clustering at the individual level is designed to account for heteroskedasticity and serial correlation within individuals over time.

dues subsidies affect individual career outcomes is through their effect on membership probability (the exclusion restriction), and (3) there are no defiers (the monotonicity assumption).

In terms of (1), we directly verify the relevance assumption in the next section through our empirical first-stage estimation and show that workers are highly responsive to changes in union membership price. In terms of (2), although the exclusion restriction cannot be tested, we can think of no other pathway through which the union dues subsidy may impact worker's outcomes given our setup, and we further note that previous papers using similar instruments have found no reason to suspect that the assumption is being violated (e.g., Barth et al. (2020b); Dodini et al. (2022)). In terms of (3), a violation of monotonicity in our setting could only occur if union membership is a Giffen good at certain prices, which is highly unlikely.

Overall, our causal estimates of the union membership effect represent the local average treatment effect (LATE) among “compliers,” i.e. those who joined a union as a result of the subsidy-induced reduction in the costs of union membership. It is, therefore, instructive to examine compliance rates among the exposed individuals in our sample. This allows us to better understand whether the effects we identify are driven by a select group of workers who react more strongly to the instrument, or if the results apply more broadly to the Norwegian working population.

In our estimation models, the instrument is continuous, which requires some adaptation from the typical complier analyses used in the event of binary instruments. To this end, we follow Dahl et al. (2014) and estimate a first-stage regression of union membership on the change in net dues from the prior year after accounting for the fixed effects from our baseline model (i.e., age group, occupation by industry, firm, etc.). We then compare predicted treatment take-up (being a union member) at the 1st percentile of residualized changes in net dues to the predicted treatment take-up (being a union member) at the 99th percentile. Put differently, we examine the set of workers that would have switched their union status at the top and the bottom of the instrument exposure distribution, which helps us scale take-up by the entire range of the instrument. We then repeat this analysis within each age group and for different demographic subgroups within each age category.

The results from our complier analysis are provided in Table A4. The compliance rate is slightly higher for natives than immigrants, for women than men, for public sector workers than private sector workers, and for high educated workers than low educated workers. The characteristics of differentially-aged workers that comply with the instrument are similar. Overall, there is significant overlap in compliance rates among the age-specific worker groups, meaning that compliers are similar across ages.¹⁷

One concern with our research design may be that the instrument reflects workers at firms with high union dues and that high union dues are not randomly assigned: they may reflect factors relating to the underlying demand for union representation, the expected future benefits of union

¹⁷In addition, exposure is relatively well distributed across both industries and occupations (Appendix Tables A2 and A3).

representation, and current and future working conditions at the firm.

However, a relationship between these factors and baseline outcomes does not threaten the validity of our estimation approach. The reason is that our empirical design is akin to an instrumented difference-in-differences design, in which we compare individuals at high and low subsidy firms over time as a continuous function of the subsidy bite. For our approach to be valid, firms need not be identical in the base year; rather, they must simply trend similarly to each other absent the policy shift, such that workers in low-exposure firms can be used as credible counterfactuals to workers at high-exposure firms in the absence of the subsidy changes because they have the same potential outcomes (Hudson et al., 2017).

To visualize the relationship between the instrument and union membership, Figure A5 shows how union membership (the first stage) and earnings (the second stage) evolved over time for workers whose base firm had larger reductions in their net union dues relative to smaller reductions in net dues, which we proxy using the top and bottom quartiles. Panels A and B demonstrate parallel trends as a function of exposure to the instrument and that firms experiencing a higher exposure are not on a different trajectory either for the treatment (union membership) or the outcome of interest (earnings). This relationship also does not change with the incorporation of additional controls (Panels C and D). Thus, prior to the subsidy expansion, low-exposure firms were trending similarly to high-exposure firms and had similar evolutions of other observables over time such that the panels are strikingly similar. This exercise suggests that low-exposure firms can be used as post-expansion counterfactuals for high-exposure firms had those firms not been highly exposed to the union subsidy policies. These parallel trends lend support for a causal interpretation of the results we present in Section 5.

Examining Panels A and B of Figure A5, we also see preliminary raw evidence of a first-stage effect of the subsidy increases on union density, as well as a second stage effect on worker wages. Specifically, we see that the union density gap between high- and low-subsidy firms reaches approximately 3.5-4 percentage points by the end of 2010, while the earnings gap between the two is approximately 20,000 NOK, or about 4% of the 2010 mean earnings. This suggests earnings gains of one percent for every one percentage point increase in union share. This comports closely to other estimates in the literature (Barth et al., 2020b; Dodini et al., 2022).

One of the reasons why we observe such clear parallel trends, even without including our rich set of fixed effects from our main model, is that these firms are very similar to each other at baseline (both with and without the fixed effects used in our main model; see Tables A5 and A6).¹⁸

¹⁸While there are a few statistically significant differences, these are very small, and with the inclusion of our controls they are not economically meaningful. For example, being a female is associated with an 11 NOK (\$1.10) larger increase in the subsidy over the entire subsidy period, and being a high school graduate is associated with an 11 NOK smaller increase in the subsidy. However, we again emphasize that firms need not be identical in the base year; rather, they must simply trend similarly to each other absent the policy shift, such that workers in low-exposure firms can be used as credible counterfactuals to workers at high-exposure firms in the absence of the subsidy changes because they have the same potential outcomes (Hudson et al., 2017).

4.4 Alternative Identification

In an alternative estimation approach, we estimate an individual fixed effects model in which we examine the relationship between earnings and union membership with fixed effects for age, year, occupation by industry cells, and firms. Identifying variation in the model comes from individual workers switching into and out of union status over their working lives. While the determinants of when or if a worker switches union status are likely endogenously related to other determinants of wages and work, this approach provides a separate check on the raw earnings outcome in Figure 2. We include this in Figure A11.

Looking at the estimates provided in Figure A11, we see a large union wage premium among young workers. This positive wage effect monotonically declines until age 35-40, at which point it flattens out completely. However, the effect is still positive for older workers. Overall, the individual fixed effects model thus aligns well with our raw descriptive plot and suggests significant earnings premiums associated with union membership that decline over age.

5 Results

In this section, we present our core findings of the effect of union membership on the career outcomes of individuals across the life cycle.

We begin by showing the average effects of union membership on workers across the career dimensions discussed in Section 3. We then proceed to estimate age-specific union membership effects, dividing workers into 5-year age bins and interacting each with our instrument in the first stage and with predicted union membership in the second. Finally, we run horse-races between predicted leave-one-out firm-level union density from our instrument and predicted individual union membership to carefully differentiate the public goods component from the private goods component of unionization. This model specification instruments both for individual membership and leave-one-out firm-level unionization and is intended to disentangle any firm-level union effects from any individual-level union membership effects.

Our decision to focus on the age dimension of union wage effects is motivated by an emerging and rapidly accelerating empirical literature on the lifecycle effects of labor market institutions and conditions (e.g., von Wachter (2020); Arellano-Bover (2024); Rinz (2022); Cotofan et al. (2023); Salvanes et al. (2024)). These papers highlight how insights from the worker lifecycle model (from training and recruitment to development and retirement) provide important predictions for how shocks and institutions may have fundamentally different impacts on individuals depending on where in the career they are located. However, there is a rich set of dimensions, beyond age, through which union effect heterogeneity would be interesting to explore. To this end, we also have added an appendix table to the manuscript in which we explore differential union wage effects across a rich set of worker characteristics: gender, education, industry, skills, and household structure. Each of these demographic splits reveals interesting effect differences that warrant at-

tention, highlighting the potential inequality effects of unions across different groups of workers within the same firms. We believe that this is a particularly important area to focus on in light of existing work on unions and wage equality (e.g., Card et al. (2004; 2020)).

5.1 Average Effects Across Workers

Table 1 provides results from estimating the mean impact of union membership on monetary compensation (Columns 1 and 2 of Panel A), job protection (Column 3 of Panel A), promotion facilitation (Columns 4 and 5 of Panel A), work environment (Column 1 of Panel B), and short-term transfer usage (Columns 2 through 3 of Panel B).

We first note that our first-stage estimates show that a 1,000 NOK reduction in the net cost of union membership increases the likelihood that a marginal worker joins by approximately 11 percentage points. This is similar to our survey evidence, which suggests approximately an 8-11 percentage point effect per 1,000 NOK. We discuss this in more detail when we turn to heterogeneous effects across the lifecycle, but highlight here that the first stage effect is not only economically meaningful, but also statistically very strong.

For monetary compensation, Panel A demonstrates that union membership generates a substantial wage premium as well as a considerable increase in the number of hours worked. The union wage premium, 0.08 log points, is slightly smaller but comparable to that which has been estimated in the prior literature based on a range of different empirical methods. For example, using novel data from the late 1930s to the early 2010s, Farber et al. (2021) provides descriptive evidence of a consistent union income premium of approximately 0.1-0.2 log points over time. The economically meaningful and statistically significant effect on hours worked that we uncover highlights that the effect of union membership on the overall take-home wage is even larger than that shown in column (1). The reason is that union membership does not only boost a worker's wage conditional on hours worked, but also increases the total number of hours worked.

With respect to job protection, the results in column (3) show that union membership generates a reduction in the intensity with which workers lose their jobs and receive unemployment benefits. Specifically, union members induced to join by our instrument receive an average of 14,600 NOK less in unemployment benefits a year. This suggests that union membership bestows a certain degree of job security to members, protecting them against layoffs at the workplace and/or reducing the length of an unemployment spell.

For promotion possibilities, columns (4) and (5) show results consistent with the idea that union membership facilitates vertical moves within the worker's existing firm, and discourages moves to other firms. In terms of magnitudes, union membership increases the probability of a vertical move within the firm by approximately 8 percentage points, and reduces the probability of a vertical move across firms with approximately 13 percentage points. In the next subsection, we will show that these average effects mask considerable heterogeneity across the life cycle of workers.

With respect to work environment, which we proxy by workers' use of Norway's generous sick leave system, we see a small and not statistically significant average reduction in sick benefit take-up as a consequence of joining a labor union. As we will show in the next section, the effects on sick leave take-up mask significant countervailing heterogeneity over age.

To summarize the impact of union membership on the average worker's use of the short-term transfer system in Norway, column (2) of Panel B shows the overall impact of union membership on the amount of money received from the central government through unemployment, sick leave, housing assistance, scholarships, and direct cash assistance. Column (3) shows the effect on the probability of receiving any of these social support transfers. In response to union membership, these transfers are reduced by approximately 13,000 NOK and the probability of using the safety net system drops by 8 percentage points (not statistically significantly different from zero). The result in column (2) can be viewed as a combined intensive and extensive effect of union membership on safety net usage, while the result in column (3) can be interpreted as a pure extensive margin effect. The effects show that labor unions may reduce individual workers' dependence on the welfare system through improved job protection and a higher-quality work environment.

Taken together, this section has examined the impact of union membership on the average worker in the labor market. While the results on wages are consistent with prior literature, the effects with respect to job security, promotion potential, work environment, and welfare usage, allow us to break new ground in understanding the overall role unions play in determining the career outcomes of individual workers. Relating these results to the survey results, it is interesting to note that the size and statistical significance of these effects appear to largely correspond to workers' ranking of career amenities shown in Figure 4.

As demonstrated by the survey results in Figure 4, worker preferences for various career outcomes vary somewhat across their careers. In addition, a union's ability to bargain for a particular worker may also depend on which stage of the career a worker is in and which amenity is being bargained over. As such, it is possible that there is substantial variation in the effect of union membership across the life cycle of workers. We turn to this question in the next section.

5.2 Heterogeneous Effects Across the Life Cycle

To provide empirical support for the patterns of differential price sensitivity from our survey in Figure 3, we present the different first-stage responses in Table A1. After accounting for differences in baseline earnings and unionization rates over age, large differences emerge. Relative to their baseline propensities to unionize, workers ages 25-29 are more than 1.5 times more sensitive to a 1% change in the total earnings cost of joining a union than their counterparts over age 45. This follows closely the relative differences in Figure 3, where approximately 30% of non-union workers ages 45-49 would reconsider their choice compared to nearly 60% of those ages 25-29.¹⁹

¹⁹What may account for the age-variance in the price elasticity of demand for union membership? First, prior work in economics has shown that young workers tend to be considerably more income-constrained than old workers

To examine variation in the causal effect of union membership across the life cycle, we estimate versions of Equations 2 and 3 in which we interact dummy variables for age group a with the instrument ND_{ifb} to serve as instruments for the interaction between union membership U_{itocaf} and a , resulting in eight combined instruments for eight endogenous interactions estimated separately (Wooldridge, 2010). To facilitate the interpretation of the results, we then plot the relevant coefficients in figures together with 95 percent confidence intervals, providing us with a detailed overview of how the union membership effects change as a function of the worker's age.

Concerning monetary compensation, Panel A of Figure 9 provides estimates of the effect of union membership on wages as well as hours worked. For wages, the results show that the union wage premium varies greatly across a worker's career. Specifically, while individuals enjoy large union wage premiums at the beginning of their working lives, this premium monotonically declines in size until age 45 at which point it ceases to be economically and statistically significant. This effect closely mirrors the descriptive patterns in Section 3.2.²⁰ This finding helps advance prior literature on the union wage premium, which has found a substantial wage effect of union membership (e.g., (Card et al., 2004; Farber et al., 2021)) for the average worker without considering heterogeneous effects across their careers. Panel A also shows that the union membership effect on hours worked is slightly larger for the very young workers aged 25 through 29, suggesting that part of any differential earnings effect across the life cycle may be driven by the union's impact on individuals' work hours.

In terms of the magnitude of our wage effects, our results for the very young workers are about 0.1 log points larger than the average effects among all workers identified in Farber et al. (2021) and Fortin et al. (2023), the effects for mid-career workers are more aligned with the average effects identified in Sojourner et al. (2015) and Card et al. (2004), and the lack of effects for old workers are similar to the average effects found in DiNardo and Lee (2004). Our results suggest that one reason for the mixed results found in the earlier literature, both with respect to magnitude and statistical significance, may be differences in the composition of workers that are being examined and not only due to differences in estimation methods.²¹

and, therefore, also display a much greater level of price sensitivity relative to old workers for goods that affect their wellbeing (e.g., Duarte (2012); Ding (2003)). This explanation is likely to apply to the union membership case as well. Younger workers in Figure 7 explicitly state they do not want to pay that much to be a member of a union. At the same time, we acknowledge that we are unable to provide a full causal decomposition of the mechanisms that drive the age-specific elasticity differences, and we see this as a very interesting direction for future work on the topic.

²⁰Estimating this effect in levels rather than in logs generates a similar result.

²¹It is challenging to separate out age effects from cohort effects through our research design, though prior work suggests cohort effects may be important in the US and UK contexts (Bryson et al., 2005). One approach is to perform a series of auxiliary analyses in which we estimate our main model separately for 10-year cohort bins. This is possible because the subsidies change over several years, such that we can examine the impact of union membership for the same subsidy change and age group, but different cohort groups. The results from this supplemental analysis are shown in Appendix Figure A4 with respect to wages and demonstrate that the age-specific result pattern is relatively constant across cohorts. In addition, Panel A of Figure A4 shows the simple union/non-union earnings gap within firms over age by birth cohorts, illustrating a nearly constant gap across birth cohorts at any given age. While care

With respect to job security and employment protection, Panel B provides estimates of the effect of union membership on the amount of unemployment benefits received. Two observations are worth noting. First, the union effect on job protection rapidly increases over the first ten years of a worker's career, with 40 through 44-year-olds experiencing a much larger reduction in their use of the unemployment insurance system than workers at the beginning of their careers. Second, the union effect on work protection flattens beyond age 44. These effects are in line with the notion that job protection may matter more for individuals during the separation phase of their careers, as skill depreciation and obsolescence pose an increasing threat of job termination. The figure suggests substantial savings to the government through reduced unemployment benefits on the order of 16,000 NOK (USD 1,600) per union member per year for those over 44.

