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IFN Working Paper No. 1494, 2024

Collectively Bargained Wages and Female Earnings: Evidence from Swedish Local Governments

Emil Bustos

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Abstract

This paper studies how a special wage increase for assistant nurses in Sweden affected income and employment. Workers in the public sector receive wages based on negotiations between unions and employers. These agreements usually provide the same wage increase for all covered workers. In 2016, an agreement was reached in the local public sector to provide special wage increases for assistant nurses and regular increases for other workers. I study the effects of this agreement using administrative data on Swedish workers, covering their occupation, income, and collective bargaining coverage. I do a difference-in-differences analysis comparing assistant nurses and attendants covered by the same agreement. The two groups had similar employment and income levels before the agreement was reached. Assistant nurses see higher increases in labor income compared to attendants in the years following the agreement, peaking at SEK 8,700 (USD 870), or 2.7%. In contrast, I find no robust effects on separation or working time, suggesting that the changes in labor income come from changes in hourly wages. Moreover, there is no effect on benefits usage or sickness payments.

Keywords: Collective Bargaining, Trade Unions, Wages, Employment

JEL Codes: J23, J31, J50, J52, J63

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Data Availability Statement: The analysis is done using administrative records held by Statistics Sweden. The author cannot share the data.

1 Introduction

Collective bargaining significantly influences labor market conditions across many OECD countries (Cazes et al., 2019; Bhuller et al., 2022). These wage-setting institutions impact wage structures, employment rates, and income equality (Nickell, 1997; Calmfors and Driffill, 1988). Despite abundant research on minimum wages, the implications of collective bargaining on individual workers remain underexplored (Fanfani, 2023).

The Nordic collective bargaining model, with Sweden as a notable example, offers a favorable environment for exploring these dynamics (Fredriksson and Topel, 2010; Barth et al., 2014). In 2016, collective bargaining in Sweden covered almost 90% of the workforce, extending beyond minimum wages and encompassing a more comprehensive range of wage earners (Medlingsinstitutet, 2017). This broad coverage suggests that the reactions of workers and employers to changes in collectively bargained wage agreements might differ from responses to changes in minimum wages.

This paper studies the role of collective wage bargaining in local public governments, particularly for assistant nurses. Understanding wages and labor flows in the local public sector is important because demographic changes require new employment practices. An aging population will require a larger caregiver workforce in the future. At the same time, this challenges employers to offer attractive pay and working conditions. This is a problem across the OECD, as employers have high turnover and caregivers in elderly care feel dissatisfied with their employment (OECD, 2020). While the market was balanced in Sweden in the 2010s, the same challenge will likely emerge in the future (Statistiska centralbyrån, 2014).

Given this backdrop, it is important to examine pay structures and their implications for the labor market in caregiving professions. This study aims to shed light on the impact of higher bargained wages on workers' income and employment opportunities, thereby enhancing the understanding of the role of collective bargaining and the workings of the public caregiving sector.

Trade unions and local governments negotiate over average wage increases in the local public sector, usually for three years. These agreements cover a broad group of workers, including assistant nurses, attendants, and other caregivers. In Sweden, if a bargaining agreement binds an employer, it is extended to all relevant workers at the workplace. In the public sector, all workers are covered by their relevant agreement. The partners usually bargain for all covered workers together and provide for the same average wage increase in SEK in addition to minimum wages.

In 2016, the social partners agreed on a special wage increase for assistant nurses for the years 2016–2018. While all workers received an increase of around SEK 500 per month (\sim USD 50), assistant nurses received additional SEK 500, SEK 180, and SEK 150 for these years. This represented an annual increase of about 3.8% for assistant nurses in 2016 and about 2.0% for attendants ¹, which represents a sizable increase for the local governments. The partners agreed on this change to increase relative wages for assistant nurses.

This paper studies this special bargaining agreement, comparing the evolution of wages and employment of assistant nurses to a similar group of attendants under the same collective bargaining framework. Both groups received identical wage increments in the agreements signed before and after this special wage increment. This suggests they would have had similar wage increases without the special agreement. We can thus estimate the effects of the special wage increase using a difference-in-differences analysis. To ensure comparability, the study focuses on women with only a high school degree, constituting the vast majority in both groups. Before the agreement was signed, the two groups were similar on observables, such as income and education.

I find that assistant nurses (the treated group) got higher increases in labor income than the control group of attendants. The two groups have parallel trends in the years preceding the 2016 bargaining agreement. Annual labor income for assistant nurses increases by an additional SEK 2,500 in 2016 and by 4,600 in 2017. These increases follow the logic of

¹Average labor income for both assistant nurses and attendants in my sample is SEK 320,000 in 2015, which means that the negotiated wage increases were about 3.8% for assistant nurses and 2.0% for attendants.

the 2016 special wage increase for assistant nurses. For comparison, the average wage for the treatment group was SEK 320,000 in 2015. An increase of SEK 4,600 thus represents a percentage increase of 1.4.

Assistant nurses keep having wage increases in later years. Assistant nurses keep seeing relatively higher wages in the subsequent years. Their labor income is SEK 8,700, higher than the control group of attendants in 2021. This represents an increase of about 2.7% compared to wages in 2015.

These results are robust to varying the choice of controls and the analysis sample. In particular, I show that the results are robust to controlling for age-by-year fixed effects and employer-by-year fixed effects. Moreover, I show that the results are similar when I include a broader sample, such as men and women. In brief, I provide robust evidence that assistant nurses got higher wages thanks to the special bargaining agreement.

I then explore the effects on employment, hours, and benefits. These factors are important to understand, as they can have profound implications for both workers and employers, influencing overall job satisfaction, labor market fluidity, and public sector expenditure.

First, I find no robust effect on separations. Since the employers face higher labor costs, we expect separations to increase compared to the attendants. At the same time, higher wages might induce worker to stay longer at their workplace. I find no immediate effect on the establishment level, only a marginally significant effect of about 1.5 percentage points from 2018 to 2020 and no effect in 2021. However, this effect disappears when we study separations from the employer rather than the workplace. These findings suggest that employers, if anything, reorganize their internal organization.

Next, I show that there is no effect on contracted working time. Employers in the local public sector might adjust on other margins, such as reducing hours to lower costs. Maintaining stable working hours is essential for workers' financial predictability and work-life balance, and for employers, it avoids the administrative burden and potential disruptions of constantly adjusting work schedules. Once again, I find stable pre-trends

and levels in the preceding years and no effect after assistant nurses got the special wages increase. In other words, there is no intensive margin response either.

Finally, there are no changes in welfare benefits, sickness pay, or pension benefits. I turn to estimating the effects on other work-related benefits, which shed light on the broader social implications of the wage hike. I find no differences in the usage of welfare benefits. The point estimates are small and statistically insignificant. The estimated effect for 2021 is only 0.176, or less than SEK 100.

Similarly, the effects on sickness pay are small and statistically insignificant. The largest effect in absolute value is only SEK 500 on the annual level. The largest observed effect for pension benefits is a negligible and insignificant decrease of SEK 250 in 2021.

This paper contributes to several strands of the literature. The paper closest to mine is [Eliasson and Nordström Skans \(2014\)](#). They study another agreement in the local public sector, where establishment-level wage increases are based on the share of low-paid women. Their results suggest that wages were higher up to four years later and that both separations and hires declined. In related work, [Forslund et al. \(2012, 2014\)](#) analyze case studies regarding occupational wage floors. Their analyses suggest that higher bargained wages increase actual wages, that hours worked and separations remain unchanged, and that workers with better labor market prospects remain at the establishment. This paper complements this research by focusing on another type of agreement and using complete population data, allowing us to learn about the wage and employment effects of those who leave the public sector.

More broadly, I contribute to the literature on collective bargaining and wage-setting by studying a new setting and showing that the special wage increase for assistant nurses led to large and persistent wage increases. There is a large literature studying how different bargaining systems affect wages. However, these focus either on the presence of trade

unions², workplace councils³, the role of bargained occupational wage floors⁴, the structure of the bargaining system affects wages⁵.

Secondly, I contribute to the literature on induced labor cost shocks and employment by exploring how higher negotiated wages for one low-skilled occupation affected their separations, studying a form of labor cost shocks that has yet to be studied. In particular, I find no effect on separations, which suggests that the results commonly found for minimum wages also hold for wage increases higher up in the wage distribution. Thus, these results provide new light on the long-run debate when and how minimum wages⁶ or negotiated wage floors⁷ negatively affect employment.

Finally, I contribute to the literature on the health benefits of wages by examining how higher wages lead to sickness and early labor market exit in a new setting. I do this by studying the effects of wage increases, which is relevant because it is something most workers see regularly, in contrast to minimum wage changes or lottery wins, which are only infrequent events. A positive correlation exists between health and income (Cutler et al., 2011). However, previous research suggests that the direct effect of higher income is either zero or inconclusive, for instance, when driven by minimum wages (Paul Leigh et al., 2019; Neumark, 2023), or lottery wins Cesarini et al. (2016); Östling et al. (2020).

This paper continues as follows. In [Section 2](#), I discuss the institutional setting and the data used. [Section 3](#) details the research design. I present the results in [Section 4](#). Finally, [Section 5](#) concludes.

²Freeman and Kleiner (1990); DiNardo et al. (1996); Card (2001); Card et al. (2004); DiNardo and Lee (2004); Western and Rosenfeld (2011); Stansbury and Summers (2020); Farber et al. (2021); Frandsen (2021).

³Addison et al. (2010); Jäger et al. (2021)

⁴For Sweden, Skedinger (2006); Lundborg and Skedinger (2014); Skedinger (2015); Calmfors et al. (2016); Daunfeldt and Westerberg (2018); Konjunkturinstitutet (201); Daunfeldt et al. (2023). In continental Europe Adamopoulou and Villanueva (2022); Card and Cardoso (2022); Fanfani (2023); Devicienti et al. (2019).

