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The Public-Private Sector Wage Gap in Lithuania: Evidence from Social Security Data*

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ABSTRACT

This paper estimates high-dimensional fixed effects models using detailed administrative data to characterize the public-private wage gap in Lithuania between 2010 and 2020. We document that public sector employees earn on average 10% more than their private sector counterparts. However, when comparing firm-specific wage effects, the gap almost disappears, with public sector employers paying a 0.3% lower premium. Interestingly, women benefit from working in the public sector, as they have a 16% premium due to both being employed by organizations with higher premiums and having higher returns to individual-specific components relative to women in private firms. In contrast, men have higher returns to unobserved permanent heterogeneity, which are particularly high for public sector workers, but they are with employers that have lower premiums relative to men in the private sector, resulting in an observed public sector premium of 4%. Our results highlight the importance of using mobility across firms, not just across sectors, and of isolating firm-specific wage components from other sources of wage variation to properly understand pay differentials across employers with different wage-setting protocols.

1 Introduction

Wage differentials between the public and private sectors have important implications for government spending, labor market efficiency, the allocation of talent across sectors, and the proper functioning of the public administration. It is not surprising, therefore, that the analysis of the public-private wage gap is a long-standing but still active topic among academics and of interest to public sector officials and policymakers.

Existing research has documented a wage premium for public sector workers relative to those in private firms (see Hospido and Moral-Benito, 2016; Bargain et al., 2018; Vilerts, 2018; Singleton, 2019; Bonaccolto-Töpfer et al., 2022; De León and Dolado, 2023; Costa, 2023, for some of the most recent work on this topic). Most of these studies have relied on observed characteristics and worker fixed effects to account for heterogeneity in the workforce across firms. However, except for Singleton (2019), they have overlooked the role of firms, for which there is growing evidence of their crucial role in wage dispersion (see Card et al., 2018, for a review).

Firm-specific wage components are particularly relevant in comparing public and private sector wages because public sector wage setting is heavily constrained by bureaucratic pay scales, unionization, and budgetary constraints that are not as relevant in the private sector. As a result, these policies affect both hiring and the wages that different workers can earn in the public sector relative to the private sector. Thus, to properly understand the public-private wage gap, one should control for observed and unobserved worker quality as well as the sorting of workers across employers and then compare the wage premium enjoyed by all individuals within an organization.

In this paper, we characterize the public-private wage gap in Lithuania. To do so, we use a unique Social Security dataset that allows us to follow workers over time and across public and private sector organizations between January 2010 and December 2020. In the first step, we estimate high-dimensional fixed effects models to account for worker and firm permanent heterogeneity as well as for the differential sorting and mobility of workers across employers by separating firm-specific wage components from other sources of wage variation that are not directly related to the type of organization. We then use these estimates to implement a

wage decomposition to analyze the contribution of each source of heterogeneity driving the raw wage gap and to quantify the public-private wage gap based on the estimated firm-specific wage effects, i.e., the wage premium enjoyed by all workers within a firm.

Our results show that between 2010 and 2020, the wages of the average public sector employee in Lithuania were about 10% higher than those in the private sector. However, if we compare only firm-specific wage components, the public-private wage gap barely survives, as the average public-sector employee works for a firm with a 0.3% lower premium than the employer of the average private-sector employee. Interestingly, the observed private-public wage gap is different for each sex: women in the public sector have 16% higher wages than female employees in private firms, while the gap is *only* 4.7% among men.

For men, we find that they are employed in public organizations that have firm-specific wage components that are 7% lower than employers where the private sector counterparts are. This is not the case for women, who instead benefit from being in the public sector by working for organizations that have pay premiums that are 4% higher relative to women in the private sector. Moreover, the levels of worker-specific wage components are higher in the public sector both for men (10% premium) and for women (5%). Thus, while for women, the firm and worker unobserved permanent heterogeneity together explain roughly 60% of the public-private sector wage gap, for men, they operate in different directions, contributing to explaining the lower pay premium.

Time-varying heterogeneity also plays a role in explaining the observed premium of public sector employees. For men, we find that the returns to the job ladder, as measured by occupation fixed effects, are almost 1% lower in the public sector than in the private sector, but women particularly benefit, as they exhibit effects that are 3.5% higher. Regarding the returns to labor market experience (age) and firm-specific experience, while both men and women in the public sector have higher returns to these characteristics, the returns are higher for women. Looking at firm size effects, we find that men in the public sector benefit from working for larger organizations compared to men in the private sector, while for women, firm size effects reduce the public sector premium.