In terms of promotion probabilities, Panel C plots the effect of union membership on advancing to a higher-paying occupation and on transferring to a higher-paying firm. The figure illustrates that unions have little impact on workers' promotion possibilities at the beginning of their careers. However, as workers age, union membership is providing workers with an increasing probability of moving up the career ladder. Specifically, the union effect on job promotions rapidly increases over the first 20 years of a worker's career, with 45 through 49-year-olds being almost 15 percentage points more likely to experience an occupational advancement due to enrollment in labor unions. After age 49, the age gradient of the union effect on occupational advancements is flat. Combined with the negative effects on firm mobility we document below, much of the increase in occupational advancement is coming from within the same firm.

With respect to across-firm mobility, Panel C also paints a more nuanced picture. Specifically, union membership has a negative effect on the likelihood that a worker upgrades to a higher-paying firm the next year. This negative effect is much larger for young workers but is both economically meaningful and statistically significant among old workers as well. This result suggests that unions may generate a lock-in effect for workers, encouraging them to remain at the existing workplace to reap the benefits of the union membership rather than transferring to other firms.

Finally, in terms of work environment—an outcome which we proxy with the intensity of utilizing the sick leave system of Norway—Panel D shows the effect of union membership on the amount of sick leave taken as a function of the worker's age. The results reveal substantial effect heterogeneity over a worker's career, with relatively sizable negative effects on sick leave usage among young workers, and positive effects on sick leave usage among old workers. While speculative, we postulate that the negative usage effects among young workers are coming from an improved work environment and increased protection against non-promotable and risky tasks that disproportionately tend to fall on new workers, while the positive usage effects among old workers are coming from improved job protection such that fear of negative worker replacement effects in

has to be taken in assessing this descriptive figure, we believe it is helpful for illustrating how little the raw gaps have changed for each age group across birth cohorts.

the event of sick leave are removed. Unfortunately, we are unable to test this empirically in the data, and we note this as a valuable area of future research. The average effect on transfer amounts from the national government for sick leave suggests modest savings of approximately 2,500 NOK per marginal union member per year.

Given the identified union membership effects on wage, hours, promotion, job protection, and sick leave, how does union membership affect a worker's overall interaction with the public safety net system? Figure 10 shows that the marginal union membership leads to approximately 15,000 NOK less in transfers for those age 25-29 coming through the unemployment, sick leave, cash assistance, housing assistance, and scholarship programs. This amount grows to a peak of approximately 20,000 (approximately 2,000 USD) NOK by age 40 and then falls gradually. For those age 55-64, there is no reduction in these transfers to union members. This is primarily due to the increased sick leave usage we identify among these workers, which appears to offset much of the effect on unemployment benefits. Overall, the transfer results suggest the largest positive fiscal externalities for workers during their peak earnings periods in the labor force.²²

An interesting question to ask is how well these effects correspond to the belief workers have regarding the unions' ability to influence key work amenities across the life cycle. As shown in Figure 5, the average worker believes that unions are best able to influence monetary compensation, closely followed by job security. They believe unions are slightly less able to influence the quality of the work environment, and even less capable of affecting the workers' promotion possibilities, though they perceive unions are still meaningfully able to do so. Interestingly, there is very little evidence of differences in workers' perceptions of the unions' ability to influence these four work dimensions across age groups. This implies a substantial information imperfection regarding workers' understanding of the union's role in their careers. Alternatively, survey respondents may distinguish between short-run benefits from unions (the focus of our paper up until now) and the longer-run effects that unions may have on workers (see Appendix Figures A9 and A10).

Taken together, the results presented in this section demonstrate that the value of a union membership varies substantially across a worker's career. It further demonstrates that unions do much more than influence wages and that they generate a net reduction in short-term government welfare expenditures. More specifically, the results show that unions play an important role at the hiring stage via monetary compensation and work environment, and at the separating stage via promo-

²²Given all the effects identified in this section, an interesting question to ask is what the overall benefit of union membership looks like across the lifecycle, calculated by aggregating all of these effects into one. This is challenging because we do not know how the identified effects translate into utility values for the individual workers. Specifically, in terms of earnings, there is a straightforward conversion into monetary values and welfare effects. However, in terms of other career effects (job protection, work environment, promotions), the conversion is more challenging and more uncertain. For example, while the effect on unemployment benefits is significant, the value that the job protection effect bestows the individual worker may greatly exceed this monetary benefit value. As such, we prefer to be cautious in our interpretation of the overall welfare effect of unions across the age distribution of workers. We believe that an interesting avenue for future research is to construct surveys that can translate the amenity effects into monetary values that are more directly comparable with the wage effects (through, for example, hypothetical scenario analysis).

tions and job protection. The overall implication of this finding is that the role of unions varies greatly depending on where in the career workers are. This result is crucial for policymakers when considering the interaction of social institutions and market structures, and how such interactions influence both individual workers as well as society.

5.3 Private versus Public Goods

When interpreting the results from Section 5.2, it is important to note that some of the goods and services that unions provide traditionally are believed to contain substantial collective goods components while others are considered to be pure private goods (e.g., (Boeri et al., 2001)). For example, while all individuals at the workplace may to some extent benefit from a union's bargaining over wages with the employer (through wage pressure spillovers), only union members can benefit from individual counseling and support for job security and promotions.

To examine the relative importance of the private and public components across our outcomes and assess the extent of spillovers to non-union members, we examine the effects of union membership interacted with two separate indicators of possible public goods: (1) the presence of a collective agreement and (2) firm-level union density. First, for the presence of a collective agreement, we control for the collective bargaining agreement status of the firm and interact our individual predicted union membership (instrumented) with the collective agreement indicator. If individual union membership provides private goods independent of the collective bargaining agreements, we expect union membership to continue to have statistically and economically meaningful effects, and that the interaction of union membership and collective bargaining status does not completely offset the effect on union membership. The results are provided in Appendix Figure A8 (over age) as well as in Appendix Table A8 (for the overall mean) and show that controlling for firm participation in sectoral collective bargaining agreements has no impact on the pattern of union wage effects identified in this section.

Second, for firm-level union density, we estimate our baseline two-stage least squares model but include an interaction between individual union membership and predicted union density from year $t-1$ at the worker's current firm on a 0-1 scale. Here, we calculate the leave-one-out predicted union density using exposure to the instrument in Equation 3 and aggregate the individual probabilities to the firm-year level, excluding each worker's own contribution to the firm's union density. Thus, in this specification, both individual union membership as well as firm-level union density are instrumented for. The results from this exercise are provided in Table 2. The table shows that both firm-level union density as well as individual-level union membership status matter for a worker's labor market outcomes. For example, at the average firm-level union density rate of 40 percent in Norway, there is a union wage premium of 5.6 percent for all workers at the firm, and an additional average effect of approximately 22 percent for those individuals at the firm who are union members. In other words, individual membership makes up 79 percent of the total union wage premium at the average firm in the private sector in Norway. However, the interac-

tion between the two variables is negative such that individual union membership has diminishing marginal returns over union density; as leave-one-out union density increases, the returns to individual union membership decrease.

The above finding is consistent with union density providing a public good to the worker, and that the spillover effect to non-union workers increases as the union density at the firm goes up. In particular, the table shows that if there is a 100 percent union firm-level density, then the effect of individual membership is negligible. In contrast, if there is 0 percent union firm-level density, then the effect of individual membership is very large. However, individual union membership still matters through most of the firm-level union density range, with a non-negligible private-good component of membership for as high as nearly 80% union density. This result is consistent with our findings from the survey and adds to a relatively sparse empirical literature on the public-private nature of union-provided goods (e.g., Hildreth (2000); Budd and Na (2000)).²³

We conclude that union membership itself plays a crucial role in a worker's ability to reap the benefits of unions and that it is important to study the worker-level effects of unionization in order to fully capture the impact of unions on workers. This is an interesting result that contrasts with some of the previous literature (e.g., Barth et al. (2000)). However, prior work has not explored this particular question through the use of exogenous variation in individual membership, so comparisons across these studies require some caution.

In light of the above results, it is also important to note that the results from the survey in Figure 6 demonstrate that union members perceive union-provided career benefits to contain a substantial private-good component across each of the four amenity bundles we examine. Interestingly, members perceive wages to contain a smaller private good component than the other three dimensions but still attribute approximately 40 percent of any union-induced wage benefit to a worker's individual membership status. While this aligns well with the wage bargaining process outlined in Section 2, the perceived importance of the private good component of wage bargaining in this paper is greater than traditionally believed. Combined with the above results, this helps us break new ground in understanding how union members perceive and are influenced by individual membership relative to union presence.

5.4 Effects by Gender

There is a growing literature documenting that men and women differ in occupational choice, career wage growth, career progressions, and responses to labor market shocks. It is therefore possible that the impact of union membership varies across genders. Different returns may partially explain why, holding fixed occupation-by-industry cell, age, firm, and year, women are approximately 5 percentage points more likely to be a member of a union than comparable men. We

²³While both these papers provide extremely insightful suggestive evidence on the public versus private goods debate, we advance the literature by using an exogenous change in unionization to more directly trace out the causal effect.

estimate the effect of union membership separately for men and women across their life cycles with respect to their longer-run wage gains. The results are provided in Figure A10.²⁴

Figure shows that men and women display a very similar pattern in terms of union membership wage effects during the subsequent five years across ages. However, the figure also illustrates that women benefit more than men at all ages of enrollment, but especially during later ages. This implies that the marginal female union member is better off relative to the marginal male union member if enrollment takes place at a later age, and that union membership contributes to a narrowing of the gender wage gap, particularly among more senior members. This is an interesting and important result that helps us better understand how existing social structures interact with the labor market to affect wage parity in society.²⁵

The gender-specific effects could operate through a series of different channels. For example, prior work on gender differences in labor markets has shown that women's outside options are more constrained than men's outside options (e.g., Le Barbanchon et al. (2021); Caldwell and Danieli (2024); Butikofer et al. (2023)). In theory, the application of group-level bargaining should disproportionately benefit those who face weaker individual-level bargaining power, and this provides one channel through which the gender-specific effects may operate. In addition, there is a rich and emerging literature showing that females are less willing to bargain with their employers and that they are more likely to benefit from bargaining interventions (Niederle and Vesterlund, 2011; Recalde and Vesterlund, 2023). Finally, there is an interesting strand of literature showing important gender-specific sectoral sorting between men and women, and that women are considerably more likely to work in the public sector (e.g., Dodini et al. (2024)). While many of these channels are difficult to examine directly in the data, it is possible to estimate sector-specific effects to see whether the public sector contributes to our gender results.

The results from estimating our main gender regression exclusively for the private sector are shown in Appendix Table A10. The table illustrates that the larger female return to union membership is present in the public as well as the private sector, but that the Union x Female interaction is reduced from 0.134 to 0.0714 when going from examining the overall effect to examining the effect only in the private sector. In other words, females benefit more from union membership than men irrespective of sector, but the disproportionate benefit is greater in the public sector, indicative of sectoral sorting playing an important role.

6 Discussion

We exploit exogenous variation in union membership to provide a comprehensive empirical analysis of the career effects of unions across the life cycle of workers. Specifically, we examine

²⁴Like the interactions with age categories, we use interactions between the net union dues and age-by-gender cells as instruments for age-by-gender interacted union membership status, meaning that this exercise is particularly computationally complex in using 16 instruments. We also include a gender dummy in order to control for baseline differences across men and women.

²⁵These patterns follow the raw trends for women quite closely. See Figure A12.

through which channels unions influence worker outcomes, whether unions influence workers differently across their careers, and whether individual union membership status matters above and beyond firm-level union density.

The core contribution of this paper is to move beyond the existing union literature by causally identifying the multidimensional career effects of unions, examining whether the effects differ across a worker's lifecycle and investigating the extent to which the effects operate through the firm level or if union members gain more than non-union workers at the same firm. We demonstrate that the effect of union membership differs greatly depending on the age and career stage at which workers enroll. In addition, we show that focusing on a restricted set of outcomes, such as the contemporaneous union wage premium, generates a fractionalized understanding of the multidimensional career effects that union membership has on workers. Specifically, unions not only affect workers' monetary compensation but also their career advancement opportunities, job security, work environment, and welfare utilization. Finally, we document a considerable private goods component of union membership, illustrating that it is important to study the worker-level effects of unionization in order to fully capture the impact of unions on workers.

The cost of joining a union is substantially below the benefit of union membership as identified in our paper. This is broadly true across the entire age distribution that we examine, but is especially true for young workers. This implies that workers either are undervaluing the returns to union membership or that there are additional costs associated with union membership that we are not capturing in the data. Our survey provides suggestive evidence in favor of the first of these explanations, revealing that workers overestimate the public goods component of union wage effects and undervalue the ability of unions to help their careers (Figures 5 through 7).

On an aggregate societal level, the union subsidy program is estimated to have generated an overall increase in union membership of approximately 5 percentage points (Barth et al., 2020a), or approximately 137,500 workers by the end of our sample. Using this number coupled with our baseline estimates in Table 1, we can perform back-of-the-envelope calculations of the overall impact of union membership on the Norwegian economy. In this exercise, we take conservative estimates of the short-run benefits on wages and safety net transfers and compare them to a range of what we believe are the largest possible program costs. Abstracting away from spillovers to non-union members at the firm as well as firm owners, we calculate that the government-induced union membership increase generated approximately 5 billion NOK in extra taxable income annually (mean earnings of 460,000 NOK * 8% * 137,500 marginal members). It also generated a reduction of 1.79 billion NOK in safety net payments (137,500*13,000). Assuming base tax rates of 27% or top marginal rates of 47.2% in 2014, this translates into revenue gains of between 1.37 billion and 2.39 billion NOK, for a gross fiscal gain via these channels of between 3.16 billion and 4.18 billion NOK.

With respect to costs, approximately 1,900,000 individual workers are members of trade unions

in Norway. Under the liberal assumption that all union members take the maximum deduction in 2014 (3,850), and assuming base and top marginal tax rates as above, the program costs, at most, 1.98 to 3.45 billion NOK annually (since the subsidy applies to all members, new and current). At the same time, it is important to note that this simple cost-benefit analysis abstracts away from a number of potentially unmeasured costs and benefits such as the firms' response to increased unionization. A full cost-benefit analysis trying to assess the return to the subsidy program would have to consider such unmeasured costs and benefits as well.

In terms of policy implications, our results highlight that the effect of union membership differs greatly depending on the age at which workers enroll and that focusing on average impacts masks important heterogeneity. Furthermore, our documentation of a substantial private return to union membership (in addition to the public goods provision) suggests that union membership is likely below the optimum for employed workers and that free-riding in this setting may be limited. We view this as an important finding for helping policymakers understand the overall effect of unions on the economy, a result that is particularly relevant now given the recent surges in labor activity in the US (NLRB, 2022). While our focus in this paper is on unions, these results allude to a more general policy implication: that age-neutral labor market policies, institutions, and regulations, may affect individuals differently across their careers. Importantly for our context, marginal union membership appears to save the government a significant amount in welfare system payouts, particularly for mid-career workers. This suggests that unions, as market actors, may reduce the need for more intensive transfers by increasing career stability and predictability.