⁵Wallerstein (1999); Hibbs Jr and Locking (2000); Cardoso and Portugal (2005); Card and De La Rica (2006); Dell’Arlinga and Pagani (2007); Granqvist and Regnér (2008); Gürtzgen (2010); Avouyi-Dovi et al. (2013); Fitzenberger et al. (2013); Andréasson (2014); Breda (2015); Braakmann and Brandl (2016); Gürtzgen (2016); Cirillo et al. (2019); Garnero et al. (2020); Lucifora and Vigani (2021); Dodini et al. (2021); Willén (2021).

⁶See Belman and Wolfson (2014); Dube (2019); Manning (2021).

⁷For Sweden, see the papers listed above. For other European countries, Martins (2021); Hijzen and Martins (2020); Card and Cardoso (2022); Fanfani (2023); Adamopoulou and Villanueva (2022).

2 Setting and Data

2.1 Collective Bargaining in Sweden

Collective bargaining is a fundamental mechanism within the Swedish labor market, serving as a structured dialogue between employers and employees, represented by trade unions, to negotiate terms of employment. This process helps establish agreements covering a vast majority of workers; in 2017, for instance, 89% of workers were covered by such agreements. These agreements can encompass a range of employment conditions such as wages, working hours, and workplace safety (Kjellberg, 2019).⁸

A strong presence of trade unions and employer associations supports the efficacy and reach of collective bargaining in Sweden. In 2018, 67% of employees were members of trade unions, while on the employer's side, 88% were members of employer associations. These high membership rates enhance the collective bargaining process, ensuring broad representation and adherence to the agreements reached.

The Swedish labor market operates with little government intervention in setting employment terms. For instance, there are no government-mandated minimum wages or automatic extensions of collective agreements. Instead, trade unions and employer's associations bargain over these issues.

Despite the absence of specific government mandates, the agreements reached through collective bargaining apply to all workers within the coverage area, regardless of whether they are individual trade union members. This inclusivity ensures that a large share of the workforce benefits from the negotiated terms.

Collective bargaining takes place at many levels. Trade unions and employers' associations bargain over wage increases by industry and occupation. These agreements often run for three years. While the parties can agree to any terms, in practice, there is strong

⁸See also Fredriksson and Topel (2010); Kjellberg (2019) for a broad overview.

coordination around the wage increases agreed upon in the manufacturing sector. This pattern-bargaining provides a benchmark called the "mark." While collective bargaining agreements often define average wage increases, they vary in how flexibly employers can distribute this at the establishment level.

Within the public sector, trade union density is higher, registering 81% of workers as trade union affiliates in 2015. Svenska Kommunalarbetareförbundet, the predominant union in this sector, represents municipal blue-collar workers. Concurrently, all public sector employers uphold membership within employer associations, securing a collective bargaining agreement for all employees. This landscape has remained stable since the 1990s, affirming a comprehensive coverage of collective bargaining agreements across all public-sector workers.

2.2 Special Wage Increase for Attendant Nurses in 2016

In Sweden, blue-collar workers in local and regional governments are typically covered by a central agreement (Huvudöverenskommelsen) between Svenska Kommunalarbetareförbundet (the blue-collar union) and the employers' association for local governments (Sveriges kommuner och landsting / Pacta). In 2016, the agreement encompassed around 500,000 workers ([Medlingsinstitutet, 2017](#)).

In the fall of 2015, the union reported that it wants assistant nurses to receive wage increases in line with the mark and that all their members are to receive real wage increases. The union argues that the general public supports their endeavors to compensate assistant nurses after decades of relatively low wages. In particular, the union wants wages to increase without a corresponding reduction in other benefits, as has been the case historically when the union negotiated higher wage increases for low-wage workers ([Lindholm, 2015](#)).

During the 2016 contract negotiation, a special wage increase was carved out for assistant nurses, setting a higher increase of SEK 1,020 compared to SEK 520 for other employees. In subsequent years (2017 and 2018), while other workers' wage increments mirrored the

export-led sector's standard, assistant nurses received an additional SEK 180 and SEK 150, respectively.

Wage floors increased at a relatively low rate to compensate for the increase in attendant nurses. In 2016, the increase was 1.8%, and in 2017 and 2018, the increase was 80% of the mark. Aside from this special wage adjustment for assistant nurses, the 2016 contract negotiation did not introduce significant changes to the existing agreements.

Notably, the contract was slightly revised in 2017. First, wage increases were negotiated in SEK and not as a function of the mark for 2017 and 2018. The revised figures were 710 and 685 for assistant nurses in 2017 and 2018; for others, it was 530 and 535. Moreover, the agreement was prolonged to 2019 and gave all members increases of 540 plus an additional 0.3% that can be distributed locally. In addition, the definition of assistant nurses was broadened to include those working in special care for the disabled ([Lindholm, 2017](#)).

I summarize the bargained wage changes for assistant nurses and attendants in [Figure 1](#).

[Figure 1 Here]

2.3 Data Sources

My study uses data on workers' earnings and occupations to study the role of bargained wage increases. My principal data source is the matched employer-employee database LISA (Longitudinell integrationsdatabas för sjukförsäkrings- och arbetsmarknadsstudier). I get this data from Statistics Sweden, which provides individual-year data for all people in Sweden.⁹ The data is of high quality since it comes from several government registries. The dataset contains individual-level data on earnings, occupation, employment, and related background variables.

However, LISA does not include some detailed labor market items, such as collective

⁹The cutoff is 16 before 2010, and then it is 15.

bargaining coverage and contracted working time. I thus complement the LISA database with the Structure of Earnings Survey (Lönestrukturstatistiken) from the National Mediation Office. The Structure of Earnings Survey is a survey that covers earnings in Sweden, in particular, how earnings are related to gender, occupation, and sector. The survey contains complete population data for the public sector workforce and those employed at large private firms. In addition, the government surveys a sample of the smaller firms. Notably, the survey asks additional questions for public sector employees, which means that we also know their contracted working time and collective bargaining coverage.

3 Empirical Strategy

3.1 Research Design

I want to estimate the effect of higher wages on workers' future income and employment. The core selection problem is that wages are usually set in expectation of the future productivity of the worker and the employer. To overcome this issue, I exploit two features of the system Swedish collective bargaining. First, I use the fact that wage increases are negotiated at the sectoral level and cover all public sector workers. Secondly, I use the particular feature of the 2016 bargaining that awarded additional wage increases to assistant nurses.

Thus, we can compare treated assistant nurses with workers in a similar care profession that only received the regular wage increase. I thus compare assistant nurses (SSYK2012 532 "Undersökterskor") with attendants (SSYK 2012 534 "Skötare, vårdare och personliga assistenter m.fl."). Note that the agreement applies to those who work as an assistant nurse in the care sector, which might differ from the occupation codes.

I compare workers working in these two professions at a local or regional government covered by the relevant agreement (Huvudöverenskommelsen) in 2015. I condition on employment in 2015 since employers might adjust their workforce composition in response to the wage agreements. This restriction also means that I estimate the intention-to-treat effect.

3.2 Estimating Equations

I estimate event studies around 2016 for workers who were assistant nurses or attendants in 2015. Let y_{it} denote an outcome, such as labor income, for individual i in year t . My

core model is then:

$$y_{it} = \alpha + \sum_{k=2012, \neq 2015}^{2021} \beta_k \times \text{Assistant Nurse}_i \times \mathbb{1}\{\text{Year}_t = k\} + \theta_i + \theta_t + \varepsilon_{it}. \quad (1)$$

where β_k estimate the mean difference between the two groups in year k , α is the constant, θ_i , θ_t are individual and year fixed effects, and ε_{it} is the error term. I cluster standard errors on the individual level.

3.3 Identification Assumptions

To credibly estimate the causal effect of the 2016 special wage increase for assistant nurses, we rely on three critical assumptions: parallel trends, no anticipation, and no spillovers.

The historical context of wage negotiations within the local public sector provides a solid grounding for the parallel trends assumption. Since the social partners negotiate for both assistant nurses and attendants, we expect wage increases to be similar without any special agreement. Indeed, [Figure 1](#) shows that assistant nurses and attendants have had similar bargained wage increases in the years before the 2016 negotiations. In the succeeding years, wage increases slowly converged to the same rates. Moreover, we see in [Figure 2](#) that the treated and control groups in my sample had similar levels and trends in labor earnings. These factors suggest that the two groups should have had similar wage increases absent the special wage increase in 2016.

Secondly, the fact that these negotiations were conducted at the sectoral level minimizes the risk that local economic conditions influence the results. While there can be local wage negotiations, the central ones put a floor on the wage increase for both groups. This bargaining mechanism ensures that wage adjustments are largely insulated from local economic conditions, making it reasonable to assume that external economic fluctuations would uniformly affect both groups. Consequently, any divergence in wage trends after the agreement was agreed upon can more confidently be attributed to the special wage increase.

Lastly, since the special wage increase resulted from long-run discussions between the union and the employers, we do not expect them to be affected by any short-run changes in economic or political conditions. In contrast, they reflect long-term objectives about equalizing pay between occupational groups. Such a context suggests that trends after 2016 are less likely to be confounded by sudden, unanticipated changes in the labor market, reinforcing the argument for parallel trends.

The assumption of no anticipation holds for similar reasons as parallel trends: wage increases are bargained on the sectoral level and complemented on the local level, which means that previous agreements were already binding when they negotiated the 2016 increase. Still, to strengthen my setup further, I establish treatment status a year before the actual wage adjustments (in 2015) to ensure that our observed effects are unlikely to be mixed up with changes in employment or occupational status.

Finally, we need to assume that there are no spillovers. In this case, this means that attendants did not suffer worse outcomes because assistant nurses were prioritized. While this cannot be perfectly ruled out, several factors talk against this. First, the special wage increase was financed by lower increases in occupational wage floors rather than lower average wage increases (Medlingsinstitutet, 2017). Secondly, the fact that I find no effect on separations (Figure 5) or contracted hours (Figure 6) suggests that local governments do not substitute assistant nurses for attendants.

In sum, the assumptions of parallel trends, no anticipation, and no spillovers are well-supported by the historical context of wage negotiations, the centralized nature of wage bargaining, and the strategic financing of the wage increase. These factors collectively strengthen the case for causal inference.