This paper connects to the existing literature in two main dimensions. We con-

tribute to the large and still growing literature using AKM models to quantify the role of firms in explaining contemporaneous wage gaps between men and women (e.g., Card et al., 2016; Palladino et al., 2023), natives versus immigrants (e.g., Dostie et al., 2023), unionized versus non-unionized workers (Addison et al., 2023), by race (e.g., Gerard et al., 2021), or across industries (Card et al., 2024). We do so by quantifying an employer-based public-private sector wage differential, which, to the best of our knowledge, has only been done before in the context of the UK by Singleton (2019). We also add to the extensive literature on understanding wage differentials between the public and private sectors (e.g., Hospido and Moral-Benito, 2016; Bargain et al., 2018; Bonaccolto-Töpfer et al., 2022; De León and Dolado, 2023; Costa, 2023) by characterizing employer premiums as well as decomposing the raw gap into different wage components that capture observed and unobserved heterogeneity of workers and firms.

The rest of the paper is organized as follows. Section 2 introduces the public sector wage setting, whereas Section 3 describes the data. Section 4 presents the econometric approach. Section 5 discusses the results. Section 6 concludes.

2 Wage setting in the Lithuanian public sector

Wage determination in the Lithuanian labor market is mainly regulated by two institutions, namely the minimum wage and the Labor Code, as collective agreements are very rare. The national minimum wage, set by the Government, determines the legal minimum that employees must receive in exchange for their work. The Labor Code defines the general working conditions and regulates the components of employees' remuneration. Importantly, the Labor Code was significantly amended in 2017, establishing, among other things, that the minimum wage can be paid only to unskilled workers.

Both labor market institutions apply equally to the public and private sectors. However, while private sector organizations are only constrained by these nationwide labor regulations as to how much they can pay each of their employees, public sector institutions are subject to additional constraints. These constraints are intended to ensure the viability of public finances as well as a fair wage policy that limits inequality within firms. However, these regulations also introduce considerable heterogeneity in the compensation of public sector workers who happen to

work in different organizations within the public sector.

The fixed salary of public sector employees depends on two components. On the one hand, the so-called *basic salary*, which is set each year by the Government resolution through the Law on the Basic Salary of State Politicians, Judges, State Officials, and Civil Servants of the Republic of Lithuania, determines the common salary components within the public sector. On the other hand, an organization-specific component, regulated by separate legal acts, determines the minimum and maximum level of remuneration of employees in different categories of the public sector. However, not all public sector institutions regulate the salaries of all their employees in the same way, as some units only have specific rules for the top management.[1]

3 Data

Social Security records. Our dataset comes from administrative records provided by the State Social Security Fund Board. The available dataset is a 25% random sample of people registered in the Social Security system at any time between 2000 and 2020.[2] The dataset has a longitudinal design that allows individuals to be tracked over time and across firms. For each sample member, we observe demographic information (e.g., sex, age, family information) and, if they are employed with a contract, we have information on all work-related income subject to social security contributions paid by the employer, including base salary as well as bonuses, allowances, overtime, commissions, or severance payments. In addition, the dataset contains information on job characteristics (e.g., tenure, occupation) and firm characteristics (e.g., legal setting, industry).[3]

To define public and private sector organizations, we combine information on the legal structure of the firm as well as the 2-digit NACE2 economic activities classification identifying the Public Administration Sector. Following the legal structure of the firm, public sector organizations include budgetary institutions, public bodies, state-owned companies, and the central bank. Moreover, NACE2 code 84 identifies institutions operating in the public administration, which we also consider to be the

[1] Appendix A provides a detailed explanation of the wage setting protocols of each public sector institution in Lithuania.

[2] This includes employees, the self-employed, as well as recipients of government transfers.

[3] Appendix B defines key classifications related to industry, occupation, and location.

public sector if they do not fall under the previous classification, for example, because it is not reported. The rest of the organizations are considered private-sector firms.