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Table 1: Average Effects of Union Membership

Panel A					
VARIABLES	(1)	(2)	(3)	(4)	(5)
	Compensation		Job Protections	Advancement	
	Log(Hourly Wage)	Log Hours	Unemployment Benefits	Pr(Advancement)	Pr(Firm Upgrade)
Union Effect	0.0822* (0.0495)	0.0925** (0.0362)	-14,634*** (1,884)	0.0798*** (0.0244)	-0.127*** (0.0256)
1st Stage (1,000 NOK)	-0.114*** (0.0058)	-0.114*** (0.0058)	-0.116*** (0.0052)	-0.114*** (0.0051)	-0.114*** (0.0051)
Non-Union Mean ($l > 0$)	5.62	3.47	50,344	0.0671	0.1168
Observations	10,745,934	10,751,060	12,538,920	12,596,786	12,596,786
Kleibergen-Paap F stat	387.39	386.45	490.73	510.59	510.59
Panel B					
VARIABLES	(1)	(2)	(3)		
	Work Environ- ment	Transfer System			
	Sick Pay	Social Support Payments	Pr(Social Support)		
Union Effect	-2,012 (5,220)	-13,282** (5,560)	-0.0865 (0.0543)		
1st Stage (1,000 NOK)	-0.116*** (0.0052)	-0.116*** (0.0052)	-0.116*** (0.0052)		
Non-Union Mean ($l > 0$)	54,595	56,155	0.3202		
Observations	12,555,423	12,240,286	12,555,423		
Kleibergen-Paap F stat	513.64	490.73	490.01		

Robust standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3. Standard errors clustered at the individual level. Outcomes are measured in year $t+1$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, base and current firm, and always union status. Current union status is instrumented by the base firm's net union due.

Table 2: Two-Stage Least Squares with Interactions for Lagged Predicted (Leave-One-Out) Union Density

VARIABLES	(1) Log(Earnings)	(2) Unemployment Benefits	(3) Sick Pay
Union Member	0.445*** (0.149)	-42,462*** (6,023)	9,399 (11,119)
Member x Predicted Union Density (t-1)	-0.571*** (0.184)	55,875*** (8,230)	-15,266 (15,297)
Predicted Union Density (t-1)	0.141*** (0.0380)	-11,507*** (1,585)	3,300 (3,083)
Observations	10,193,978	10,944,385	10,958,543
Kleiberg-Paap F stat	39.87	41.07	41

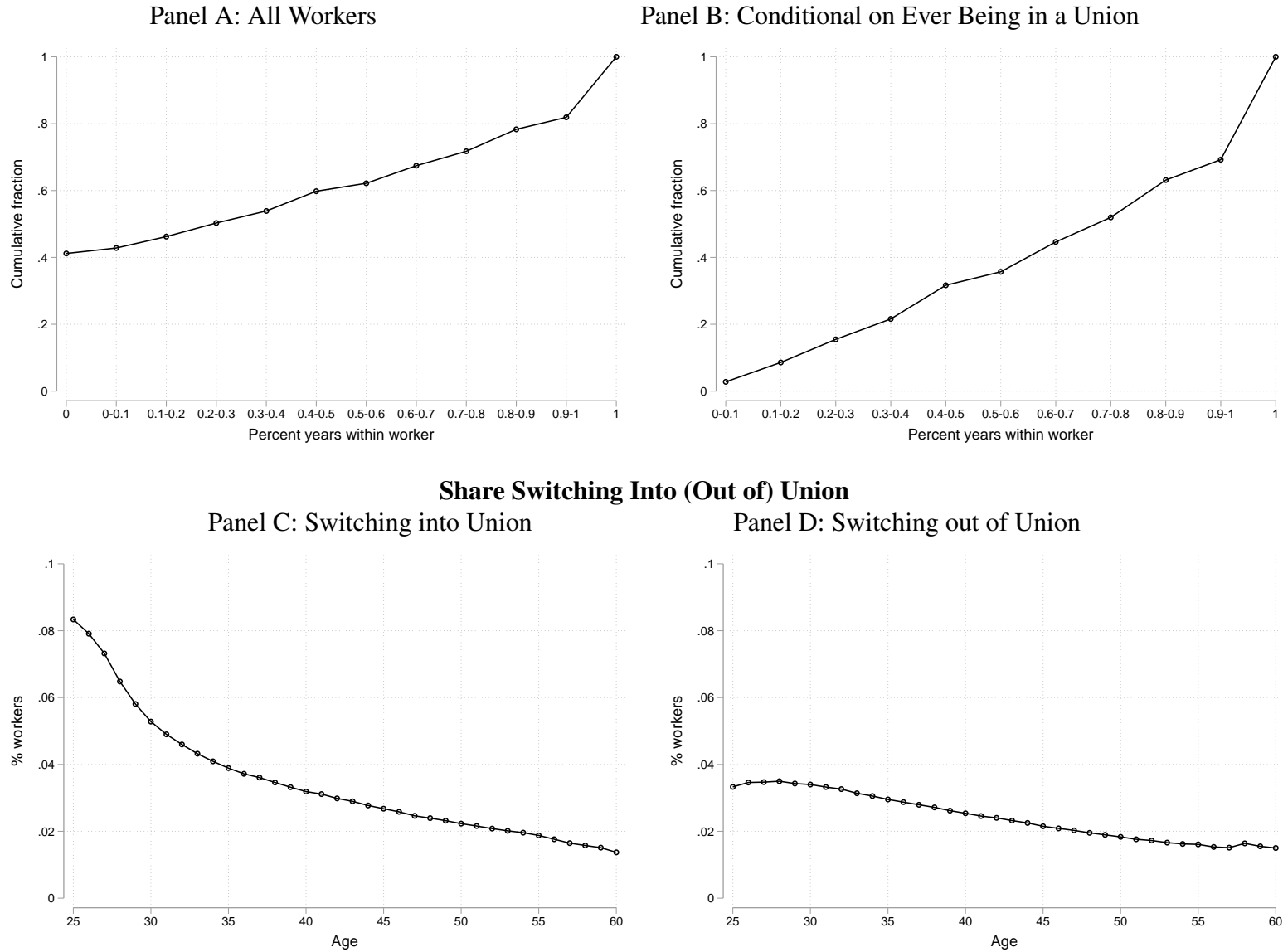
Robust standard errors in parentheses

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

Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with interactions for union density (on a 0-1 scale) in the prior year at the worker's current firm. Standard errors are clustered at the individual level. Outcomes are measured in year $t+1$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, base and current firm, and always union status. Current union status is instrumented by the base firm's net union dues after subtracting the subsidies introduced through Norwegian tax policy. Firm-level union density is predicted using Equation 3 and aggregated to the firm-year level using the average of the individual membership probabilities excluding the individual worker, i.e., the predicted union density for all other workers at the firm in the prior year.

Figure 1: Share of Working Years in a Union and Union Switching Rates



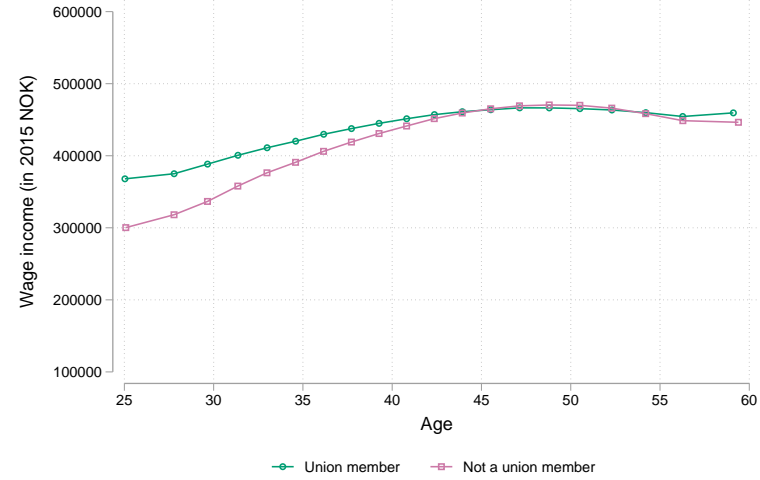
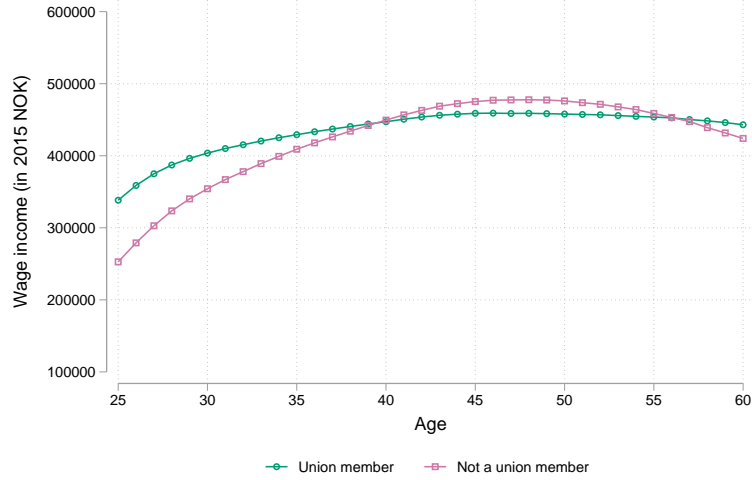
Source: Authors' calculations of Norwegian registry data from 1993 to 2017.

Notes: In Panel A, the Y axis represents the cumulative share of workers that spent X share of their working years as a member of a labor union during our sample period. In Panel B, the Y axis is the share of workers switching into (out of) a union by age.

Figure 2: Union Membership, Earnings, and Selected Transfers by Age

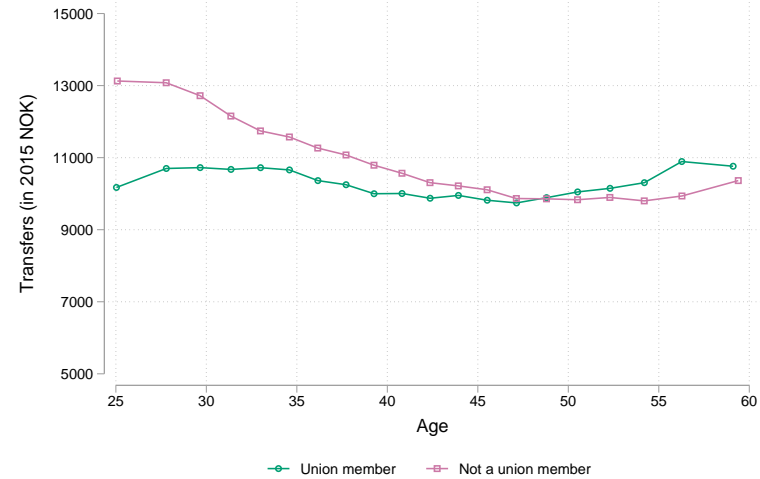
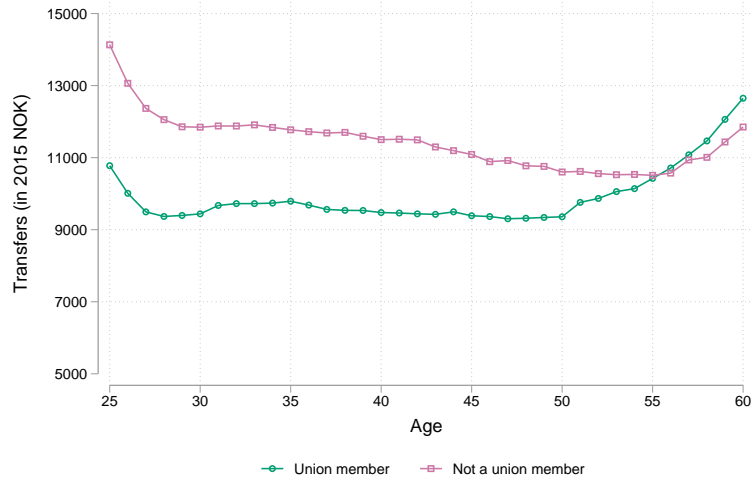
Panel A: Annual Earnings by Age, Union Status

Panel B: Annual Earnings by Age, Union Status, with Controls



Panel C: Social Support Payments

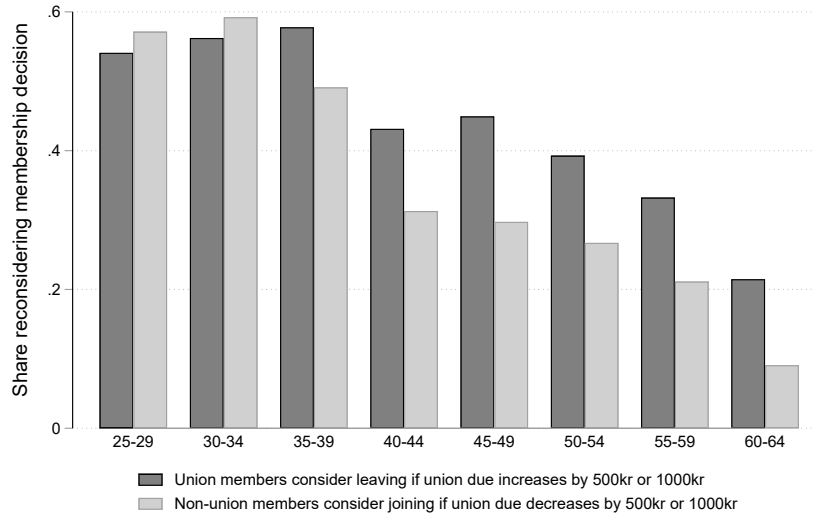
Panel D: Social Support Payments, with Controls



Source: Authors' calculations of Norwegian registry data from 1993 to 2017.

Notes: Panel B and D include fixed effect controls for gender, immigration status, industry, education (program and level), and year. Social support payments include unemployment benefits, sick leave, housing allowance, scholarships, and financial assistance.

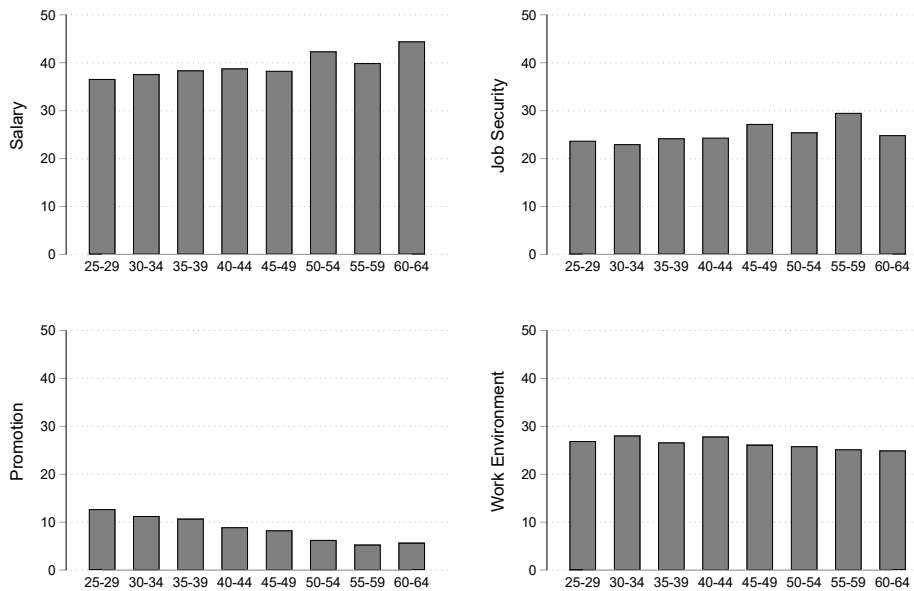
Figure 3: Price Sensitivity to Union Membership



Source: Authors' calculations based on survey data collected by NORSTAT on behalf of the authors.