3.4 Sample Selection

We need to find a suitable control group to estimate the special wage increase for assistant nurses. While attendants are similar to assistant nurses in many respects, we see some

differences between the two groups. This is shown in the last two columns of [Table 1](#). I thus restrict my sample further to make the two groups more balanced.

I define my core sample as assistant nurses or attendants who, in 2015, were covered by the central agreement. In addition, I limit my sample to female full-time workers aged 45–55, with no more than a high school education, who earned between SEK 200,000 and SEK 380,000. I show in various robustness tests that my main results are robust to varying these conditions. Ultimately, I have 15,147 assistant nurses in the treated group and 6,017 attendants in the control group.

3.5 Summary Statistics

In the final sample, assistant nurses and attendants look similar in observable characteristics. [Table 1](#) shows descriptive statistics for both groups. The average age is 50 in both groups, and the average income is SEK 320,000 for the assistant nurses and SEK 322,000 for the attendants. I define the sample so that both groups are female, have 100% contracted time, and have a high school as the highest finished level of education. Since the two groups are similar, we can be more convinced that changes around 2016 are driven by the collective bargaining agreements and not by other unobserved shocks.

I also include means for the unadjusted samples in the last two columns for comparison. We then see that age (45 and 43) and income (265,100 and 267,700) are comparable. The groups differ in some other dimensions. Nurses are more likely to be female (92% and 75%), have slightly higher contracted time (82% and 79%), have a higher share that only finished high school (88% and 78%), and have a lower share with post-secondary education (12% and 22%).

[[Table 1](#) Here]

4 Results

4.1 Effect on Labor Income

I begin by showing that assistant nurses got higher labor income than attendants in the years following the special wage increase. Labor income captures the joint effect of changes in hourly wages, hours, and employment.

Previous research suggests that bargained wages affect worker outcomes. In particular, [Forsslund et al. \(2012, 2014\)](#); [Eliasson and Nordström Skans \(2014\)](#) show that bargained wage increases in collective bargaining agreements translate into higher wages for workers. Papers studying wage floors also find such effects.¹⁰ We would thus expect such effects in this setting as well.

Assistant nurses get higher labor income increases after the 2016 agreement. [Figure 2](#) shows the evolution of nominal labor income for assistant nurses and attendants. The two groups had similar trends and levels in the years preceding the 2016 agreement. We then see that assistant nurses' labor income increases more than that of attendants in the subsequent years. The corresponding real values are given in [Figure 3](#) and [Table 2](#). In real terms, the effect starts at an annual increase of SEK 2,600 in 2016, then increases to SEK 5,800 in 2018, and then continues upwards to SEK 8,700 in 2021. These results are statistically significant at the 1% level.

[[Figure 2](#) Here]

I show additional robustness checks in [Table 2](#). First, I keep the sample fixed but introduce additional fixed effects. In column (2), I show that the results are robust to including cohort-year fixed effects. These consider any differences in the age distribution between the two groups. If labor income increases correlate with age, this could introduce bias into

¹⁰[Skedinger \(2006\)](#); [Lundborg and Skedinger \(2014\)](#); [Forsslund et al. \(2014\)](#); [Skedinger \(2015\)](#); [Calmfors et al. \(2016\)](#); [Daunfeldt and Westerberg \(2018\)](#); [Konjunkturinstitutet \(201\)](#); [Daunfeldt et al. \(2023\)](#).

the models. Next, in column (3), I add employer-year fixed effects. If assistant nurses and attendants work for different employers, these employers might have different propensities to increase labor income, even absent the special wage increase. We see that the results are robust to include these fixed effects.

I also show that the results are robust to varying the sample restrictions. In column (4), we see that the results are robust to having a more comprehensive income range (SEK 150,000 to SEK 400,000) in 2015. In column (5), the results are robust to including cohorts aged 40–55 in 2015.

Next, I do three sample variations where the groups are comparable if we add additional fixed effects. In column (6), I change the sample to those with contracted working time in 2015 to at least 85% in 2015 and include contracted time-year fixed effects. In column (7), I include both men and women and gender-year fixed effects. Finally, in column (8), I include those with the highest degree of education being high school or beyond high school, as well as education-by-year fixed effects.

These results confirm that the intended special wage increase boosted the labor income of attendant nurses, at least in comparison to attendants. Since the two groups share the same collective bargaining agreement and have similar pre-reform characteristics and parallel trends in the preceding years, we have good reason to believe we find a causal effect.

[Figure 3 Here]

4.2 Effect on Separations

Next, I show that higher wages have no robust effect on separations in this setting. Ex-ante, the effects are ambiguous. While higher labor costs make workers less attractive to retain the employer, higher wages might also reduce turnover if workers feel more appreciated. This latter factor might be particularly relevant in caregiving professions (OECD, 2020).

Previous research has found mixed evidence on the role of higher wages in explaining separations. Internationally, many studies find employment effects of higher minimum wages close to zero (Belman and Wolfson, 2014; Dube, 2019; Manning, 2021). However, that conclusion is contended (Neumark et al., 2014). Swedish studies usually find negative or null effects.¹¹ However, as pointed out in Eliasson and Nordström Skans (2014), wage floors usually only bind for a small group of workers. Similarly, minimum wage studies focus on low-skilled workers by design.

Assistant nurses are no more likely to leave their establishment than their attendants. I compare the likelihood that the two groups will leave the current establishment where they are working. The results are shown in Figure 5 and Table 4. First, the two groups have parallel trends in the years leading up to 2016. We then see a slight increase for assistant nurses of about 1.5 percentage points in the later years. However, the effect is noisy and is only statistically significant on the 5% level.

[Figure 5 Here]

To understand this further, I also study the likelihood that the two groups leave their employer. Note that an employer might have multiple establishments. In Figure 4 and in Table 3, we find that the point estimates are lower than the estimates for establishment separations. In 2016, there was an effect of 0.6 percentage points, but it was only significant at the 10% level, and the subsequent point estimates are smaller and statistically insignificant.

These results suggest that attendant nurses might be more likely to change workplaces, but there are no differences in the probability of leaving their employer. In other words, there is no robust support that higher wages for attendant nurses increased their risk of leaving their employer.

¹¹Skedinger (2006); Lundborg and Skedinger (2014); Forslund et al. (2014); Eliasson and Nordström Skans (2014); Skedinger (2015); Calmfors et al. (2016); Daunfeldt and Westerberg (2018); Konjunkturinstitutet (201); Daunfeldt et al. (2023).

4.3 Effects on Contracted Working Time

Employers might reduce hours worked in response to higher labor costs. Even if higher labor costs do not induce employers to lay off workers, they might still be able to dampen the labor cost shock by reducing the number of hours worked. International evidence also points toward a small response on the intensive margin, even if the results are often combined in meta-studies (Belman and Wolfson, 2014; Dube, 2019). In the Swedish context, some studies find small or no effects (Forslund et al., 2014; Skedinger, 2015; Konjunkturinstitutet, 201), while others find negative effects (Eliasson and Nordström Skans, 2014; Konjunkturinstitutet, 201).

I find no differences in contracted working time between assistant nurses and attendants. To study the intensive margin response, I see if there are any differences between the two groups regarding contracted hours. Note that this variable only exists if the person remains in the public sector or moves to either a large private firm or a small one that happens to be surveyed. Still, since the effect on separations is small, this will not be a major concern.

We see in Figure 6 and Table 5 that the estimated effects on contracted working time are both small and statistically insignificant in most cases. First, both groups have parallel trends and levels before 2016. We see a peak in 2015 for both groups. This effect is somewhat mechanical since I require individuals to work full-time in 2015. Since some workers reduce their hours, but no one can increase them, we expect contracted hours to decrease.

Next, we study the magnitudes in the event studies. The immediate response is a reduction of -0.052, and then the estimated coefficients alternate between positive and negative signs. Since the average was 100 in 2015, the effects are also economically small. The robustness checks in Table 5 provide further evidence that the findings are robust across specifications.

These results suggest no intensive margin response following the special wage increase.

Note that the estimated treatment effect on labor income is about 2.7%, suggesting a non-trivial wage increase. My results thus align with studies that find small or no effects of induced higher wages on hours worked.

[Figure 6 Here]

4.4 Effect on Benefits and Health

While health and income have a positive association, the causal mechanisms are much less understood (Cutler et al., 2011). There has been some work trying to relate minimum wages to health outcomes. However, there seem to be no general conclusions, and many studies find mixed or inconclusive evidence (Paul Leigh et al., 2019; Neumark, 2023). In the Swedish context, Cesarini et al. (2016); Östling et al. (2020) show no effect of lottery wins on health.

I explore if higher wages cause assistant nurses to have better health outcomes, thus inducing them to take out lower benefits. I compare the change for the two groups for three related social outcomes: welfare benefits, sickness pay, and pension benefits.

First, we see that there is no effect on welfare benefits. Table 6 shows the event study coefficients when we compare assistant nurses and attendants concerning welfare benefits. They were on parallel trends before 2016 and no differences after 2016. Moreover, the estimated coefficients are small: The point estimates do not exceed either SEK -100 or SEK 200 annually.

Next, we see that there is no effect on sickness pay. Table 7 shows that the estimated coefficients are negative. However, the coefficients are statistically insignificant, and the magnitudes are small: the largest coefficient in absolute value indicates a reduction of about SEK 500 yearly.

Finally, we see that there is no difference in average pension benefits. We see in Table 8 that the estimates for pension benefits are both small and statistically insignificant. Once

again, the largest effect, in absolute value, is for 2021, about negative SEK 250.

In brief, I find no evidence that higher wages make attendant nurses take out additional benefits compared to the attendant control group.

5 Conclusion

Collective bargaining shapes labor market outcomes across OECD countries (Cazes et al., 2019; Bhuller et al., 2022). However, the nuanced effects of collective bargaining on individual workers, particularly within specific frameworks, have yet to be thoroughly explored, leaving a gap in our understanding (Fanfani, 2023).

This paper addresses this gap by analyzing the impacts of collectively bargained wage changes on Swedish local public sector caregivers. This is an important area of study since an older population likely demands more caregivers in the future. At the same time, the latter group is today plagued by high turnover rates and widespread job dissatisfaction (OECD, 2020; Statistiska centralbyrån, 2014).