The labor income variable refers to *all* work-related income subject to Social Security contributions, including base salary and non-regular payments such as bonuses, allowances, overtime pay, commissions, or severance payments.[4] This is a broad measure of earnings, as it directly captures any payment made by the employer in a given month. There is an important limitation that is worth discussing. The data set does not report information on hours worked. This implies that we cannot calculate hourly wages or restrict the analysis to full-time workers. To mitigate this issue, we employ daily wages, computed as monthly income divided by days worked in the month and expressed in real terms using the 2015 consumer price index.

Analysis sample. For our analysis, we impose the following restrictions on the raw dataset. We focus on the period 2010 to 2020 because the quality of information is significantly better, and we can track workers at a monthly frequency. From this sample, we target workers aged 20 to 60 who have jobs in both private and public sectors, with full information.[5] We exclude observations where workers are employed but also receive social benefits to avoid situations where workers miss some work days, for example, due to sick leave. Moreover, we only keep observations such that the labor income in the month is at least half of the current monthly minimum wage. In this way, we aim to remove workers with low labor market attachment in that month, as well as those who work very few hours, as we do not observe hours or part-time status.[6] For each remaining job spell, we drop the last observation to exclude severance and other payments upon job termination (e.g., unused vacation). Finally, if workers have more than one job in a month, we keep the wage observation related to the longest job spell and restrict the final sample to workers with at least two valid observations between 2010 and 2020. The resulting

[4]Given the change in Social Security contributions in 2019, we recalculate income before the 2019 reform by multiplying it by the official re-scaling factor of 1.289.

[5]In practice, we discard job spells with missing information on occupation category, sector of activity, location, or firm type.

[6]This restriction is particularly important in our context, as aggregate data from Statistics Lithuanian show that there are noticeable differences in paid hours worked per month between the private and public sectors, as shown in Figures C.1 and C.2 in Appendix C.

sample consists of 416,162 workers and 84,033 firms observed over 25,625,010 monthly observations between January 2010 and December 2020, with 32% of the workers observed at least one month in the public sector.

Table 1: Summary statistics

	Cleaned data		Connected set	
	Public	Private	Public	Private
Women	0.785	0.435	0.786	0.434
Lithuanian	0.994	0.970	0.994	0.971
Married	0.680	0.592	0.680	0.588
Parent	0.802	0.693	0.803	0.690
Age	45.63	40.48	45.63	40.35
Wage	3.30	3.23	3.30	3.24
Tenure	8.15	4.70	8.15	4.62
High-skilled occupation	0.708	0.380	0.708	0.370
Vilnius; Kaunas; Klaipeda	0.485	0.583	0.485	0.584
Service sector	0.995	0.376	0.995	0.374
No. workers	111,764	344,132	111,308	334,041
No. firms	6,380	77,653	6,037	68,643
No. observations	6,639,339	18,985,671	6,615,349	18,419,709

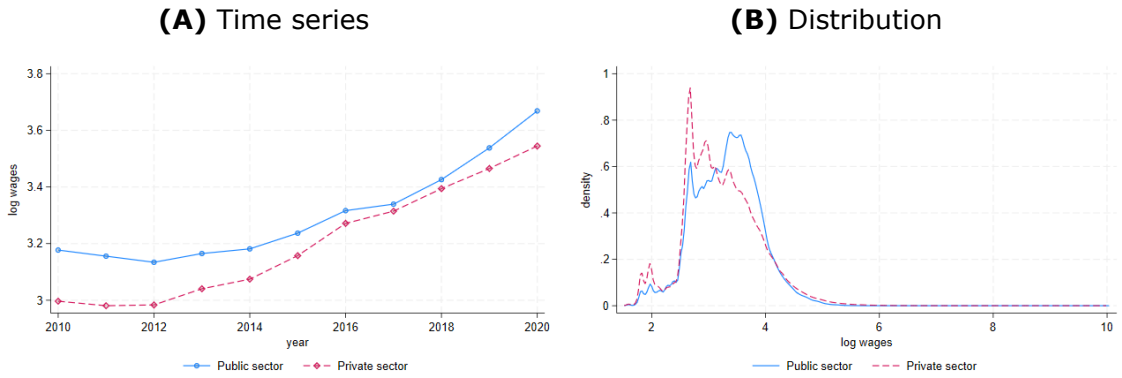
Notes: Wages refer to (log) daily earnings expressed in real terms using the 2015 Consumer Price Index. Tenure is expressed in years. Vilnius, Kaunas, and Klaipeda are the three largest cities in Lithuania.