Notes: The question on the survey asked, "If your after-tax dues for union membership were reduced [increased] by [500,1000] NOK, would you reconsider your decision to join a union?"

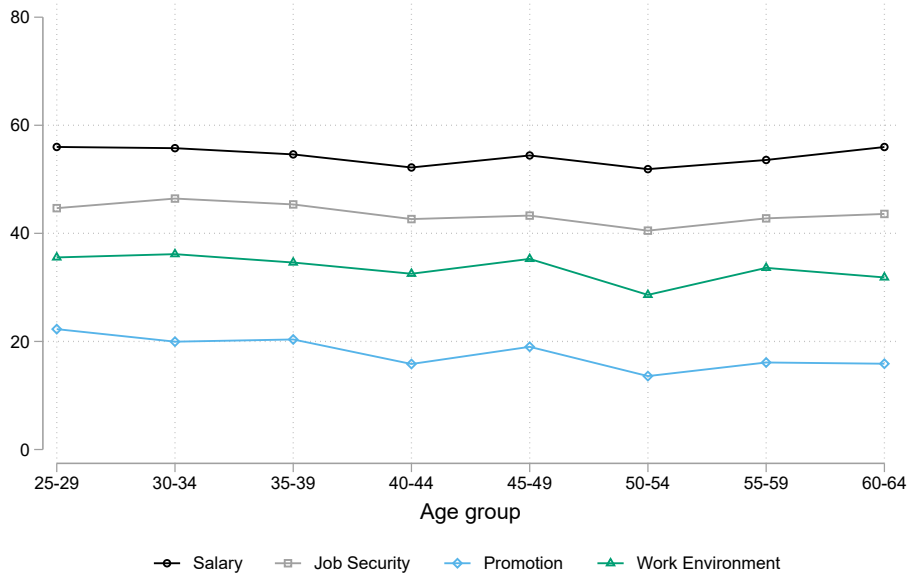
Figure 4: Union Worker Valuation of Career Amenities



Source: Authors' calculations based on survey data collected by NORSTAT on behalf of the authors.

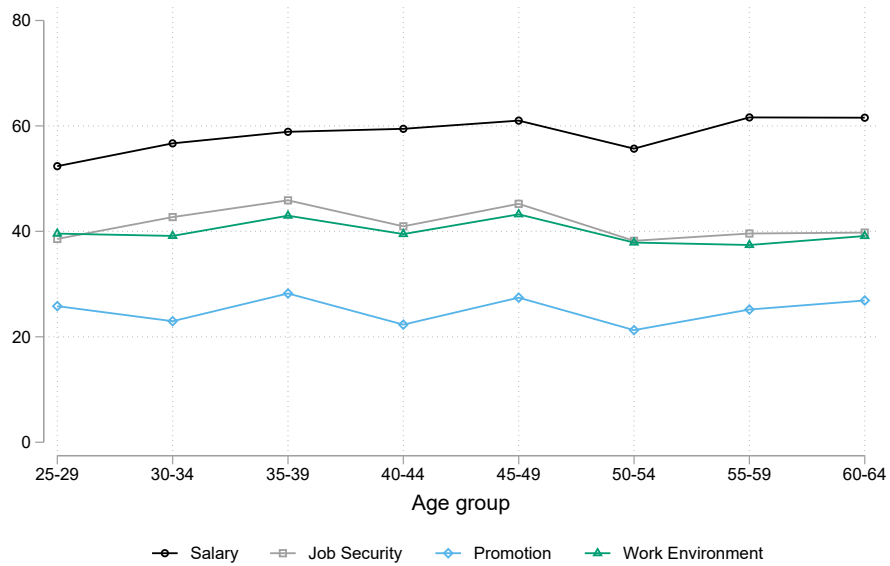
Notes: The question on the survey asked, "Rank the following job characteristics based on importance to your future career and well-being: Salary, Job Safety, Promotion Potential and Work Environment Quality. Here we ask you to award 100 points across the four categories. You can assign anything between 0 and 100 to any of the categories, as long as the total amount of points for all four categories is 100." The results for non-union workers are nearly identical.

Figure 5: Union Worker Perception of Union Influence Over Career Outcomes



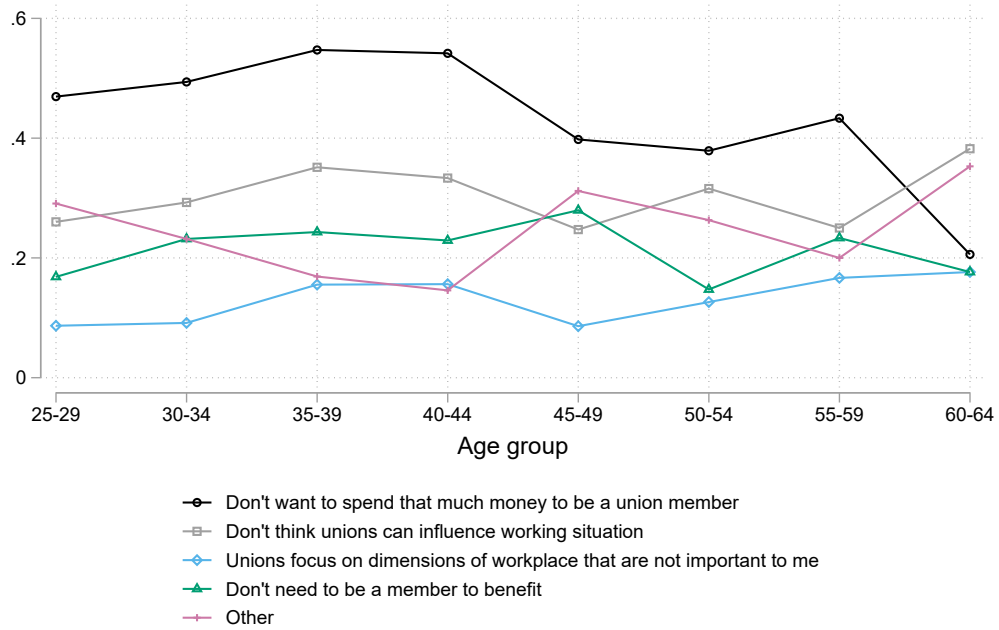
Source: Authors' calculations based on survey data collected by NORSTAT on behalf of the authors.
 Notes: The question on the survey asked, "How important do you think the union is to improving your pay, job security, promotion potential and work environment quality? 0 means 'not at all' and 100 means 'completely.' The total for all four need NOT be 100."

Figure 6: Perceived Public Good Component of Union Membership



Source: Authors' calculations based on survey data collected by NORSTAT on behalf of the authors.
 "Compared to members, to what extent do you think nonmembers in your workplace can benefit from the presence of unions along these four dimensions? 0 means 'not at all' and 100 means 'completely.'"

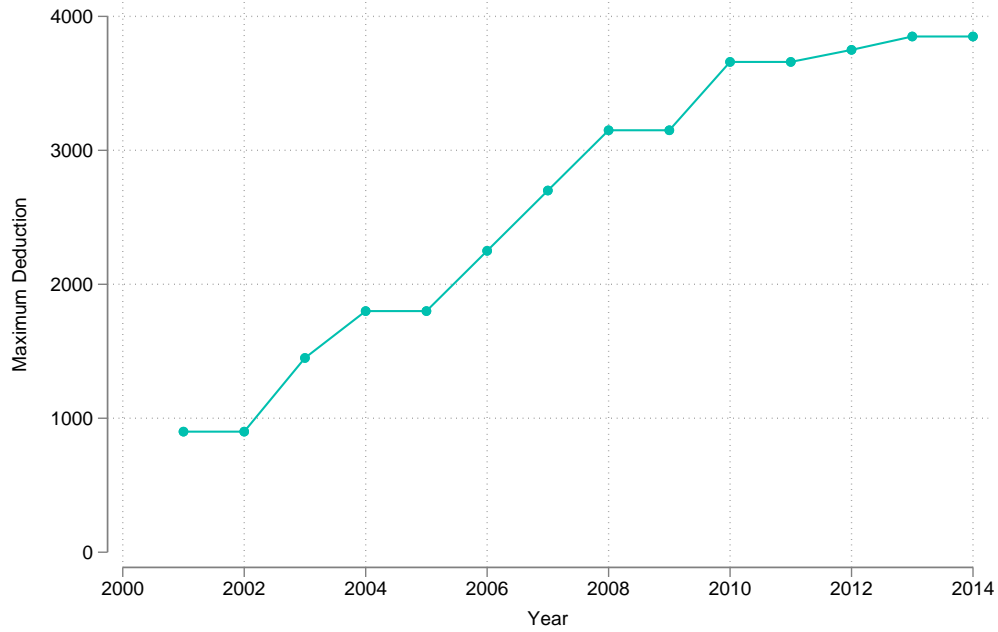
Figure 7: Non-Union Workers' Reasons For Not Joining



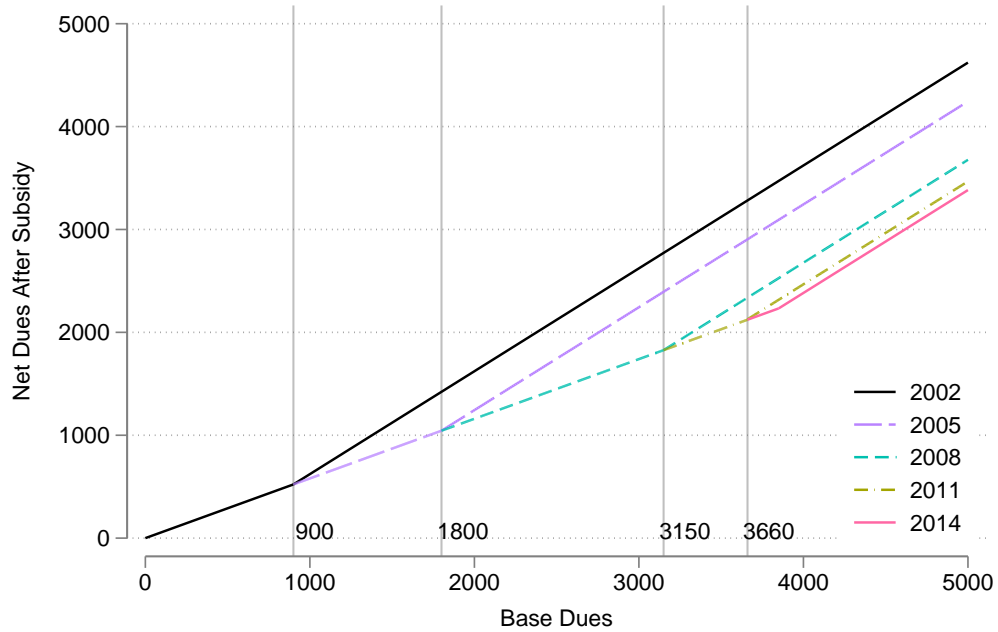
Source: Authors' calculations based on survey data collected by NORSTAT on behalf of the authors.

Notes: The question on the survey asked, "The purpose of this question is to understand the reason why you do not join a union. Check all the boxes that apply."

Figure 8: Maximum Deductions and Net Union Dues After Subsidy vs Base Dues Over Time
 Panel A: Maximum Deductions by Year



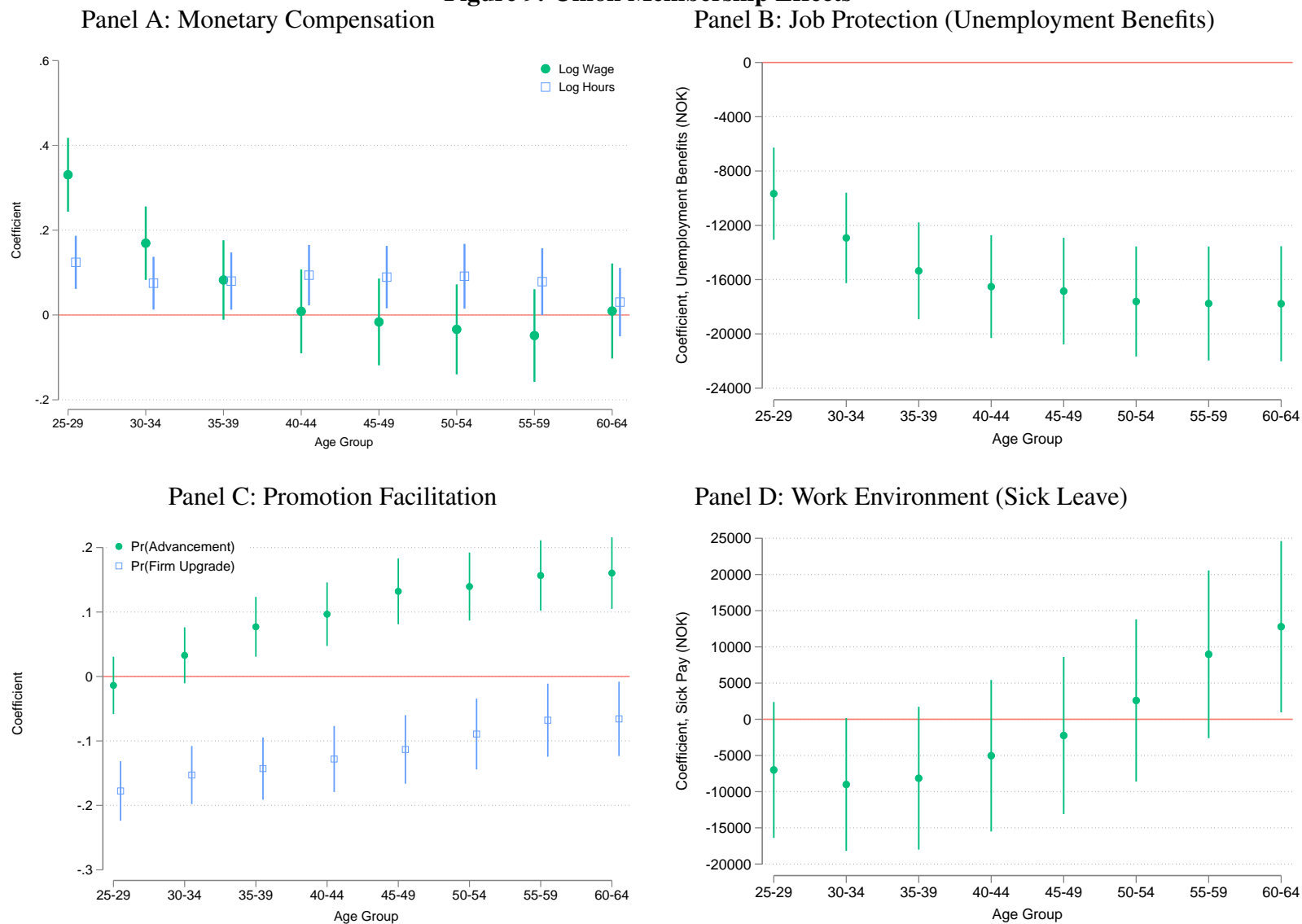
Panel B: Net Union Dues After Subsidy vs Base Dues Over Time



Source: Authors' illustration of the legislated maximum union dues deductions and net-of-subsidy union dues in Norway over time.