This study centers on the special wage increase for assistant nurses in Swedish local public governments introduced in 2016. I compare their income and employment outcomes with those of attendants, who received a smaller wage increase under the same collective agreement. This targeted wage increase, amounting to a significant SEK 1,020 (3.8%) for assistant nurses in 2016 as opposed to 520 (2.0%) for attendants, sets the stage for a detailed examination of the policy's effectiveness.

The analysis uncovers that assistant nurses and attendants had similar levels and trends in labor income in the years preceding the agreement in 2016 and that assistant nurses started seeing sustained labor income gains in the following years. These differences with attendants reached approximately SEK 8,700 or about 2.7% by 2021.

Further extending the analysis to separations and contracted working time, the study anticipated potential shifts in labor dynamics. Increased labor costs could either reduce turnover, reflecting a positive aspect of higher wages, or, conversely, dampen labor demand from the employer's perspective. However, the findings reveal no significant effects on separations, whether from the establishment, the employer, or contracted working time. This suggests that the wage increase had a neutral impact on these outcomes.

Finally, I explore the effects on work-related benefits. Notably, I find no noticeable changes in benefits usage, sickness payments, or pension benefits. This finding is particularly intriguing, as it suggests that the wage increase did not lead to an increased or decreased usage of these forms of compensation.

While this study offers valuable insights into the effects of collective bargaining on caregivers within the Swedish public sector, it acknowledges limitations in its scope. While the public sector is important across countries, the dynamics might play out differently in the private sector.

In sum, this paper significantly contributes to the broader discourse on collective bargaining, highlighting how targeted wage increases can achieve their intended benefits for workers without inducing adverse labor market consequences. Nonetheless, further research is needed to examine such wage policies' broader organizational and fiscal implications.

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Tables

Table 1: Descriptive Statistics: Assistant Nurses and Attendants

	Baseline Sample										Raw Sample	
	Assistant Nurses					Attendants					Assistant Nurses	Attendants
	N	Mean	Median	Min	Max	N	Mean	Median	Min	Max	Mean	Mean
Age	15,147	50.19	50.00	45.00	55.00	6,017	50.18	50.00	45.00	55.00	45.48	43.38
Labor Income	15,147	3,196.35	3,226.00	2,000.00	3,500.00	6,017	3,215.62	3,242.00	2,000.00	3,800.00	2,650.90	2,677.30
Female	15,147	1.00	1.00	1.00	1.00	6,017	1.00	1.00	1.00	1.00	0.92	0.75
Contracted Time	15,147	100.00	100.00	100.00	100.00	6,017	100.00	100.00	100.00	100.00	82.10	79.38
High School	15,147	1.00	1.00	1.00	1.00	6,017	1.00	1.00	1.00	1.00	0.88	0.78
Higher Education	15,147	0.00	0.00	0.00	0.00	6,017	0.00	0.00	0.00	0.00	0.12	0.22
Welfare Benefits	15,147	4.46	0.00	0.00	1,300.00	6,017	5.70	0.00	0.00	1,400.00	5.76	7.98
Pension Benefits	15,147	5.76	0.00	0.00	2,700.00	6,017	5.85	0.00	0.00	2,000.00	42.64	44.19
Sickness Payments	15,147	38.06	0.00	0.00	1,200.00	6,017	38.90	0.00	0.00	1,200.00	65.13	53.19

Notes: The table shows summary statistics for assistant nurses (treated group) and attendants (control groups) for the year 2015. The first ten columns show values for the baseline sample, while the last two show average values for the raw sample. High school is a dummy if the highest level of education is high school. Higher education is a dummy if the highest level of education is beyond high school. Monetary values are expressed in SEK 100 and deflated to the 2015 value of the consumer price index from Statistics Sweden. Minimum and maximum values have been rounded to preserve confidentiality.

Table 2: Assistant Nurses and Attendants: Labor Income (Event Studies)

	Labor Income (SEK 100)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	Age Control	Employer Control	More Income Groups	More Cohorts	More Contracted Hours	Men and Women	All Education
2012 × Assistant Nurse	-0.569 (8.267)	-0.561 (8.244)	6.326 (8.800)	0.316 (8.116)	-10.054 (7.690)	-6.510 (6.550)	-4.787 (7.893)	-6.409 (8.106)
2013 × Assistant Nurse	4.314 (7.253)	4.284 (7.242)	11.790 (7.770)	5.878 (7.189)	3.617 (6.813)	4.226 (5.838)	-2.499 (7.015)	-0.737 (7.132)
2014 × Assistant Nurse	4.837 (5.938)	4.760 (5.934)	4.087 (6.406)	8.357 (5.969)	5.939 (5.401)	6.620 (4.640)	-0.492 (5.718)	0.982 (5.721)
2015 × Assistant Nurse	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
2016 × Assistant Nurse	25.646*** (6.765)	25.606*** (6.765)	25.190*** (7.329)	26.699*** (6.772)	28.200*** (6.088)	25.157*** (5.089)	22.599*** (6.397)	25.654*** (6.388)
2017 × Assistant Nurse	45.884*** (8.252)	45.913*** (8.249)	38.368*** (8.880)	50.275*** (8.206)	51.275*** (7.536)	51.067*** (6.413)	47.466*** (7.778)	46.648*** (7.816)
2018 × Assistant Nurse	57.939*** (9.197)	58.116*** (9.196)	49.256*** (9.889)	65.169*** (9.097)	60.957*** (8.299)	64.920*** (7.117)	52.445*** (8.781)	60.160*** (8.755)
2019 × Assistant Nurse	53.876*** (10.162)	54.093*** (10.157)	37.462*** (10.768)	61.555*** (10.012)	61.049*** (8.999)	61.388*** (7.706)	47.983*** (9.710)	56.295*** (9.644)
2020 × Assistant Nurse	71.376*** (11.031)	71.553*** (11.025)	46.658*** (11.759)	77.175*** (10.820)	76.150*** (9.722)	75.745*** (8.345)	66.674*** (10.618)	69.269*** (10.460)
2021 × Assistant Nurse	86.688*** (12.258)	87.010*** (12.237)	57.884*** (12.948)	94.244*** (11.954)	90.439*** (10.804)	90.891*** (9.249)	79.385*** (11.753)	89.049*** (11.561)
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	Yes	No	No	No
Age-Year Fixed Effects	No	Yes	No	No	No	No	No	No
Employer-Year Fixed Effects	No	No	Yes	No	No	No	No	No
Contracted Time-Year Fixed Effects	No	No	No	No	No	Yes	No	No
Education Level-Year Fixed Effects	No	No	No	No	No	No	No	Yes
Gender-Year Fixed Effects	No	No	No	No	No	No	Yes	No
Adjusted R-Squared	0.456	0.458	0.458	0.482	0.462	0.478	0.452	0.452
Observations	211,074	211,074	210,894	223,997	275,976	394,555	241,459	241,996

Notes: The table shows event study estimates that compare labor income for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Column (1) has the baseline sample. Column (2) adds cohort-by-year fixed effects. Column (3) adds employer-by-year fixed effects. Column (4) increases the sample to those with an income between SEK 150,000 and SEK 400,000 in 2015. Column (5) increases the sample to individuals aged between 40 and 55 in 2015. Column (6) increases the sample by including those with a contracted working time of 85% and above in 2015 and includes contracted working time-by-year fixed effects. Column (7) includes both men and women and gender-by-year fixed effects. Column (8) includes those with the highest degree of education being high school or beyond high school, as well as education-by-year fixed effects. Monetary values are expressed in SEK 100 and deflated to the 2015 value of the consumer price index from Statistics Sweden. Standard errors are clustered on the individual level. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$.

Table 3: Assistant Nurses and Attendants: Employer Separation (Event Studies)

	Separation (Firm)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	Age Control	Employer Control	More Income Groups	More Cohorts	More Contracted Hours	Men and Women	All Education
2012 × Assistant Nurse	-0.009** (0.004)	-0.009** (0.004)	-0.011** (0.004)	-0.009** (0.004)	-0.008** (0.004)	-0.007** (0.003)	-0.008** (0.004)	-0.008** (0.004)
2013 × Assistant Nurse	-0.001 (0.004)	-0.001 (0.004)	-0.003 (0.004)	-0.001 (0.004)	-0.002 (0.003)	-0.002 (0.003)	-0.003 (0.004)	-0.002 (0.004)
2014 × Assistant Nurse	-0.001 (0.003)	-0.001 (0.003)	-0.003 (0.003)	-0.001 (0.003)	-0.000 (0.003)	-0.000 (0.003)	-0.003 (0.003)	0.000 (0.003)
2015 × Assistant Nurse	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
2016 × Assistant Nurse	0.006* (0.003)	0.006* (0.003)	0.008** (0.003)	0.005 (0.003)	0.001 (0.003)	-0.000 (0.003)	0.003 (0.003)	0.005 (0.003)
2017 × Assistant Nurse	-0.000 (0.004)	-0.000 (0.004)	0.000 (0.004)	0.000 (0.004)	-0.002 (0.003)	-0.001 (0.003)	-0.001 (0.004)	0.001 (0.004)
2018 × Assistant Nurse	0.001 (0.004)	0.001 (0.004)	0.002 (0.004)	0.000 (0.004)	-0.002 (0.004)	-0.003 (0.003)	-0.002 (0.004)	0.001 (0.004)
2019 × Assistant Nurse	0.000 (0.004)	0.000 (0.004)	0.003 (0.004)	0.001 (0.004)	-0.002 (0.004)	-0.001 (0.003)	-0.001 (0.004)	0.001 (0.004)
2020 × Assistant Nurse	-0.004 (0.004)	-0.004 (0.004)	-0.000 (0.004)	-0.002 (0.004)	-0.003 (0.004)	-0.003 (0.003)	-0.004 (0.004)	-0.003 (0.004)
2021 × Assistant Nurse	-0.004 (0.004)	-0.004 (0.004)	0.000 (0.004)	-0.005 (0.004)	-0.005 (0.004)	-0.005 (0.003)	-0.003 (0.004)	-0.001 (0.004)
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	Yes	No	No	No
Age-Year Fixed Effects	No	Yes	No	No	No	No	No	No
Employer-Year Fixed Effects	No	No	Yes	No	No	No	No	No
Contracted Time-Year Fixed Effects	No	No	No	No	No	Yes	No	No
Education Level-Year Fixed Effects	No	No	No	No	No	No	No	Yes
Gender-Year Fixed Effects	No	No	No	No	No	No	Yes	No
Adjusted R-Squared	0.111	0.111	0.126	0.113	0.110	0.110	0.116	0.114
Observations	211,074	211,074	210,894	223,997	275,976	394,555	241,459	241,996

Notes: The table shows event study estimates that compare separations from current employer for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Column (1) has the baseline sample. Column (2) adds cohort-by-year fixed effects. Column (3) adds employer-by-year fixed effects. Column (4) increases the sample to those with an income between SEK 150,000 and SEK 400,000 in 2015. Column (5) increases the sample to individuals aged between 40 and 55 in 2015. Column (6) increases the sample by including those with a contracted working time of 85% and above in 2015 and includes contracted working time-by-year fixed effects. Column (7) includes both men and women and gender-by-year fixed effects. Column (8) includes those with the highest degree of education being high school or beyond high school, as well as education-by-year fixed effects. Standard errors are clustered on the individual level. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$.