Table 1 reports basic summary statistics for public and private sector workers. The table shows that compared to the private sector, public sector employees tend to be older and more likely to be female, married, and have at least one child. In addition, these individuals have been employed at their current companies for a longer period and are more likely to hold a job classified as high-skilled based on the occupation classification. Not surprisingly, virtually all public sector employees work in the service sector, compared to less than 40% of private sector employees. Location also differs, with the public sector over-represented in Lithuania's three largest cities. Importantly for our econometric approach, the set of firms through which workers move, i.e., the largest connected set of firms, captures more than 97% of the observations in the estimation data yielding a very similar sample composition.

In terms of earnings, the pooled data show a wage premium of about 7% (6% in the largest connected set) in favor of public sector workers. Panel A of Figure 1 shows that differences in (log) daily wages shrank between 2015 and 2018, to start diverging again afterward. In terms of earnings dispersion, the public sector exhibits a lower mass of workers earning the minimum wage but, interestingly, also a larger mass of individuals in the top half of the distribution, as shown in Panel B of Figure 1. This different shape of the distribution can be explained by the difference

in occupational composition in both sectors (see Appendix C Figure C.3).[7] In the next section, we describe the econometric model we rely on to decompose the public-private sector wage gap into worker and firm permanent heterogeneity and other factors.

Figure 1: Wages by sector



Source: Social Security records and own calculations.
Notes: Panel A shows (log) real daily earnings for the public and private sectors over time. Panel B plots the distribution of (log) real daily earnings, net of time effects, for public and private sector organizations.

4 Econometric approach

Wage regression. To estimate employer wage premiums, we adopt an AKM specification (Abowd et al., 1999), which assumes that the firm- and worker-specific components are additively separable functions of (log) wage as follows

$$y_{it} = \eta_i + \psi_{j(i,t)} + \theta_{o(i,t)} + X_{it}\Omega + \epsilon_{it} \tag{1}$$

where y_{it} is the log daily earnings of worker i in month t. η_i represents time-invariant wage-specific components of the worker, such as ability. $\psi_{j(i,t)}$ is the fixed effect of firm j in which worker i is employed in period t to capture persistent wage differences across firms that are enjoyed by *all* workers in a given firm, i.e., employer wage premiums or pay policies.[8] $\theta_{o(i,t)}$ represents 2-digit ISCO code occupation

[7] In the Appendix C Figures C.5 and C.6 we show the same figures separately for men and women.

[8] Firm fixed effects are unbiased if strict exogeneity holds, i.e., $E\left[\epsilon_{it}|\eta_i, \psi_{j(i,t)}, X_{it}\right] = 0$. In the Appendix C, we show that movements from low (high) to high (low) firms are nearly symmetric (Figure C.7). We also show how they vary by the type of origin firm (Figure C.8) or destination firm (Figure C.9). The movements are almost symmetric when looking at the private sector, while for public firms, there seem to be slight differences with respect to some movements. Still, they do not seem stark enough to suggest a widespread violation of the exogeneity assumption. For more evidence evaluating the AKM model in Lithuania for different periods, see Garcia-Louzao and Ruggieri (2023).

fixed effects to capture occupational heterogeneity between the private and public sectors. X_{it} are time-varying covariates including quadratic polynomials in age, tenure, and firm size as well as year and month fixed effects.[9] ϵ_{it} is the error term that reflects purely transitory wage fluctuations.

Employer-based pay differential. From Equation (1), the public-private sector wage gap can be calculated based on the difference between the average of firm fixed effects in the public and private sector, as follows

$$\hat{\Psi} = E\left[\hat{\phi}_{J(it)} \,\middle|\, J \in \text{Public}\right] - E\left[\hat{\phi}_{J(it)} \,\middle|\, J \notin \text{Public}\right] \tag{2}$$

where $\hat{\Psi}$ simply represents the difference in wage premiums enjoyed by *all* workers in the public sector relative to those enjoyed by *all* workers in the private sector. In other words, $\hat{\Psi}$ is the wage differential between the public and private sectors once observed and unobserved (worker) heterogeneity and differential sorting of workers to firms are taken into account. Thus, this comparison of firm fixed effects will reflect productivity differences across organizations, heterogeneous rent-sharing protocols, or other firm-specific factors that are ultimately factored into company wages (Card et al., 2018).