Notes: Figure assumes a marginal tax rate of 42%, which is the typical top marginal rate over the 2001-2014 sample period. Vertical lines mark the maximum deductions over time.

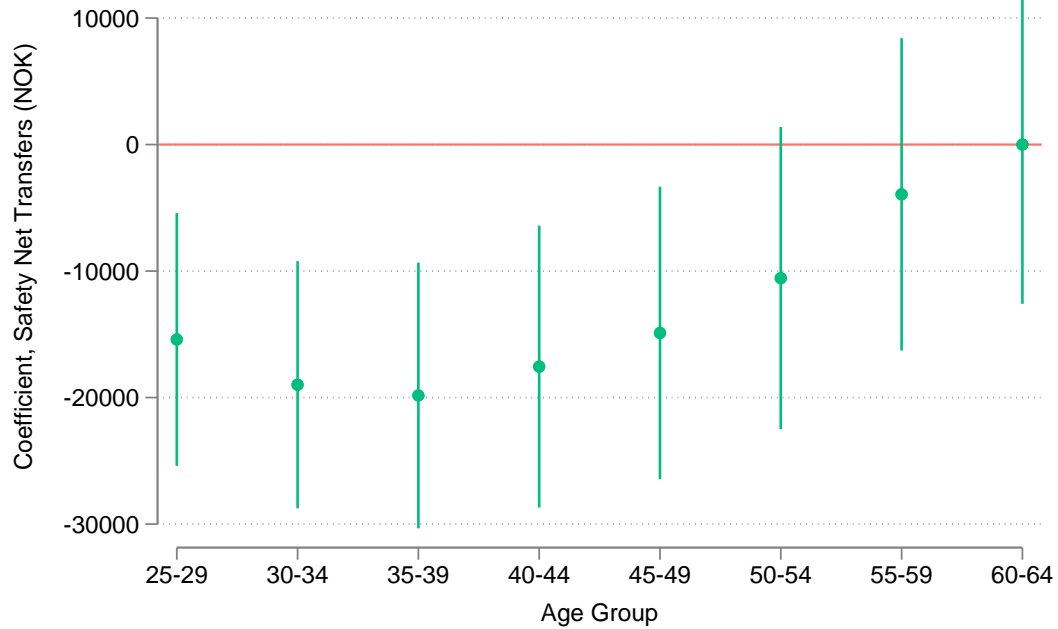
Figure 9: Union Membership Effects



Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with interactions for 5-year age bins. 95% confidence intervals are derived from standard errors clustered at the individual level. Outcomes are measured in year $t+1$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, base and current firm, and always union status. Current union status is instrumented by the base firm's net union dues after subtracting the subsidies introduced through Norwegian tax policy.

Figure 10: Union Membership Effects on Social Support Payments



Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with interactions for 5-year age bins. 95% confidence intervals are derived from standard errors clustered at the individual level. Outcomes are measured in year $t+1$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, base and current firm, and always union status. Current union status is instrumented by the base firm's net union dues after subtracting the subsidies introduced through Norwegian tax policy. Safety net transfers include unemployment benefits, sick leave, housing allowance, scholarships, and financial assistance.

A Figures and Tables Appendix

Table A1: Measured Price Elasticities by Age

Age Group	Percent Change Income Cost, Base Rates	1% Change
25-29		-0.0667
30-34		-0.0467
35-39		-0.0504
40-44		-0.0543
45-49		-0.0394
50-54		-0.0393
55-59		-0.0382
60-64		-0.0361

Source: Authors' calculations of Norwegian registry data for 2001-2015.

Notes: Estimates divide the relevant first stage coefficients for each age group in Equation 3 by age-group mean annual earnings and age-group mean unionization rates.

Table A2: Identifying Variation by Industry Group

In 2003 during first year of instrument exposure			
Industry	(1) Share of Industry Workers with High Exposure	(2) Share of High- Exposure Workers in Industry	(3) Share of Total Workers in In- dustry
Agriculture and Fishing	0.592	0.011	0.009
Mining	0.747	0.018	0.012
Manufacturing	0.271	0.075	0.135
Construction	0.089	0.011	0.062
Wholesale Trade	0.827	0.228	0.135
Transportation	0.492	0.077	0.076
Finance, Real Estate, Business, Ho- tels	0.470	0.145	0.151
Public Sector	0.505	0.397	0.385
Other	0.545	0.039	0.035
Overall	0.557	1.000	1.000

Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: "High exposure" is defined as the set of workers experiencing an above-median reduction in their net union dues from 2003-2010 as determined by their base firm in the data. Identifying variation is widespread across industry groups.

Table A3: Identifying Variation by Occupation Group

In 2003 during first year of instrument exposure			
Industry	(1) Share of Occupation's Workers with High Exposure	(2) Share of High-Exposure Workers in Occupation	(3) Share of Total Workers in Occupation
Managers	0.569	0.108	0.092
Professionals	0.414	0.110	0.129
Technicians and Associate Professionals	0.494	0.240	0.238
Clerical Support Workers	0.494	0.084	0.083
Service and Sales Workers	0.636	0.295	0.227
Skilled Agricultural, Forestry, Fishery Workers	0.641	0.007	0.005
Craft and Related Trade Workers	0.220	0.041	0.092
Plant and Machine Operators	0.352	0.062	0.086
Elementary Occupations	0.567	0.053	0.046
Overall	0.520	1.000	1.000

Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: "High exposure" is defined as the set of workers experiencing an above-median reduction in their net union dues from 2003-2010 as determined by their base firm in the data. Identifying variation is widespread across occupation groups.

Table A4: Compliers Analysis

Panel A: Pr(complier _x)								
Age Group	(1) Overall	(2) Female	(3) Non-Western Immigrant	(4) Bachelors Degree +	(5) White Collar	(6) Manufacturing	(7) Public Sector	(8) Collective Agreement
25-29	0.081	0.116	0.054	0.095	0.101	0.067	0.165	0.071
30-34	0.087	0.116	0.071	0.099	0.105	0.077	0.159	0.070
35-39	0.077	0.108	0.076	0.088	0.092	0.054	0.133	0.052
40-44	0.072	0.099	0.087	0.080	0.086	0.048	0.124	0.049
45-49	0.060	0.092	0.064	0.069	0.071	0.047	0.111	0.034
50-54	0.051	0.075	0.042	0.052	0.060	0.028	0.082	0.029
55-59	0.050	0.064	0.071	0.052	0.059	0.016	0.074	0.033
60-64	0.026	0.034	-0.006	0.020	0.036	0.001	0.042	0.005

Panel B: Pr(x _l complier)								
Age Group	(1) Overall	(2) Female	(3) Non-Western Immigrant	(4) Bachelors Degree +	(5) White Collar	(6) Manufacturing	(7) Public Sector	(8) Collective Agreement
25-29	0.162	0.082	0.009	0.060	0.113	0.011	0.077	0.031
30-34	0.173	0.088	0.013	0.071	0.128	0.015	0.086	0.032
35-39	0.152	0.100	0.015	0.071	0.137	0.013	0.089	0.029
40-44	0.142	0.099	0.014	0.063	0.137	0.013	0.091	0.030
45-49	0.119	0.105	0.010	0.056	0.128	0.014	0.098	0.024
50-54	0.100	0.092	0.005	0.045	0.118	0.009	0.085	0.021
55-59	0.100	0.068	0.004	0.038	0.103	0.005	0.071	0.021
60-64	0.052	0.045	0.000	0.019	0.080	0.000	0.051	0.004

Source: Authors' calculations of Norwegian registry data from 2002 to 2010.

Notes: We calculate compliance in three steps. We residualize the one-year change in instrument exposure (net dues) on all of our fixed effects except always union status. We then estimate our first-stage regression of union membership status on this measure of exposure for each age group and within-age subgroup. We then use the parameters generate predicted union membership at the 1st and 99th percentile of instrument exposure and classify the share of workers changing union membership status as compliers.

Table A5: Instrument Intensity and Baseline Characteristics, Regressions

VARIABLES	(1) Reduction in Net Dues, 1000s	(2) Reduction in Net Dues, 1000s
Log Real Earnings	-0.00687*** (0.00133)	-8.59e-05 (0.000399)
Female	0.0184*** (0.00101)	0.00110*** (0.000271)
Age	8.39e-05** (3.62e-05)	-8.55e-07 (2.12e-05)
High School Diploma	-0.00532*** (0.000650)	-0.00122*** (0.000233)
Bachelors Degree +	0.00387** (0.00192)	0.000233 (0.000541)
Constant	0.247*** (0.0164)	0.171*** (0.00461)
Observations	3,181,575	3,179,728
R-squared	0.042	0.701
Occ by Ind FE		X
Age Group FE		X
Always Union Dummy		X
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Source: Authors' calculations of Norwegian registry data from 2002 to 2010.

Notes: Estimates come from a regression of the reduction in net dues within a worker's base firm in the data between 2002 and 2010 on a set of baseline characteristics for each worker in the base firm. Standard errors are clustered at the base firm level.

Table A6: Instrument Intensity and Baseline Characteristics, Correlations

VARIABLES	(1)	(2)
	Raw Correlation with Reduction in Net Dues	Conditional Correlation with Reduction in Net Dues
Log Real Earnings	-0.109	-0.00282
Female	0.189	0.0101
Age	0.00475	-0.0000116
Less than High School	0.0224	0.0104
High School Diploma	-0.0738	-0.0158
Bachelors Degree +	0.0580	0.00799
Observations	3,241,835	3,241,835

Source: Authors' calculations of Norwegian registry data from 2002 to 2010.

Notes: Correlations are between the reduction in net dues within a worker's base firm in the data between 2002 and 2010 and a set of baseline characteristics for each worker in the base firm. Conditional correlations are for the reduction in net dues after residualizing on controls for occupation by industry cell, age group, and "always union" status.

Table A7: Two-Stage Least Squares Estimates Clustering at Base Firm Level

VARIABLES	(1) Log(Hourly Wage)
Age 25-29	0.331** (0.141)
Age 30-34 (Relative to 25-29)	-0.161*** (0.0186)
Age 35-39 (Relative to 25-29)	-0.248*** (0.0277)
Age 40-44 (Relative to 25-29)	-0.322*** (0.0351)
Age 45-49 (Relative to 25-29)	-0.347*** (0.0400)
Age 50-54 (Relative to 25-29)	-0.365*** (0.0445)
Age 55-59 (Relative to 25-29)	-0.379*** (0.0480)
Age 60-64 (Relative to 25-29)	-0.321*** (0.0518)
Observations	10,745,934
Robust standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with interactions for 5-year age bins. Standard errors are clustered at the base firm level. Outcomes are measured in year $t+1$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, base and current firm, and always union status. Current union status is instrumented by the base firm's net union dues after subtracting the subsidies introduced through Norwegian tax policy.

This level of clustering still allows enough precision to detect differences from zero as well as differences across age groups such that the level of clustering does not alter our conclusions.

Table A8: Two-Stage Least Squares with Interactions for Collective Agreements

VARIABLES	(1) Log(Earnings)	(2) Unemployment Benefits	(3) Sick Pay
Union Member	0.0747 (0.0484)	-13,946*** (1,859)	-2,229 (5,144)
Member x Collective Agreement	-0.00684 (0.0168)	-1,266 (781.1)	377.6 (1,892)
Collective Agreement	-0.00945 (0.00862)	1,631*** (392.6)	-509.3 (948.0)
Observations	10,745,934	12,538,920	12,555,423
Kleiberg-Paap F stat	217.67	280.46	280.01

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with interactions and controls for the firm having a collective agreement. Standard errors are clustered at the individual level. Outcomes are measured in year $t+1$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, base and current firm, and always union status. Current union status is instrumented by the base firm's net union dues after subtracting the subsidies introduced through Norwegian tax policy.

Table A9: Heterogeneous Member Effects on Log Annual Earnings by Subgroup

VARIABLES	(1) Female	(2) High School	(3) Manufacturing	(4) White Collar	(5) With Child(ren) at Home
Union Effect in Base Group	0.0796* (0.0440)	-0.0163 (0.0462)	0.0588 (0.0435)	0.277*** (0.0549)	0.132*** (0.0455)
Union Effect * Interacted Group	0.134*** (0.00727)	0.176*** (0.00924)	0.166*** (0.0320)	-0.196*** (0.0397)	-0.0386*** (0.00780)
Observations	11,643,867	11,643,867	11,643,867	11,643,867	11,643,867
Kleibergen-Paap F stat	242.65	245.28	247.29	247.19	249.41
Robust standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with interactions for each demographic group. Standard errors are clustered at the individual level. Outcomes are measured in year $t+1$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, base and current firm, and always union status. Current union status is instrumented by the base firm's net union dues after subtracting the subsidies introduced through Norwegian tax policy.

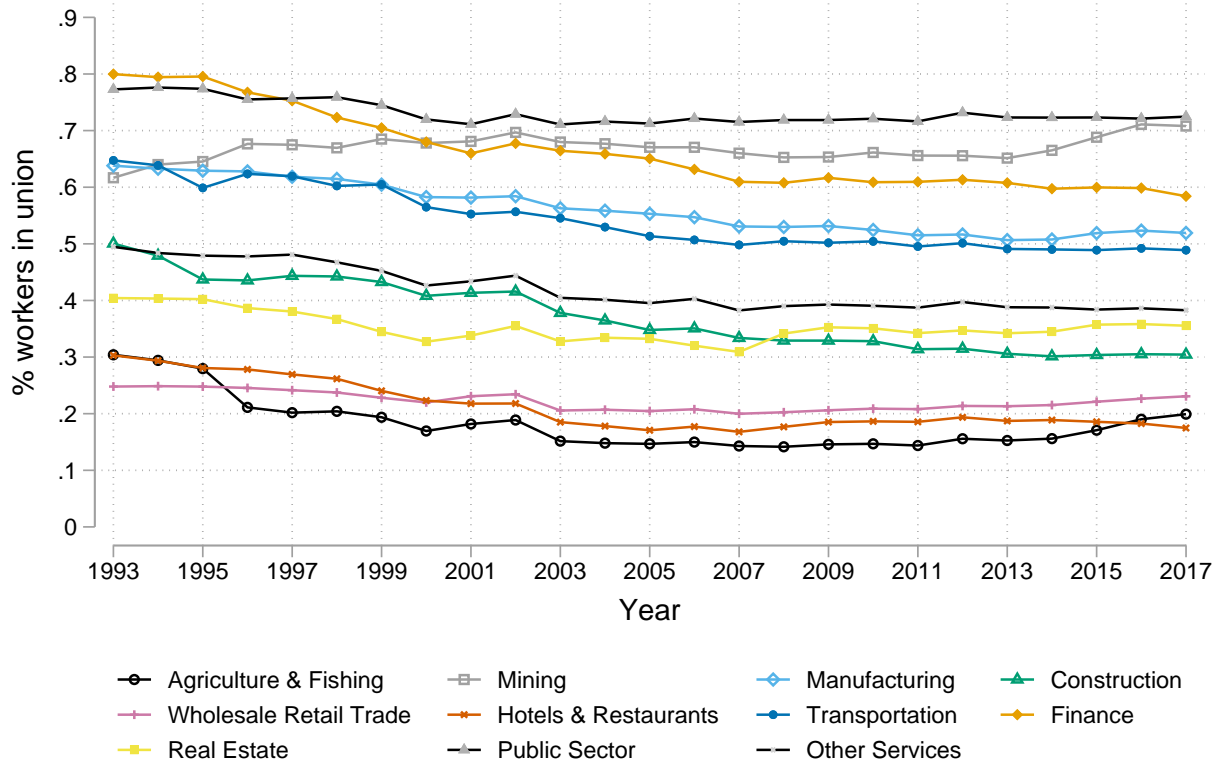
Table A10: Two-Stage Least Squares Estimates by Gender, Private Sector Only