Table 4: Assistant Nurses and Attendants: Establishment Separation (Event Studies)

	Separation (Establishment)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	Age Control	Employer Control	More Income Groups	More Cohorts	More Contracted Hours	Men and Women	All Education
2012 × Assistant Nurse	-0.001 (0.007)	-0.001 (0.007)	0.002 (0.007)	-0.001 (0.007)	-0.001 (0.006)	-0.007 (0.005)	-0.002 (0.007)	-0.003 (0.007)
2013 × Assistant Nurse	-0.010 (0.007)	-0.010 (0.007)	-0.003 (0.007)	-0.010 (0.007)	-0.007 (0.006)	-0.004 (0.005)	-0.013* (0.007)	-0.010 (0.007)
2014 × Assistant Nurse	0.005 (0.007)	0.005 (0.007)	0.009 (0.007)	0.003 (0.007)	0.006 (0.006)	0.005 (0.005)	0.002 (0.006)	0.006 (0.006)
2015 × Assistant Nurse	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
2016 × Assistant Nurse	0.001 (0.007)	0.001 (0.007)	0.009 (0.007)	0.000 (0.007)	0.001 (0.006)	-0.001 (0.005)	-0.002 (0.006)	-0.001 (0.006)
2017 × Assistant Nurse	0.011 (0.007)	0.011 (0.007)	0.011 (0.008)	0.009 (0.007)	0.008 (0.006)	0.003 (0.005)	0.010 (0.007)	0.009 (0.007)
2018 × Assistant Nurse	0.013* (0.007)	0.013* (0.007)	0.018** (0.007)	0.015** (0.007)	0.010 (0.006)	0.006 (0.005)	0.013* (0.007)	0.009 (0.007)
2019 × Assistant Nurse	0.016** (0.007)	0.016** (0.007)	0.016** (0.008)	0.016** (0.007)	0.015** (0.007)	0.013** (0.005)	0.014** (0.007)	0.013** (0.007)
2020 × Assistant Nurse	0.015** (0.007)	0.015** (0.007)	0.024*** (0.008)	0.017** (0.007)	0.012* (0.006)	0.010* (0.005)	0.014** (0.007)	0.014** (0.007)
2021 × Assistant Nurse	0.005 (0.007)	0.005 (0.007)	0.011 (0.008)	0.003 (0.007)	0.001 (0.007)	-0.002 (0.005)	0.005 (0.007)	0.004 (0.007)
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	Yes	No	No	No
Age-Year Fixed Effects	No	Yes	No	No	No	No	No	No
Employer-Year Fixed Effects	No	No	Yes	No	No	No	No	No
Contracted Time-Year Fixed Effects	No	No	No	No	No	Yes	No	No
Education Level-Year Fixed Effects	No	No	No	No	No	No	No	Yes
Gender-Year Fixed Effects	No	No	No	No	No	No	Yes	No
Adjusted R-Squared	0.086	0.086	0.104	0.087	0.085	0.086	0.087	0.089
Observations	211,074	211,074	210,894	223,997	275,976	394,555	241,459	241,996

Notes: The table shows event study estimates that compare separations from current establishment for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Column (1) has the baseline sample. Column (2) adds cohort-by-year fixed effects. Column (3) adds employer-by-year fixed effects. Column (4) increases the sample to those with an income between SEK 150,000 and SEK 400,000 in 2015. Column (5) increases the sample to individuals aged between 40 and 55 in 2015. Column (6) increases the sample by including those with a contracted working time of 85% and above in 2015 and includes contracted working time-by-year fixed effects. Column (7) includes both men and women and gender-by-year fixed effects. Column (8) includes those with the highest degree of education being high school or beyond high school, as well as education-by-year fixed effects. Standard errors are clustered on the individual level. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$.

Table 5: Assistant Nurses and Attendants: Contracted Working Time (Event Studies)

	Contracted Time							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	Age Control	Employer Control	More Income Groups	More Cohorts	More Contracted Hours	Men and Women	All Education
2012 × Assistant Nurse	-0.300 (0.273)	-0.297 (0.273)	-0.245 (0.293)	-0.403 (0.266)	-0.219 (0.263)	-0.163 (0.222)	-0.309 (0.255)	-0.264 (0.266)
2013 × Assistant Nurse	-0.125 (0.266)	-0.126 (0.265)	-0.064 (0.285)	-0.157 (0.260)	0.107 (0.254)	0.114 (0.216)	-0.318 (0.250)	-0.090 (0.254)
2014 × Assistant Nurse	0.017 (0.171)	0.017 (0.171)	0.011 (0.182)	-0.131 (0.169)	-0.088 (0.155)	-0.063 (0.133)	-0.117 (0.161)	0.016 (0.167)
2015 × Assistant Nurse	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
2016 × Assistant Nurse	-0.052 (0.191)	-0.049 (0.191)	0.185 (0.204)	-0.247 (0.186)	-0.110 (0.176)	-0.247* (0.148)	-0.141 (0.180)	-0.131 (0.181)
2017 × Assistant Nurse	0.459 (0.310)	0.460 (0.310)	0.249 (0.331)	0.385 (0.301)	0.531* (0.285)	0.579** (0.240)	0.318 (0.287)	0.466 (0.294)
2018 × Assistant Nurse	-0.052 (0.315)	-0.048 (0.315)	-0.212 (0.336)	-0.014 (0.309)	0.001 (0.286)	0.031 (0.242)	-0.171 (0.296)	0.037 (0.296)
2019 × Assistant Nurse	0.259 (0.334)	0.270 (0.334)	0.082 (0.355)	0.120 (0.324)	0.015 (0.295)	-0.096 (0.251)	0.249 (0.310)	0.150 (0.312)
2020 × Assistant Nurse	0.087 (0.341)	0.093 (0.341)	-0.217 (0.368)	0.012 (0.331)	0.071 (0.304)	-0.059 (0.259)	0.054 (0.319)	0.041 (0.318)
2021 × Assistant Nurse	-0.094 (0.354)	-0.087 (0.354)	-0.356 (0.376)	-0.188 (0.342)	-0.231 (0.311)	-0.083 (0.266)	-0.227 (0.330)	-0.007 (0.330)
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	Yes	No	No	No
Age-Year Fixed Effects	No	Yes	No	No	No	No	No	No
Employer-Year Fixed Effects	No	No	Yes	No	No	No	No	No
Contracted Time-Year Fixed Effects	No	No	No	No	No	Yes	No	No
Education Level-Year Fixed Effects	No	No	No	No	No	No	No	Yes
Gender-Year Fixed Effects	No	No	No	No	No	No	Yes	No
Adjusted R-Squared	0.159	0.159	0.159	0.163	0.160	0.193	0.161	0.161
Observations	205,452	205,452	205,291	217,775	268,044	382,792	234,207	235,023

Notes: The table shows event study estimates that compare contracted working time for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Column (1) has the baseline sample. Column (2) adds cohort-by-year fixed effects. Column (3) adds employer-by-year fixed effects. Column (4) increases the sample to those with an income between SEK 150,000 and SEK 400,000 in 2015. Column (5) increases the sample to individuals aged between 40 and 55 in 2015. Column (6) increases the sample by including those with a contracted working time of 85% and above in 2015 and includes contracted working time-by-year fixed effects. Column (7) includes both men and women and gender-by-year fixed effects. Column (8) includes those with the highest degree of education being high school or beyond high school, as well as education-by-year fixed effects. Standard errors are clustered on the individual level. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$.