Gelbach's decomposition. To decompose the contribution of worker heterogeneity, employer wage premiums, as well as time-varying components to the observed public-private wage gap, we rely on the decomposition proposed by Gelbach (2016). This decomposition, which is based on the omitted variable bias formula, has the advantage of unambiguously quantifying the share of the gap that is due to the set of variables included in Equation (1) that represents our *full* model. Formally, consider as the *base* model a simple linear regression including a dummy for public sector employees (and month-year dummies), such that $\tilde{\beta}$ is the coefficient attached to the public sector indicator and measures the *raw* gap between workers in public and private sector organizations, net of time effects. Following Gelbach

[9] Because cohort effects are nested within the person effects, it is not possible to uniquely identify the age, time, and person effects separately. To address this identification issue, we impose a flat age profile at age 40, use a third-degree polynomial expressed in deviations from that value, and omit the linear term from the estimating equation as in Card et al. (2018).

(2016), one can prove by the Frisch-Waugh-Lovell theorem that[10]

$$\tilde{\beta} = \hat{\delta_\eta} + \hat{\delta_\phi} + \hat{\delta_\Omega}$$

where $\hat{\delta_x}$ are simply the coefficients from the projection of each of the estimated effects of the variables in the full model, worker fixed effects ($\hat{\eta}$), firm fixed effects ($\hat{\phi}$), and groups of time-varying characteristics predicted effects ($X\hat{\Omega}$) onto the public sector dummy.

5 Workers and firms in the public-private sector gap

5.1 The wage gap across models

Table 2 presents estimates of the public-private wage gap for the average Lithuanian worker and by sex. The first row indicates that once month and year effects are removed, public sector employees earn almost 10% higher wages compared to workers in private firms, this wage premium for public sector employees. The existence of the premium is consistent with existing literature for several European economies, but it is 2 to 5 percentage points lower than previous estimates for Lithuania based on survey data for the period 2004-2012 (Christofides and Michael, 2013; Campos et al., 2017).[11] We also measure the raw wage gap for men and women separately and document a premium of 4.7% and 16%, respectively. These results are consistent with existing evidence on wages in the public sector being higher and this premium being particularly salient for women, similar to the findings in Campos et al. (2017).

In the second row, we quantify the wage gap following a common approach in the literature, i.e., using worker-fixed effects along with other time-varying characteristics such as occupation, age, tenure, and firm size, in addition to time effects as controls. In this model, the public-private sector wage differential is solely identified by workers moving into and out of the public sector and, hence, allows to keep worker (unobserved) permanent heterogeneity constant. The results indicate

[10] See Cardoso et al. (2016) for details on how the Gelbach strategy can be implemented in settings where the omitted variables are fixed effects and the coefficient of interest refers to a variable that is subsumed in one of the fixed effects.

[11] Using the 2015 Labor Force Survey for Latvia, Vilerts (2018) estimates a small premium for public employees that reverts to a penalty once individual characteristics and selection effects are taken into account.

Table 2: Public-private sector wage differential, 2010-2020

	Pooled	Men	Women
1. Raw gap	0.0988	0.0469	0.1613
	(0.0022)	(0.0050)	(0.0027)
2. Movers approach	0.0789	-0.0053	0.1215
	(0.0049)	(0.0093)	(0.0055)
3. AKM approach	-0.0036	-0.0692	0.0397
	(0.0012)	(0.0033)	(0.0015)
Observations	25,625,010	11,608,645	12,942,145

Notes: Raw gap in row 1 refers to a linear regression of the (log) real daily earnings on the public sector dummy, including only month and year fixed effects as controls. Movers approach in row 2 estimates a panel data model where the (log) real monthly wages is projected onto the public sector dummy along with worker and occupation fixed effects plus quadratic polynomials in age, tenure, firm size as well as month and year fixed effects. AKM approach in row 3 estimates the model in equation (1) that accounts for firm, worker, and occupation fixed effects plus quadratic polynomials in age, tenure, firm size, as well as month and year fixed effects. The gap in row 3 is calculated as $E\left[\hat{\phi}_{J(it)} \,\middle|\, J \in \text{Public}\right] - E\left[\hat{\phi}_{J(it)} \,\middle|\, J \notin \text{Public}\right]$. Standard errors are clustered at the worker level in parentheses.