VARIABLES	(1) Log Annual Earnings
Union Membership (Male)	0.0672* (0.0406)
Union x Female	0.0714*** (0.00946)
Female	-0.243*** (0.00447)
Observations	10,151,659

Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

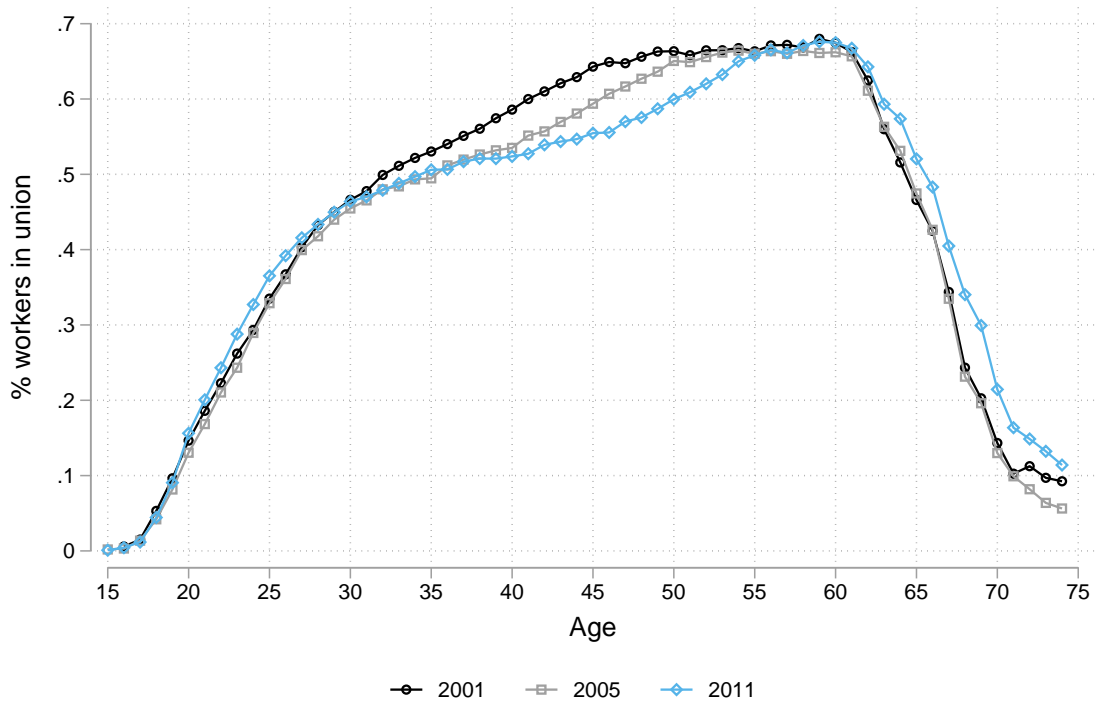
Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with interactions and controls for gender when the sample is limited to the private sector. Standard errors are clustered at the individual level. Outcomes are measured in year $t+1$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, base and current firm, and always union status. Current union status is instrumented by the base firm's net union dues after subtracting the subsidies introduced through Norwegian tax policy.

Figure A1: Unionization by Major Industry by Year



Source: Authors' calculations of Norwegian registry data from 1993 to 2017.

Figure A2: Union Membership Rates by Age

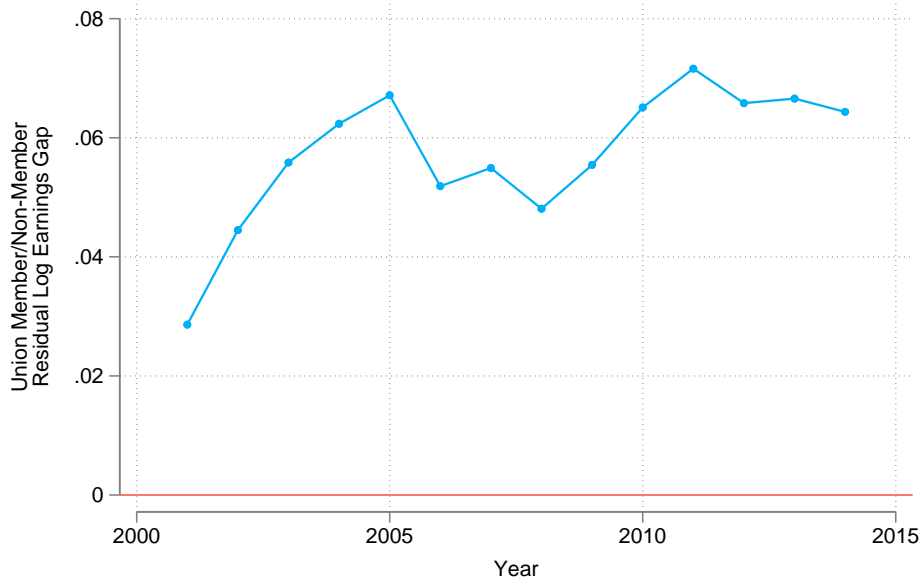


Source: Authors' calculations of Norwegian registry data.

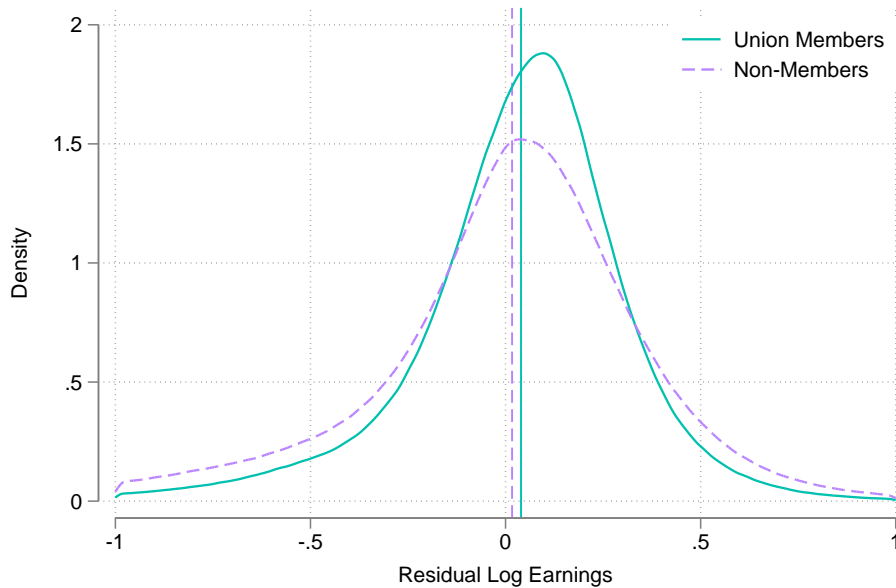
Notes: Shares reflect raw shares of workers in unions by age as of the years 2001, 2005, and 2011. Union membership is defined by having taken a union deduction in the tax register for that year.

Figure A3: Earnings Gaps Between Union Members and Non-Members within Firms

Panel A: Union Member vs Non-Member Residual Log Earnings Gap by Year



Panel B: Kernel Densities of Residual Log Earnings by Union Status

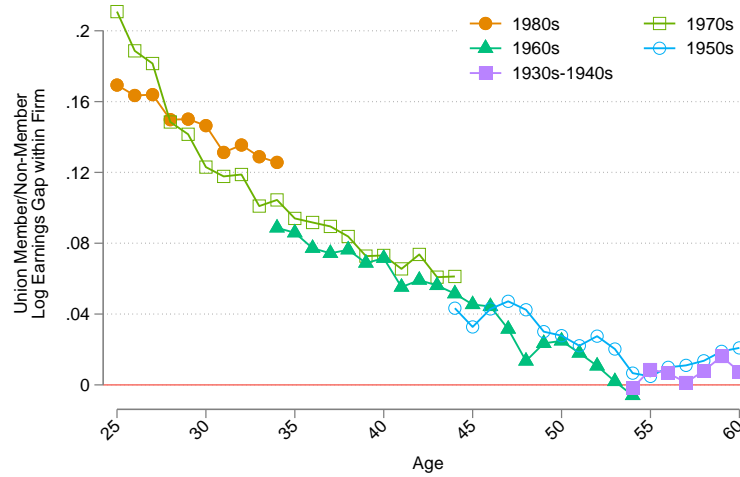


Source: Authors' calculations of Norwegian registry data from 2001-2014.

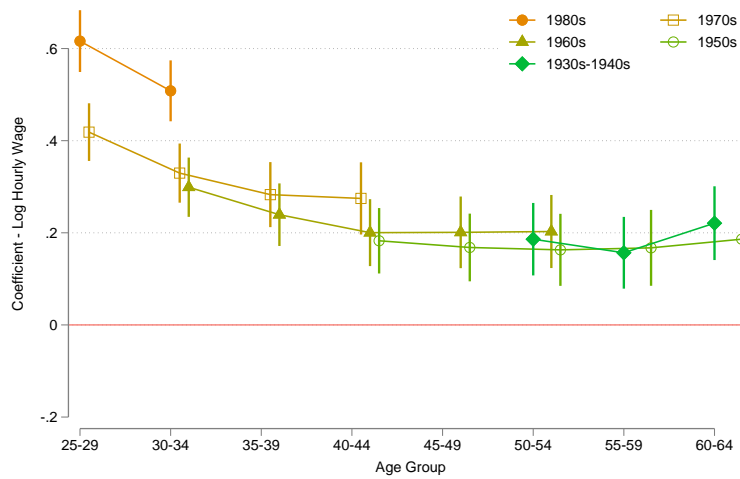
Notes: At the individual level, log annual earnings are residualized on controls for 5-year age bins, occupation by industry cell, firm, and year. Panel A presents the mean for union members over time, while Panel B presents the kernel densities among union members vs non-members. Gaps between members vs non-members thus represent differences for worker of the same age in the same occupation in the same firm. Vertical lines in Panel B denote the sample mean values for each group.

Figure A4: Earnings Gaps Between Union Members and Non-Members, by Age and Cohort

Panel A: Average Union Log Earnings Gap within Firm by Age, Cohort



Panel B: Saturated Model with Ten-Year Age Cohort Interactions

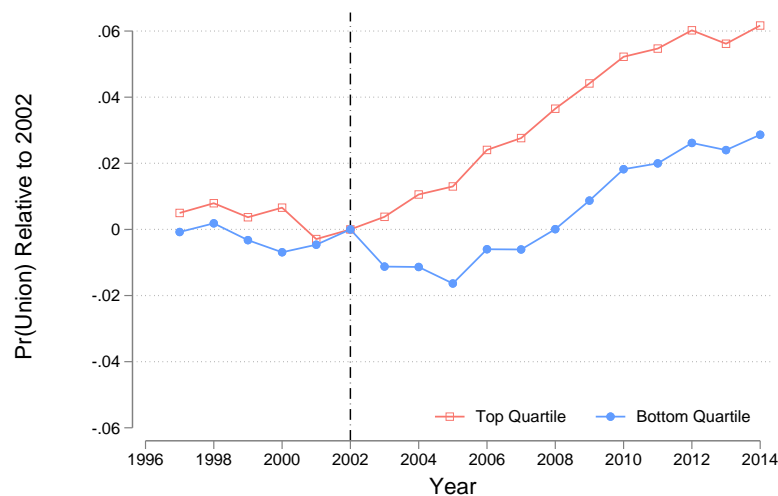


Source: Authors' calculations of Norwegian registry data from 2001-2014.

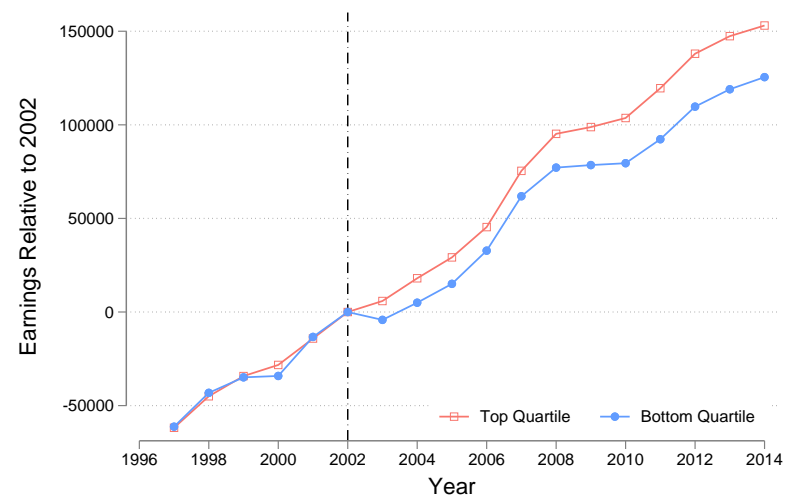
Notes: Panel A represents the average gap between union and non-union workers within firms by age and birth cohort. Panel B is based on estimates of Equations 3 and 2 with additional controls and interactions with 10-year birth cohort bins.