Table 6: Assistant Nurses and Attendants: Welfare Benefits (Event Studies)

	Welfare (SEK 100)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	Age Control	Employer Control	More Income Groups	More Cohorts	More Contracted Hours	Men and Women	All Education
2012 × Assistant Nurse	1.199 (1.137)	1.208 (1.137)	1.862 (1.189)	0.802 (1.108)	0.796 (1.000)	1.709** (0.856)	1.148 (1.039)	1.162 (1.048)
2013 × Assistant Nurse	0.171 (1.079)	0.159 (1.079)	1.037 (1.112)	-0.064 (1.056)	-0.252 (0.931)	0.397 (0.795)	0.471 (0.989)	0.030 (0.982)
2014 × Assistant Nurse	-0.610 (0.884)	-0.613 (0.884)	-0.306 (0.923)	-0.787 (0.851)	-0.269 (0.737)	0.280 (0.630)	-0.584 (0.797)	-0.481 (0.787)
2015 × Assistant Nurse	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
2016 × Assistant Nurse	0.849 (0.697)	0.844 (0.697)	0.789 (0.759)	0.780 (0.690)	0.463 (0.597)	0.447 (0.526)	0.562 (0.634)	0.557 (0.635)
2017 × Assistant Nurse	1.048 (0.787)	1.043 (0.787)	1.344 (0.872)	0.809 (0.810)	0.586 (0.685)	0.912 (0.608)	0.655 (0.731)	0.797 (0.707)
2018 × Assistant Nurse	1.156 (0.988)	1.149 (0.989)	1.465 (1.094)	1.037 (0.976)	0.764 (0.840)	1.081 (0.713)	0.947 (0.894)	0.862 (0.900)
2019 × Assistant Nurse	-0.085 (0.985)	-0.090 (0.985)	0.036 (1.043)	-0.069 (0.981)	-0.554 (0.859)	0.675 (0.733)	0.265 (0.915)	-0.271 (0.871)
2020 × Assistant Nurse	0.938 (0.967)	0.935 (0.966)	1.277 (1.059)	0.128 (1.032)	-0.204 (0.869)	1.122 (0.768)	1.119 (0.901)	0.700 (0.860)
2021 × Assistant Nurse	0.176 (1.042)	0.174 (1.041)	0.571 (1.130)	-0.401 (1.068)	-0.761 (0.925)	0.276 (0.800)	0.114 (0.979)	-0.140 (0.945)
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	Yes	No	No	No
Age-Year Fixed Effects	No	Yes	No	No	No	No	No	No
Employer-Year Fixed Effects	No	No	Yes	No	No	No	No	No
Contracted Time-Year Fixed Effects	No	No	No	No	No	Yes	No	No
Education Level-Year Fixed Effects	No	No	No	No	No	No	No	Yes
Gender-Year Fixed Effects	No	No	No	No	No	No	Yes	No
Adjusted R-Squared	0.285	0.285	0.284	0.289	0.276	0.274	0.281	0.276
Observations	211,074	211,074	210,894	223,997	275,976	394,555	241,459	241,996

Notes: The table shows event study estimates that compare welfare benefits for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Column (1) has the baseline sample. Column (2) adds cohort-by-year fixed effects. Column (3) adds employer-by-year fixed effects. Column (4) increases the sample to those with an income between SEK 150,000 and SEK 400,000 in 2015. Column (5) increases the sample to individuals aged between 40 and 55 in 2015. Column (6) increases the sample by including those with a contracted working time of 85% and above in 2015 and includes contracted working time-by-year fixed effects. Column (7) includes both men and women and gender-by-year fixed effects. Column (8) includes those with the highest degree of education being high school or beyond high school, as well as education-by-year fixed effects. Monetary values are expressed in SEK 100 and deflated to the 2015 value of the consumer price index from Statistics Sweden. Standard errors are clustered on the individual level. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$.

Table 7: Assistant Nurses and Attendants: Sickness Pay (Event Studies)

	Sick Pay (SEK 100)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	Age Control	Employer Control	More Income Groups	More Cohorts	More Contracted Hours	Men and Women	All Education
2012 × Assistant Nurse	-0.482 (3.107)	-0.483 (3.110)	-2.204 (3.256)	-1.618 (3.200)	-0.502 (2.661)	1.135 (2.238)	-0.415 (2.842)	-1.535 (2.868)
2013 × Assistant Nurse	-0.980 (3.148)	-0.963 (3.151)	-1.733 (3.382)	-1.101 (3.234)	-1.808 (2.719)	-2.701 (2.341)	0.078 (2.925)	-1.310 (2.912)
2014 × Assistant Nurse	-1.205 (3.078)	-1.148 (3.079)	-1.147 (3.350)	-2.792 (3.171)	-1.167 (2.632)	-0.503 (2.224)	-0.633 (2.824)	-1.026 (2.841)
2015 × Assistant Nurse	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
2016 × Assistant Nurse	-2.229 (4.218)	-2.186 (4.220)	-4.851 (4.564)	-1.368 (4.157)	-2.779 (3.670)	-1.617 (3.052)	-1.036 (3.921)	-3.339 (3.925)
2017 × Assistant Nurse	-5.193 (4.719)	-5.160 (4.719)	-4.329 (5.027)	-5.885 (4.628)	-8.012* (4.133)	-7.589** (3.464)	-4.732 (4.374)	-6.989 (4.420)
2018 × Assistant Nurse	-3.938 (4.864)	-4.006 (4.865)	-5.627 (5.247)	-4.557 (4.766)	-5.263 (4.236)	-8.414** (3.604)	-1.092 (4.564)	-5.944 (4.568)
2019 × Assistant Nurse	-4.959 (5.245)	-5.036 (5.245)	-4.048 (5.574)	-6.440 (5.142)	-5.659 (4.465)	-6.192 (3.787)	-3.946 (4.874)	-6.093 (4.883)
2020 × Assistant Nurse	1.189 (5.313)	1.167 (5.314)	4.036 (5.777)	0.254 (5.196)	0.644 (4.527)	-1.378 (3.869)	2.641 (4.973)	3.370 (4.912)
2021 × Assistant Nurse	-1.040 (5.818)	-1.093 (5.814)	-0.447 (6.213)	-1.203 (5.675)	0.273 (4.991)	-1.615 (4.250)	1.470 (5.415)	-0.702 (5.398)
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	Yes	No	No	No
Age-Year Fixed Effects	No	Yes	No	No	No	No	No	No
Employer-Year Fixed Effects	No	No	Yes	No	No	No	No	No
Contracted Time-Year Fixed Effects	No	No	No	No	No	Yes	No	No
Education Level-Year Fixed Effects	No	No	No	No	No	No	No	Yes
Gender-Year Fixed Effects	No	No	No	No	No	No	Yes	No
Adjusted R-Squared	0.205	0.205	0.205	0.214	0.205	0.205	0.209	0.208
Observations	211,074	211,074	210,894	223,997	275,976	394,555	241,459	241,996

Notes: The table shows event study estimates that compare sickness pay for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Column (1) has the baseline sample. Column (2) adds cohort-by-year fixed effects. Column (3) adds employer-by-year fixed effects. Column (4) increases the sample to those with an income between SEK 150,000 and SEK 400,000 in 2015. Column (5) increases the sample to individuals aged between 40 and 55 in 2015. Column (6) increases the sample by including those with a contracted working time of 85% and above in 2015 and includes contracted working time-by-year fixed effects. Column (7) includes both men and women and gender-by-year fixed effects. Column (8) includes those with the highest degree of education being high school or beyond high school, as well as education-by-year fixed effects. Monetary values are expressed in SEK 100 and deflated to the 2015 value of the consumer price index from Statistics Sweden. Standard errors are clustered on the individual level. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$.

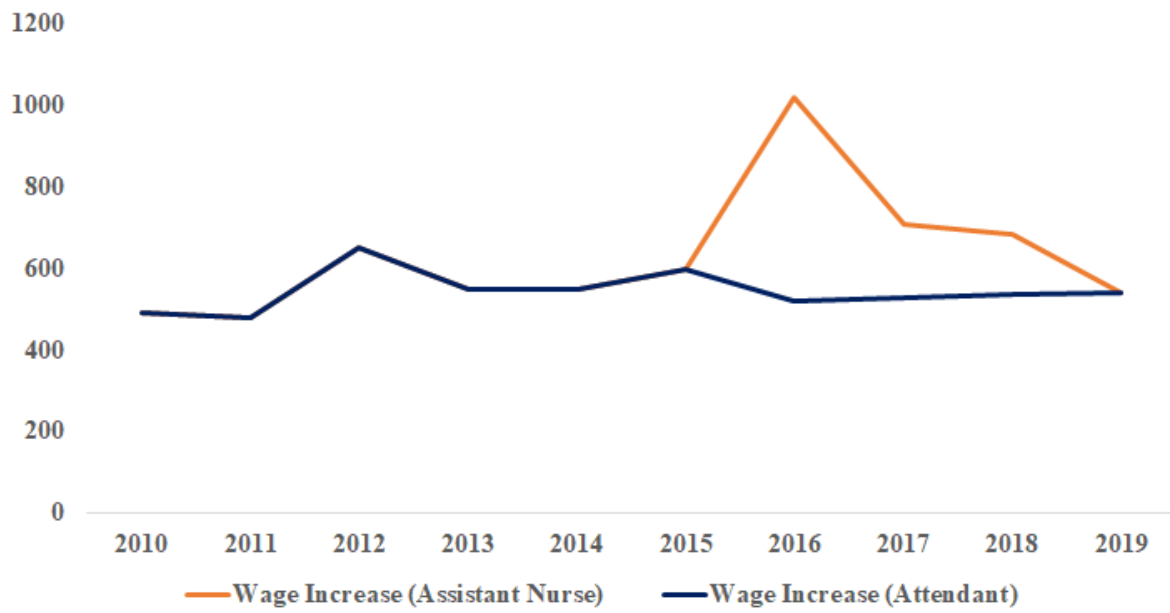
Table 8: Assistant Nurses and Attendants: Pension Benefits (Event Studies)

	Pension (SEK 100)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	Age Control	Employer Control	More Income Groups	More Cohorts	More Contracted Hours	Men and Women	All Education
2012 × Assistant Nurse	0.733 (0.933)	0.741 (0.930)	0.711 (0.973)	0.702 (0.905)	0.509 (0.740)	0.902 (0.665)	0.302 (0.851)	1.180 (0.864)
2013 × Assistant Nurse	0.714 (0.742)	0.722 (0.739)	0.779 (0.753)	0.727 (0.711)	0.450 (0.600)	0.807 (0.556)	0.345 (0.698)	0.985 (0.701)
2014 × Assistant Nurse	0.351 (0.533)	0.358 (0.531)	0.529 (0.527)	0.338 (0.503)	0.171 (0.435)	0.383 (0.389)	0.261 (0.486)	0.504 (0.520)
2015 × Assistant Nurse	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
2016 × Assistant Nurse	-0.412 (1.039)	-0.404 (1.040)	-0.917 (1.052)	-0.970 (1.013)	-0.537 (0.937)	-0.702 (0.779)	-0.192 (0.945)	0.255 (0.963)
2017 × Assistant Nurse	-1.206 (1.253)	-1.204 (1.253)	-1.782 (1.231)	-1.109 (1.183)	-0.435 (1.051)	-0.845 (0.851)	-1.102 (1.125)	-1.016 (1.138)
2018 × Assistant Nurse	-0.064 (1.386)	-0.084 (1.385)	-0.603 (1.445)	-0.131 (1.309)	-0.502 (1.172)	0.112 (0.959)	-0.233 (1.289)	-0.386 (1.285)
2019 × Assistant Nurse	-0.831 (1.559)	-0.863 (1.556)	-1.457 (1.728)	-1.216 (1.476)	-1.675 (1.373)	-0.955 (1.160)	-0.991 (1.436)	-0.725 (1.432)
2020 × Assistant Nurse	-0.353 (1.814)	-0.394 (1.811)	-0.886 (1.988)	-0.911 (1.743)	-1.661 (1.587)	-0.043 (1.337)	-0.046 (1.716)	-0.498 (1.670)
2021 × Assistant Nurse	-2.408 (2.463)	-2.456 (2.464)	-2.365 (2.586)	-2.484 (2.351)	-3.568* (2.079)	-1.080 (1.700)	-2.534 (2.299)	-2.763 (2.244)
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	Yes	No	No	No
Age-Year Fixed Effects	No	Yes	No	No	No	No	No	No
Employer-Year Fixed Effects	No	No	Yes	No	No	No	No	No
Contracted Time-Year Fixed Effects	No	No	No	No	No	Yes	No	No
Education Level-Year Fixed Effects	No	No	No	No	No	No	No	Yes
Gender-Year Fixed Effects	No	No	No	No	No	No	Yes	No
Adjusted R-Squared	0.366	0.366	0.365	0.370	0.375	0.377	0.359	0.364
Observations	211,074	211,074	210,894	223,997	275,976	394,555	241,459	241,996