that while these characteristics matter, they do not seem to play a critical role in explaining the raw gap for the average worker, as the premium only reduces to 8%. However, when we estimate the model separately for men and women, we find that for men, the gap disappears completely, while for women, the estimated gap is 75% of the raw gap. This reduction in the public sector premium is consistent with existing studies that emphasize the importance of accounting for selection (e.g., Hospido and Moral-Benito, 2016; Bonaccolto-Töpfer et al., 2022; Costa, 2023).

Importantly, the movers approach overlooks the role of firms in the wage gap, as it does not take into account firms' wage policies or the sorting of workers across employers. Thus, the third row presents our preferred results from estimating the AKM model described in equation (1). We find that once firm-specific wage components, i.e. the wage premium enjoyed by all workers in a given firm, are isolated from other sources of wage dispersion, such as observed and unobserved worker heterogeneity as well as differential sorting across employers, public sector organizations pay only slightly lower wages (0.3% lower wage premiums) compared to private firms. However, when we estimate the model separately for women and men, i.e., firm fixed effects are gender specific as in Singleton (2019), we find that male public sector employees work for lower-paying companies compared to their private sector counterparts, and the opposite is true for women. While these sex

differences are consistent with a similar study for the UK by Singleton (2019), the results for Lithuania contrast with those for the UK, as we find that men are penalized by being in the public sector, while in the UK there is no premium or penalty. Interestingly, our results are quantitatively similar for women.

5.2 Decomposition of the observed wage gap

To better understand the contribution of worker- and firm-side heterogeneity in explaining the changes in the wage gap, Table 3 reports the results of Gelbach's decomposition.

For the average worker, the decomposition shows that half of the observed wage gap of 10% in favor of public sector workers is explained by the fact that these workers have higher individual-specific wage components or, in AKM words (Abowd et al., 1999), there are more high-wage workers in the public sector.[12] The results also point to high paying occupations are more common in the public sector, these higher occupation returns likely emerge from middle-top occupations as professionals being overrepresented in the public sector compared to the private sector (see Figure C.3). In addition, we find that the returns to age (labor market experience) and tenure (firm-specific experience) appear to be higher among public employers. Finally, as already suggested by the wage gap obtained from comparing employer wage premiums, the results indicate that firm-specific wage components contribute negatively to the observed public sector premium. However, the contribution is small compared to the other components, suggesting that there are no significant differences in the premium received by *all* workers employed in the average public organization relative to the average private firm.

As discussed earlier, men and women appear to reap different wage benefits from working in the public sector relative to the private sector. The decomposition exercise allows us to quantify the contribution of each covariate in the model to the observed differences in the public-private wage gap for men and women separately.

For men, the decomposition shows that skill returns, as measured by worker fixed effects, play a fundamental role in explaining the public sector wage premium,

[12] This might reflect the fact that public sector employees tend to be more educated, thus partly reflecting differences in educational attainment and its returns. For example, (Campos et al., 2017) documents that the public-private wage gap for tertiary graduates is higher in Lithuania than in other Western economies, both overall and at the unexplained level, and argues that it partly reflects the equilibrium outcome of labor shortages.

Table 3: Gelbach decomposition of the public-private sector wage gap

	Pooled	Men	Women
Raw gap	0.0988	0.0469	0.1613
	(0.0022)	(0.0050)	(0.0027)
Decomposition			
Firm fixed effects	-0.0023	-0.0696	0.0420
	(0.0012)	(0.0033)	(0.0015)
Worker fixed effects	0.0518	0.0953	0.0504
	(0.0019)	(0.0046)	(0.0022)
Occupation fixed effects	0.0102	-0.0087	0.0353
	(0.0004)	(0.0008)	(0.0006)
Age effects	0.0222	0.0157	0.0240
	(0.0003)	(0.0005)	(0.0003)
Tenure effects	0.0107	0.0028	0.0167
	(0.0001)	(0.0003)	(0.0001)
Firm size effects	0.0061	0.0115	-0.0071
	(0.0003)	(0.0004)	(0.0004)