Figure A5: Union Membership and Earnings by Base Firm Reduction in Net Dues

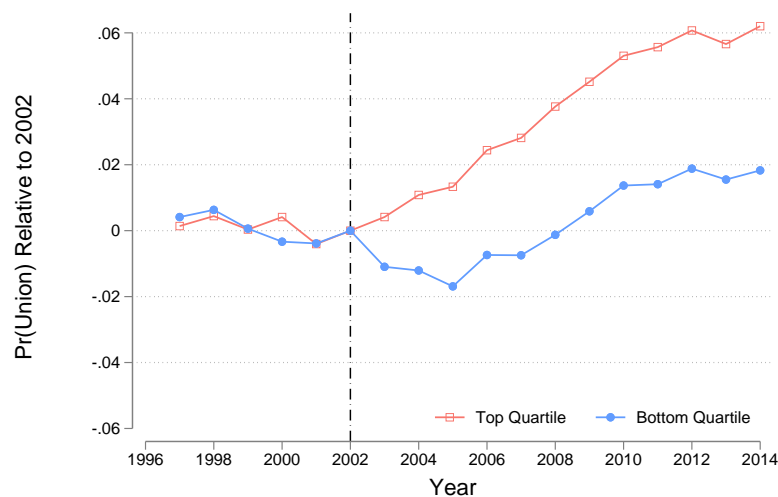
Panel A: Union Membership | Base Firm Fixed Effects



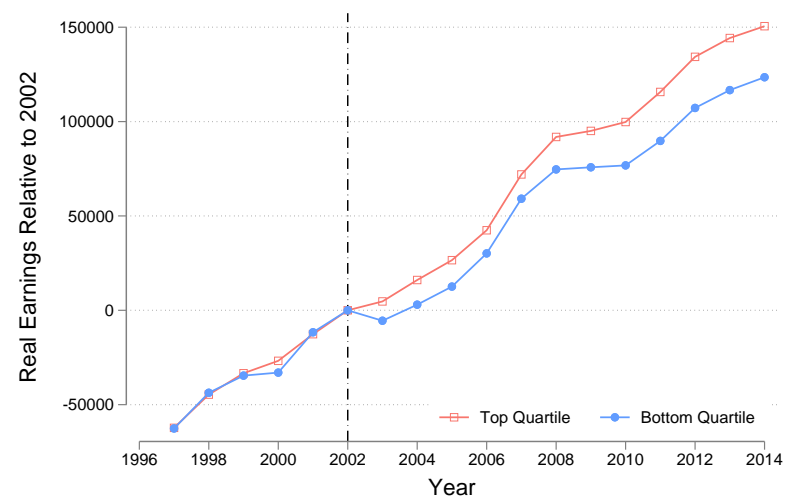
Panel B: Annual Earnings | Base Firm Fixed Effects



Panel C: Union Membership | Other Controls



Panel D: Annual Earnings | Other Controls

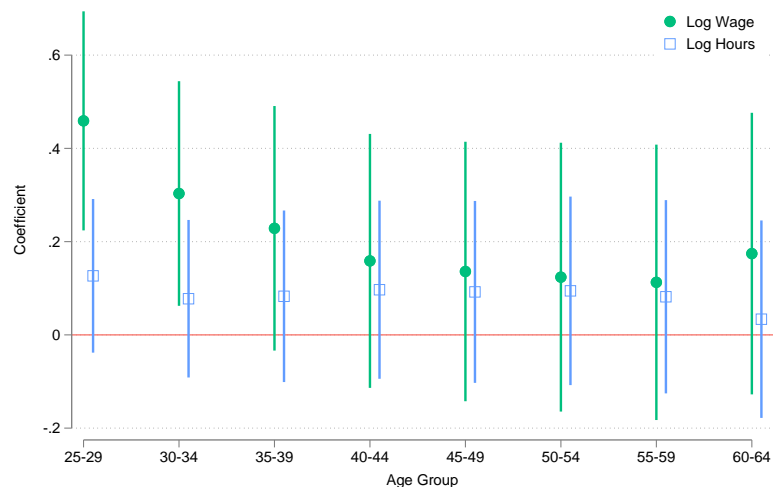


Source: Authors' calculations of Norwegian registry data.

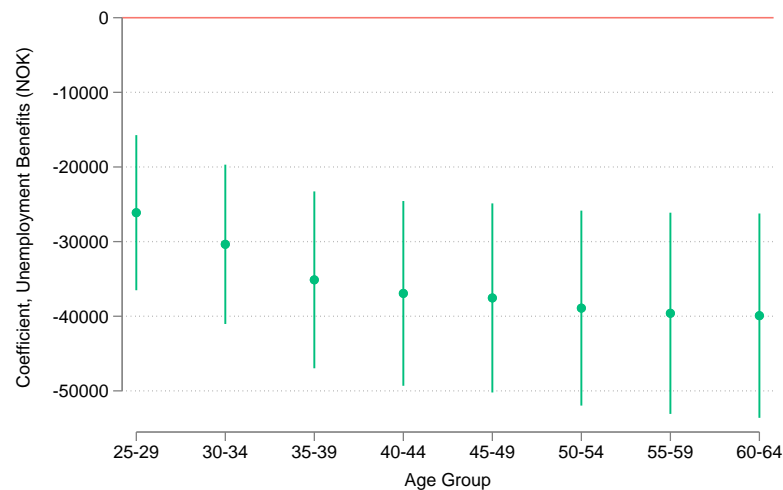
Notes: Changes in net dues are calculated within each worker's base firm from 2003 to 2010 during the period in which the maximum tax deduction or union dues changed significantly, after which we compare the top and bottom quartiles of this reduction. Panels A and B are residualized on base firm fixed effects, so these are comparing the evolution of union membership and earnings for people with the same base firm over time. Panels C and D incorporate additional controls for age group at entry into the sample, base occupation-by-industry cell, and always union status.

Figure A6: Union Membership Effects without Always Union Dummy

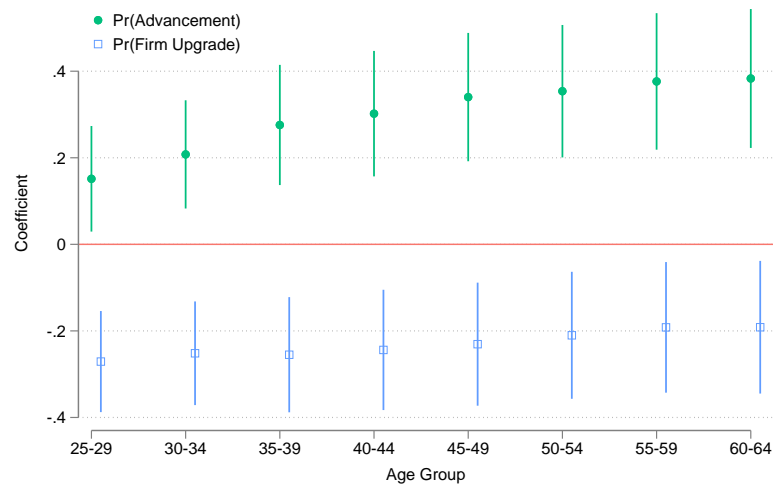
Panel A: Monetary Compensation



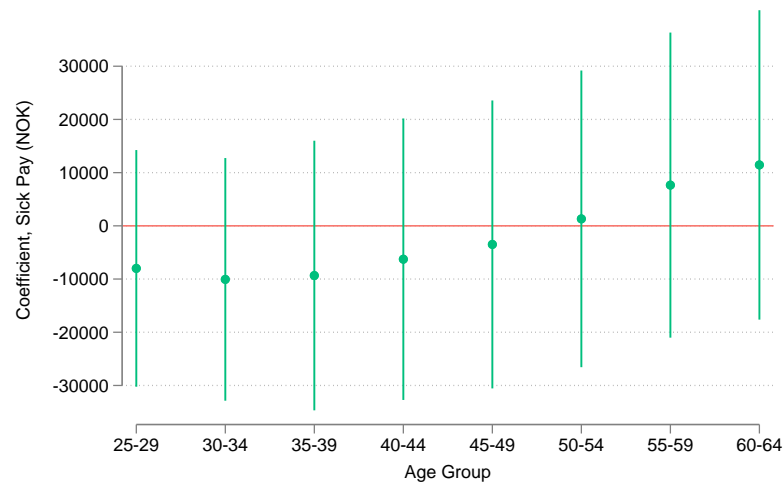
Panel B: Job Protection (Unemployment Benefits)



Panel C: Promotion Facilitation



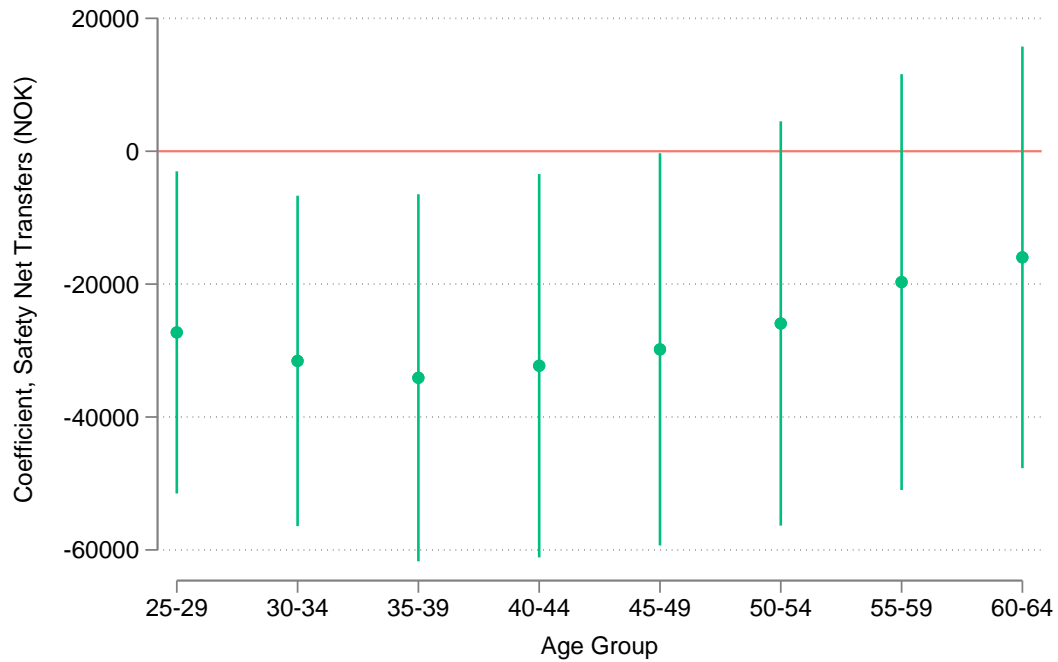
Panel D: Work Environment (Sick Leave)



Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with interactions for 5-year age bins excluding the “always union” indicator. 95% confidence intervals are derived from standard errors clustered at the individual level. Outcomes are measured in year $t+1$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, and base and current firm. Current union status is instrumented by the base firm’s net union dues after subtracting the subsidies introduced through Norwegian tax policy.

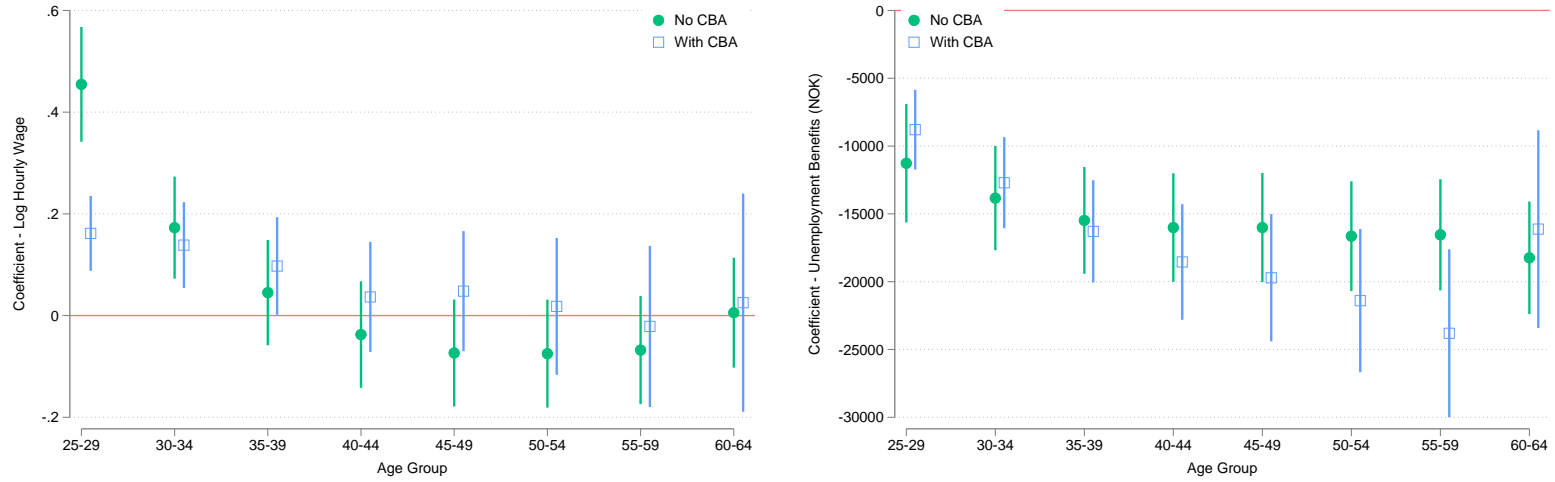
Figure A7: Union Membership Effects on Social Support Payments



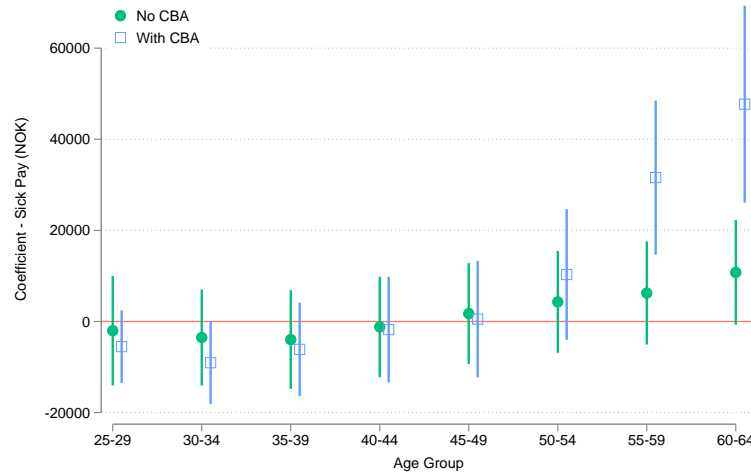
Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with interactions for 5-year age bins excluding the “always union” indicator. 95% confidence intervals are derived from standard errors clustered at the individual level. Outcomes are measured in year $t+1$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, and base and current firm. Current union status is instrumented by the base firm's net union dues after subtracting the subsidies introduced through Norwegian tax policy. Safety net transfers include unemployment benefits, sick leave, housing allowance, scholarships, and financial assistance.

Figure A8: Estimates with Collective Agreement Interactions
 Panel A: Log Hourly Wages Panel B: Unemployment Benefits



Panel C: Sick Leave

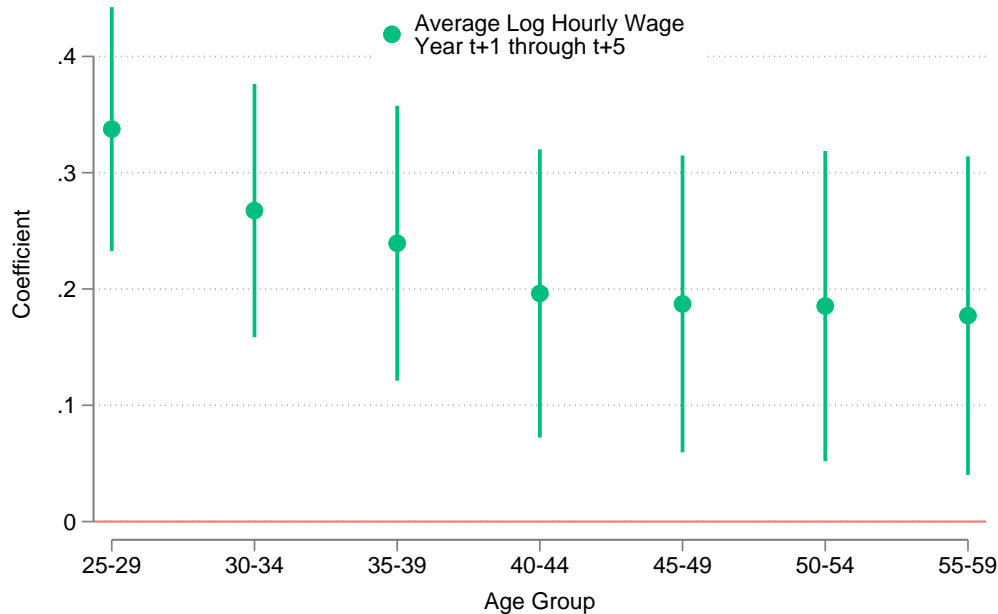


Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

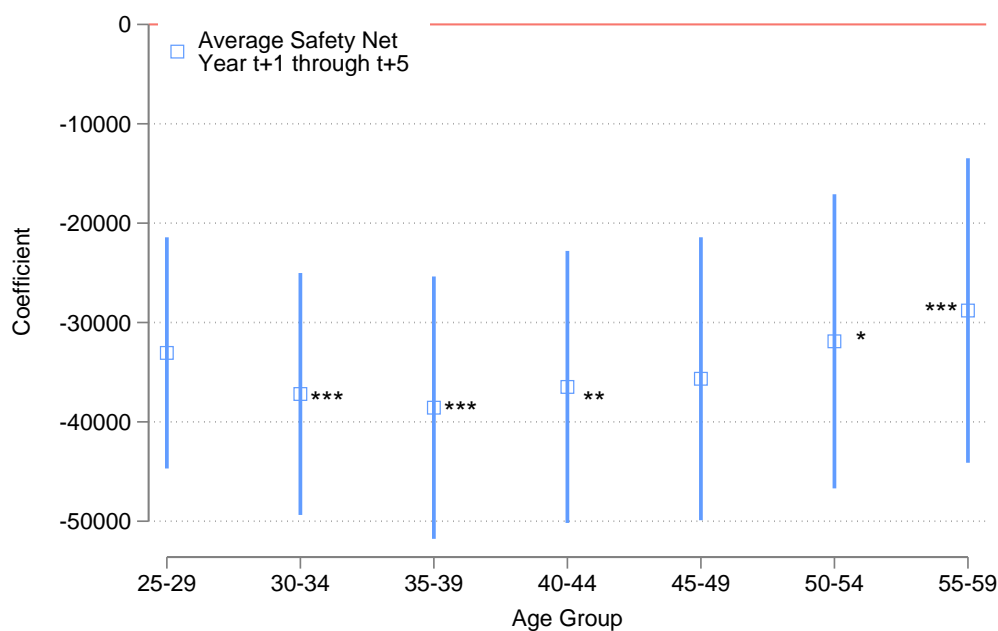
Notes: Estimates are from Equations 3 and 2 with added interactions for collective agreement by union status by age and collective agreement by age.