Notes: The table shows event study estimates that compare pension benefits for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Column (1) has the baseline sample. Column (2) adds cohort-by-year fixed effects. Column (3) adds employer-by-year fixed effects. Column (4) increases the sample to those with an income between SEK 150,000 and SEK 400,000 in 2015. Column (5) increases the sample to individuals aged between 40 and 55 in 2015. Column (6) increases the sample by including those with a contracted working time of 85% and above in 2015 and includes contracted working time-by-year fixed effects. Column (7) includes both men and women and gender-by-year fixed effects. Column (8) includes those with the highest degree of education being high school or beyond high school, as well as education-by-year fixed effects. Monetary values are expressed in SEK 100 and deflated to the 2015 value of the consumer price index from Statistics Sweden. Standard errors are clustered on the individual level. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$.

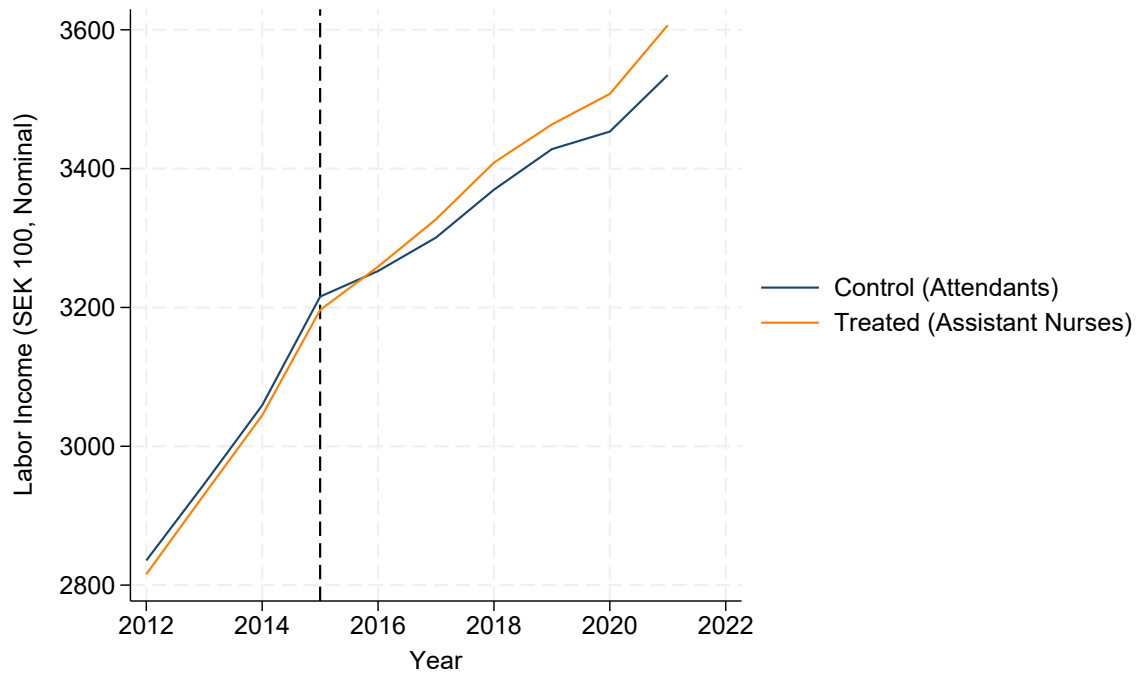
Figures

Figure 1: Bargained Wage Increases for Assistant Nurses and Attendants



Notes: The figures show bargained wage increases in nominal SEK for assistant nurses and attendants according to the collective bargaining agreement Huvudöverenskommelsen between Svenska Kommunalarbetsförbundet and Sveriges kommuner och landsting / Pacta. The data comes from Medlingsinstitutet (2011, 2013, 2014, 2017); Lindholm (2017).

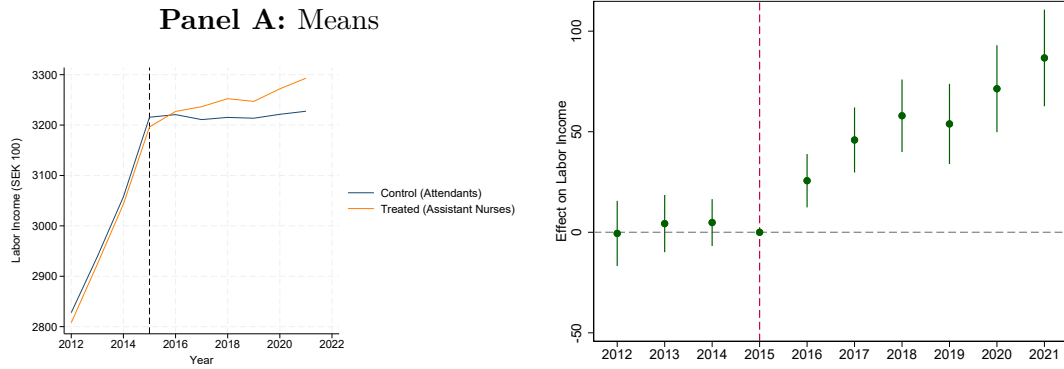
Figure 2: Nominal Labor Income for Assistant Nurses and Attendants



Notes: The figure shows the evolution of average nominal labor income for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Panel A displays the evolution of mean values. Panel B displays event study estimates. Monetary values are expressed in SEK 100.

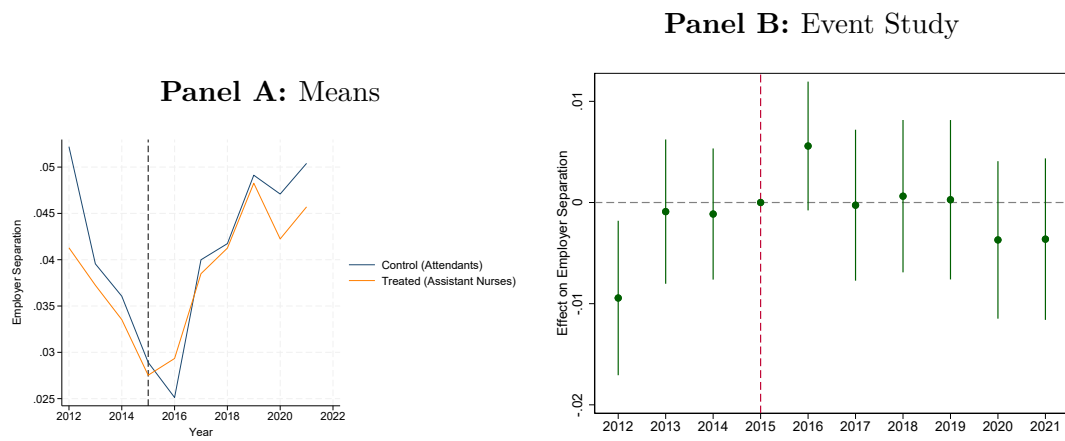
Figure 3: Labor Income for Assistant Nurses and Attendants

Panel B: Event Study



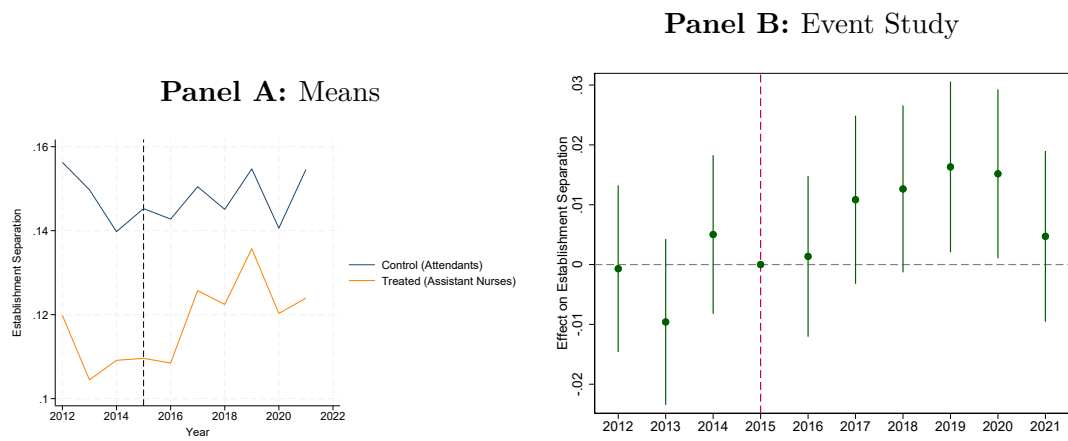
Notes: The figure shows averages and event study coefficients that compare the evolution of labor income for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Panel A displays the evolution of mean values. Panel B displays event study estimates. Monetary values are expressed in SEK 100 and deflated to the 2015 value of the consumer price index from Statistics Sweden. Standard errors are clustered on the individual level.