Notes: Raw gap in row 1 refers to a linear regression of the (log) real daily earnings on the public sector dummy, including only month and year fixed effects as controls. The decomposition refers to the contribution of each covariate to the full model in Equation 1 to the raw gap. Standard errors are clustered at the worker level in parentheses.

as they are almost 10% higher for public sector employees. In the opposite direction, the contribution of firm fixed effects is 7% lower for the public sector average. These firm-specific wage components, which can be interpreted as productivity differences or rent sharing, may indicate that men tend to sort into lower-paying, less productive firms when working in the public sector or that they are able to extract less rent from the employer because of the more rigid wage setting in public institutions. The contribution of other wage components is much weaker in relative terms, with returns to the job ladder, as reflected by the occupation fixed effects, contributing negatively, while the effects of age, tenure, and firm size are positive, suggesting higher returns to these characteristics for men in the public sector.

For women, the picture is different. First, the contribution of the worker and firm fixed effects is in the same direction, suggesting that women benefit from being in the public sector due to higher returns to individual skills as well as being in better-paying firms. Second, returns to occupational position also contribute positively to the public sector wage premium, with a magnitude comparable to that of the worker and firm fixed effects. This large (and positive) contribution relative to men may reflect more fragile glass ceilings due to organizational policies in the

public sector.[13] The contribution of age and tenure effects is also substantial and favors women in the public sector, which again may be related to wage-setting policies that automatically index wages to each employee after long absences from the workplace, such as parental leave. The firm size effect is negative for female public sector employees. However, the magnitude of the effect is much smaller than that of the other variables.

6 Conclusions

This paper estimates employer wage premiums to characterize the public-private sector wage gap in Lithuania between 2010 and 2020. We document that, unconditionally, workers employed in the public sector have 10% higher wages compared to those in private firms, and the gap is still about 8% when accounting for worker heterogeneity. However, once we account for firm-specific wage components, the results indicate that the public sector pays, on average, 0.3% lower premiums compared to private firms, suggesting that most of the gap is due to workforce heterogeneity. However, there is considerable heterogeneity between men and women: male public sector employees work for organizations that pay 7% lower premiums than their private sector counterparts, while women benefit from being in the public sector by having firm-specific wage components that are almost 4% higher than those of women in the private sector.

Taken together, the results highlight the need to isolate firm-specific wage components from other sources of wage heterogeneity when quantifying wage differentials that compare workers employed by organizations with institutionalized wage-setting protocols to firms where wages are market-driven. Importantly, understanding how pay policies are related to the provision of non-pecuniary job amenities, such as greater job security, is an interesting area for future research. Similarly, given the existing cross-country evidence on the role of firms in explaining the gender pay gap (Palladino et al., 2023), the differences found between men and women open up an interesting avenue for future research to investigate how workplace policies pursued by the public sector can contribute to reducing gender gaps in the labor market.

[13] Consistent with this, Christofides et al. (2013) using survey data for 2007, found that the public sector in Lithuania is associated with lower gender wage gaps.

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Appendix

A Public sector institutions and pay policies

Budgetary institutions. This group of institutions includes legal entities controlled by the state or local governments such as public administration, defense, justice, and social services. The salary of all employees in these institutions consists of two parts: a fixed salary, which depends on the basic salary and the chosen coefficient, and a variable component. The coefficient used to determine the minimum and maximum fixed salaries depends on the budgetary institution, the position held by the employee, the education level, work experience, and, in some cases, other qualifications.[14] The variable component, typically in the form of annual bonuses, is employee-specific. For example, managers' bonuses and the conditions for receiving them depend on the governing body, e.g., the ministry of the budgetary institution to which they report, while other employees' bonuses are determined by top management. Importantly, the variable component of top management is limited to an integer multiple of the sum of the average fixed and variable components of the compensation of other employees in the same institution. The integer has varied over time; for example, in 2018, the maximum variable compensation for a manager of a budgetary institution was 5.