Figure A9: Average Union Membership Effects Over Five Years

Panel A: Average Log Hourly Wage



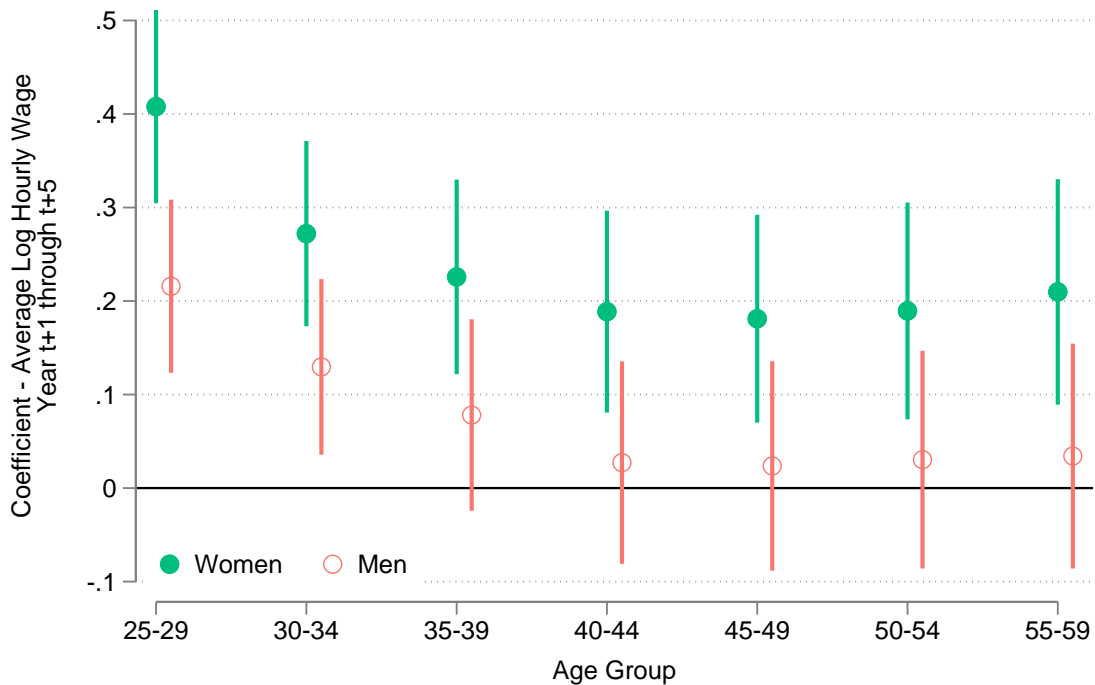
Panel B: Average Safety Net Transfers



Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with interactions for 5-year age bins. 95% confidence intervals are derived from standard errors clustered at the individual level and reflect the null of zero effects. All coefficients in Panel A for ages 30-59 are statistically different from age 25-29 at the 1% level. In Panel B, stars denote statistically significant differences from the age 25-29 effect (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Outcomes are the average of annual outcomes measured in periods $t+1$ through $t+5$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, base and current firm, and always union status. Current union status is instrumented by the base firm's net union dues after subtracting the subsidies introduced through Norwegian tax policy. Safety net transfers include unemployment benefits, sick leave, housing allowance, scholarships, and financial assistance. Age on the x-axis refers to the age at which the worker joined the union as a result of the tax policy.

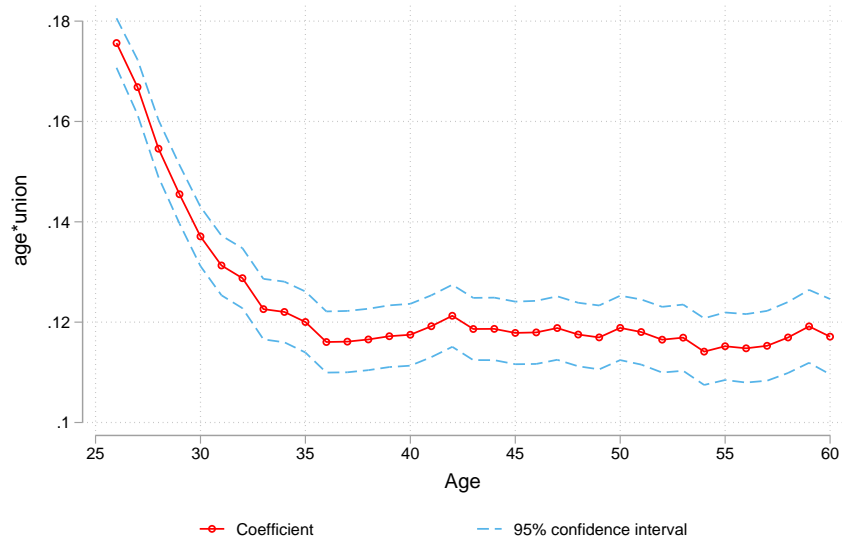
Figure A10: Average Union Membership Effects Over Five Years, by Gender



Source: Authors' calculations of Norwegian registry data from 2001 to 2015.

Notes: Estimates come from the two-stage least squares specification in Equations 2 and 3 with union interactions for 5-year age bins by gender. 95% confidence intervals are derived from standard errors clustered at the individual level. Outcomes are the average of annual outcomes measured in periods $t+1$ through $t+5$. The model includes fixed effects for year, base and current 5-year age bin, base and current occupation-by-industry cell, base and current firm, always union status, and gender. Current union status is instrumented by the base firm's net union dues after subtracting the subsidies introduced through Norwegian tax policy. Age on the x-axis refers to the age at which the worker joined the union as a result of the tax policy.

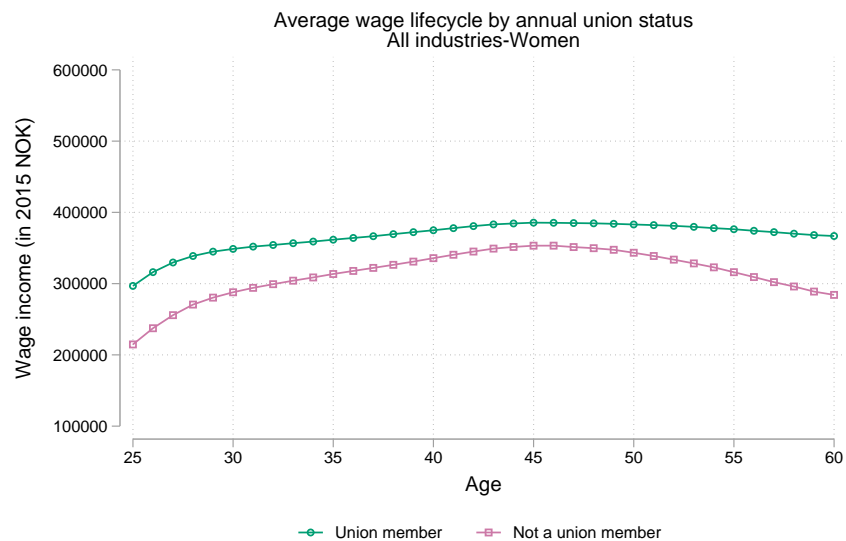
Figure A11: Union Membership and Earnings by Age, Individual Fixed Effects Model



Source: Authors' calculations of Norwegian registry data.

Notes: All coefficients are for age interacted with an indicator for union membership status. 95% confidence intervals are derived from standard errors clustered at the individual level. The model includes fixed effects for individuals, age, year, occupation by industry cell, and firm. Estimates correspond to the IV estimates in Panel A of Figures 2 and 9, respectively.

Figure A12: Raw Annual Earnings for Women
Annual Earnings



Source: Authors' calculations of Norwegian registry data from 1993 to 2017 for employed women.

Survey Instrument

[INTRO1] This is a survey that Norstat conducts on behalf of the Norwegian School of Economics and Business Administration. The results will be used in a research project.

All information collected through the survey is anonymized and will not be disclosed to any third party. As part of scientific publishing, anonymised data may be shared in open scientific repositories.

If you want more information about the project, you can choose the option below. If you want to start the survey, you choose it.

[R1] I want more information

[R2] I want to start the survey

[R1] Information and declaration of consent

Purpose of the project

We want to understand how individuals in Norway value their work environment and how they view unions. The results of the study will increase our understanding of workplace preferences and their relative importance.

Who is responsible for the project?

The Norwegian School of Economics (NHH) is the responsible institution for the project. Alexander Willen, professor at NHH, is the project manager. The other project members are Kjell G. Salvanes, professor at NHH, Samuel Dodini, postdoctoral fellow vid NHH, and Julia Zhu, postdoctoral fellow at NHH. If you have any questions about the project, you can contact NHH via Alexander Willen (alexander.willen@nhh.no).

What does participation mean for you?

If you choose to participate in the project, you will be asked to answer a survey by completing an online questionnaire. It takes about 7 minutes. The survey includes questions about your work situation, union status, and your job preferences. In addition, we will ask some basic demographic questions about, for example, age and gender. Participation in the survey is voluntary and you can withdraw your consent at any time without giving any reason. All information collected through the survey is anonymized and will not be disclosed to any third party. As part of scientific publishing, anonymised data may be shared in open scientific repositories. There will be no negative consequences if you choose not to participate or decide to withdraw at a later date.

Declaration of consent

I have received and understood information about the survey and hereby consent:

- to participate in the online survey.
- to enable researchers to process my anonymised data and use them for publications in scientific journals and other scientific dissemination.

[R2] Survey

[Age] What is your age?

[Gender] Are you male or female?

[Zip code] What is your zip code?

[Fylke] Which county do you live in?

What is your highest completed education?

[R1] Primary school/primary school

[R2] Upper secondary school (incl. former vocational school)

[R3] Vocational school, trade certificate/journeyman's certificate and other 1-2 year education after upper secondary school

[R4] University/college up to 3 years (Bachelor's degree)

[R5] University/college 4 years or more (Master's degree and higher)

[R98] Other

Where were you born?

[R1] Norway

[R2] Outside Norway

[R3] Don't want to answer

Can you state which country you were born in?

At what age did you move to Norway?

How many years of full-time work experience do you have?

Are you currently in part-time or full-time work?

[R1] Part-time (less than 30 hours per week)

[R2] Full-time (at least 30 hours per week)

[R3] Not working

What industry is your main job in?

Do you work in the public or private sector?

[R1] Public sector

[R2] Private sector

How many people work at your workplace?

Row:

[R1] 1-5

[R2] 6-10

[R3] 11-50

[R4] 51-100

[R5] More than 100

[R6] Don't want to answer

Rank the following job characteristics based on importance to your future career and well-being: Salary, Job Safety, Promotion Potential and Work Environment Quality.

Here we ask you to award 100 points across the four categories. You can assign anything between 0 and 100 to any of the categories, as long as the total amount of points for all four categories is 100.

Row:

[R1] Salary: Everything associated with the financial payment of your work (base salary, bonuses, overtime pay, generosity with retirement plans, etc.)

[R2] Job security: Protection and support (legal and otherwise) against being laid off and fired, both in the event of mass closures and individual layoffs (wrongful or not)

[R3] Promotion potential: Potential to move up the career ladder in the company

[R4] Work environment quality: The day-to-day quality of your work environment, including physical environment (e.g. equipment and facilities), company culture (e.g. support, feedback, collaboration, potential to influence) and working conditions (e.g. workplace safety, conditions employment, work-life balance)

Are you a member of a trade union?

[R1] Yes

[R2] No

[R3] Don't want to answer

For how many years have you been a member?

Have you been a member continuously during that time, or have you changed in and out of membership over the years?

[R1] Continuous

[R2] Not continuously

How important do you think the union is to improving your pay, job security, promotion potential and work environment quality?

0 means "not at all" and 100 means "entirely". The total for all four need NOT be 100.

[R1] Monetary compensation

[R2] Job security

[R3] Promotion potential

[R4] Working environment quality

Compared to members, the extent to which do you think nonmembers in your workplace can benefit from the presence of unions along these four dimensions
0 means "not at all" and 100 means "complete". The total for all four need NOT be 100.

[R1] Monetary compensation

[R2] Job security

[R3] Promotion potential

[R4] Working environment quality

Have you found a union membership useful for receiving non-work benefits such as lower mortgage rates, access to cheaper/better insurance, etc.?

How important has this been for your decision to join a union?

If your after-tax dues for union membership increased by [XYZ] dollars, would you reconsider the decision to join a union?

Row:

[R1] Yes

[R2] No

The purpose of this question is to understand the reason why you do not join a union. Check all the boxes that apply.

Row:

[R1] I don't want to spend so much money being a union member

[R2] I don't think unions can affect my work situation

[R3] I find that unions focus on dimensions of the workplace that are not important to me.

[R4] I don't think I need to be a member of a union to take advantage of the influence unions have on my work situation and well-being

[R5] Other reason, note:

If your after-tax dues for union membership were reduced by [XYZ] NOK, would you reconsider your decision to join a union?

Row:

[R1] Yes

[R2] No

Second Survey

Our second survey of union members in Norway recruited 960 respondents. Below are the questions asked in the survey that inform the analysis in the text:

How do you think union members are treated at your workplace by the local union?

[R1] I think all union members are treated equally by the local union

[R2] I think some members are prioritized over other members by the local union

[If answer R2 in last question]

Who do you think is being prioritized by your local union?

[Open text response]