Figure 4: Separation Probability (Employer) for Assistant Nurses and Attendants



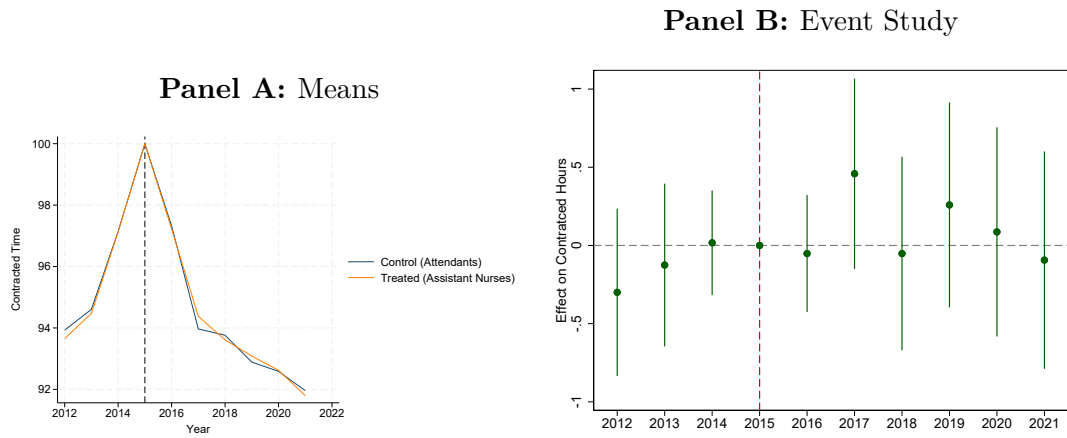
Notes: The figure shows averages and event study coefficients that compare the evolution of separations from current employer for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Panel A displays the evolution of mean values. Panel B displays event study estimates. Standard errors are clustered on the individual level.

Figure 5: Separation Probability (Establishments) for Assistant Nurses and Attendants



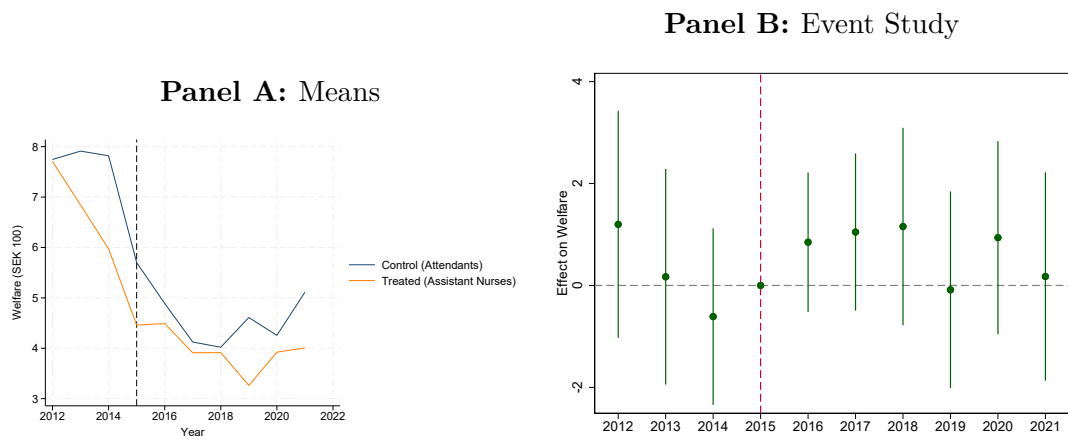
Notes: The figure shows averages and event study coefficients that compare the evolution of separations from current establishment for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Panel A displays the evolution of mean values. Panel B displays event study estimates. Standard errors are clustered on the individual level.

Figure 6: Contracted Working Time for Assistant Nurses and Attendants



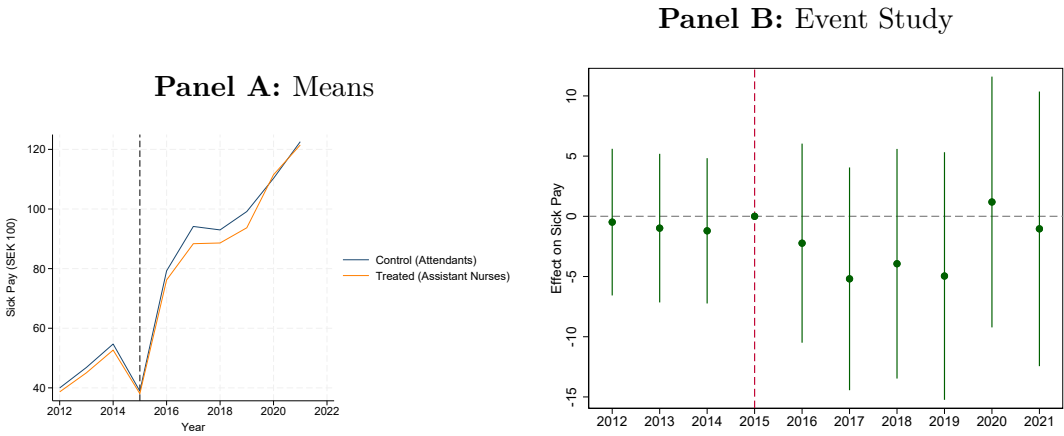
Notes: The figure shows averages and event study coefficients that compare the evolution of contracted working time for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Panel A displays the evolution of mean values. Panel B displays event study estimates. Standard errors are clustered on the individual level.

Figure 7: Welfare Benefits for Assistant Nurses and Attendants



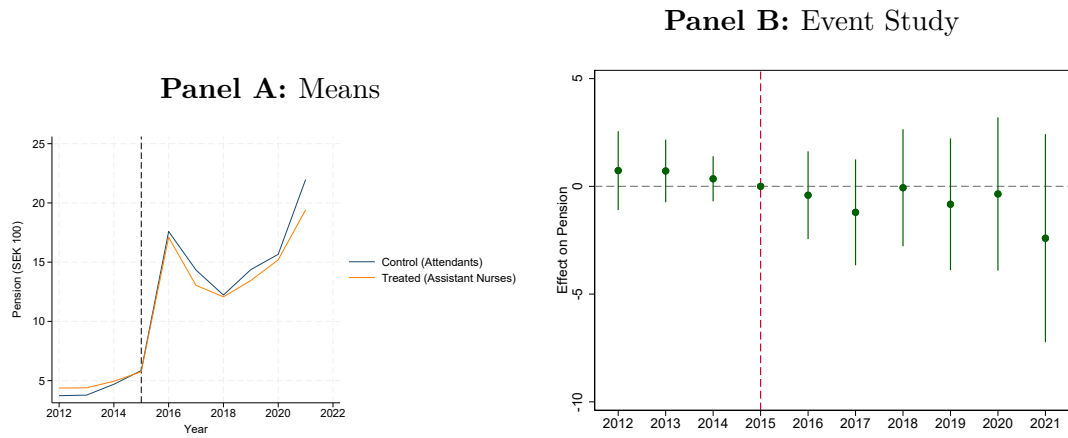
Notes: The figure shows averages and event study coefficients that compare the evolution of welfare benefits for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Panel A displays the evolution of mean values. Panel B displays event study estimates. Monetary values are expressed in SEK 100 and deflated to the 2015 value of the consumer price index from Statistics Sweden. Standard errors are clustered on the individual level.

Figure 8: Sickness Pay for Assistant Nurses and Attendants



Notes: The figure shows averages and event study coefficients that compare the evolution of sickness pay for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Panel A displays the evolution of mean values. Panel B displays event study estimates. Monetary values are expressed in SEK 100 and deflated to the 2015 value of the consumer price index from Statistics Sweden. Standard errors are clustered on the individual level.

Figure 9: Pension Benefits for Assistant Nurses and Attendants



Notes: The figure shows averages and event study coefficients that compare the evolution of pension benefits for assistant nurses (treated) and attendants (control). The baseline sample includes female, full-time employed, high-school educated workers in the public sector covered by the relevant collective bargaining agreement earnings between SEK 200,000 and SEK 380,000. These variables are measured in 2015. Panel A displays the evolution of mean values. Panel B displays event study estimates. Monetary values are expressed in SEK 100 and deflated to the 2015 value of the consumer price index from Statistics Sweden. Standard errors are clustered on the individual level.

Appendix

A1 Sample Selection

I start with the Structure of Earnings Survey (Lönestrukturstatistiken). Some individuals have more than one employer.

- I then keep the employer with the highest pay.
- I drop individuals with duplicates on the individual and year level.

I then identify all workers in the Structure of Earnings Survey that work either in the municipal (kommun) or regional (landsting) sectors in 2015.

I keep these workers and match them to the LISA (Longitudinell integrationsdatabas för sjukförsäkrings- och arbetsmarknadsstudier) database.

I also drop individuals who have duplicates on the individual and year levels.

I can match 9,117,690 observations from the Structure of Earnings Survey data and cannot match 6,061.

I drop these observations that I cannot match.

I then use the data from the Structure of Earnings Survey and keep only those individuals that worked in the local public sector in 2015.

I then define my analysis as workers who, in 2015:

- worked in the local public sector,
- was covered by the central agreement: for those working in municipalities, I use the agreement code directly, while for those working in the regional authorities, I use the variable if the agreement with Svenska Kommunalarbetsförbundet covers them.

- was an assistant nurse (SSYK2012 532 "Undersökterskor") or an attendant (SSYK 2012 534 "Skötare, vårdare och personliga assistenter m.fl."),
- was aged 45–55,
- worked full-time,
- was a woman,
- had high school as the highest level of education,
- earned between SEK 200,000 and SEK 380,000

I also provide the translations between the Swedish SSYK 2012 codes and the ISCO-08 codes ([Statistiska centralbyrån, 2016](#)) for international comparisons. The SSYK 2012 code 532 represents ISCO-08 codes of 5321, 5322 and 3258; while the Swedish code 534 represents ICO 5321, 5322, 5329, and 3259.