Public bodies. Under this category fall all non-profit public legal persons of limited civil liability with the goal of satisfying public interests. For instance, agencies related to investment promotion, innovation, or public sports facilities are public bodies. The salary of management staff in these units is defined by a fixed component, a variable part, and an optional bonus. The fixed component mirrors that of budgetary institutions, i.e., an organization-specific coefficient times the basic salary set by the Government. The variable part, paid to all employees, is a performance payment at the end of the year based on the fulfillment of institution-specific indicators established by the Board of Directors prior to the beginning of the year and limited to a maximum of 50% of the monthly fixed salary. Bonuses based on individual performance are also allowed, but cannot exceed the value of a monthly fixed salary. In addition, the sum of the fixed and variable components

[14] For instance, teachers can obtain different qualification levels through attestation and coefficients will depend on those qualifications.

of the salary of the most senior executives could not exceed 5 times the sum of the average monthly fixed and variable components of the salaries of other employees in the same organization. The remuneration of other employees is specific to each public institution and is based on a payroll system approved by the institution's governing bodies.

Healthcare institutions. Despite these organizations belong to the category of public bodies, the top-management remuneration is regulated under a separate law, the Law on Healthcare Institutions. Managers' salaries can be divided into two parts as in other institutions based on fixed (coefficient$\times$basic salary) and variable components. The coefficient associated to the fixed part of the salary is associated with the workers. Before 2019, the coefficient was related to both the number of employees in the institution as well as to its state, regional, or district status. From 2019, the coefficient depends on the revenue received from the compulsory health insurance fund and the number of doctors and nurses employed in the healthcare institution during the last calendar year. The variable component was limited to 40% of the fixed component before 2019 and 20% thereafter. Managers could also receive annual bonuses paid at the end of the year, but they could not exceed the average monthly salary of doctors and nurses. For employees other than top management, the remuneration system was decided by the governing body and is specific to each healthcare institution.

Higher education institutions. Similarly to health care institutions, higher education entities, although public bodies have autonomy to adopt specific conditions of remuneration and requirements for a particular position, as established by the Law on Education and Studies. The council of the institution decides on the coefficient of the rector (in the case of universities) or the director (in the case of colleges) to determine the fixed salary, taking into account the basic salary. The remuneration system for other employees is approved by the head of the higher education institution with the agreement of the council.

State-owned enterprises. State-owned companies can be either state enterprises or state-owned limited liability companies (either public liability or private liability). The institutions differ in how the coefficient for determining the fixed

salary of managers is set. In the case of state enterprises, the Government decides, while in the case of state-owned limited liability companies, the level is only *recommended*.

The salaries of the top management in state enterprises were a combination of fixed salary, variable components, and annual bonuses.[15] The fixed salary is based on the institution-specific coefficient times the basic salary.[16] Coefficients are set according to the type of enterprise based on the number of employees, equity capital, and revenue from its activities. The variable part could be up to 50% of the fixed monthly salary, while bonuses could not exceed 4 fixed monthly salaries. The head of the company is responsible for implementing a remuneration system for other employees with the approval of the board of directors. For example, Regitra is a state enterprise responsible for the registration of vehicles, examination of drivers, and issuance of driving licenses.

State-owned limited liability companies have the right to choose a compensation system independently. In essence, the wage system in state-owned limited liability companies is similar to that in the private sector: the compensation system is determined by the head of the company with the approval of the board of directors. The exact salaries of top management and members of collegial bodies are determined by the general meeting in accordance with the government's guidelines. For example, Ignitis Group, an international energy company, is the largest state-owned limited liability company and the second-largest company in Lithuania in terms of capital.

Central bank. For the national central bank, only the salaries of the top management are regulated under the Law of the Bank of Lithuania. The salary of the chairperson of the Board is equal to six (until 2012) or five (thereafter) average monthly salaries of employees of private monetary intermediaries institutions, as published by the State Data Agency. Until 2012, the salary of the deputy chairperson and members of the Board was determined by the Board, taking into account the salary of the chairperson. Since 2012, the salary of the deputy chairperson

[15]Board members were not allowed to get any payment for their job until 2015. Since then, the compensation of board members cannot exceed 1/5 of the manager's monthly salary.

[16]For some years, the minimum wage was used instead of the basic salary, affecting also the level of coefficients set by the Government given the level differences between the basic salary and the minimum wage.

and members of the Board may not exceed 90% of the chairperson's salary and is still determined by the Board. In addition, the Board of the Bank determines the principles of service and the status of other employees. The remuneration system is approved by the Board with the consent of the Employees' Union and by the collective bargaining agreement.

B Definition of categorical variables

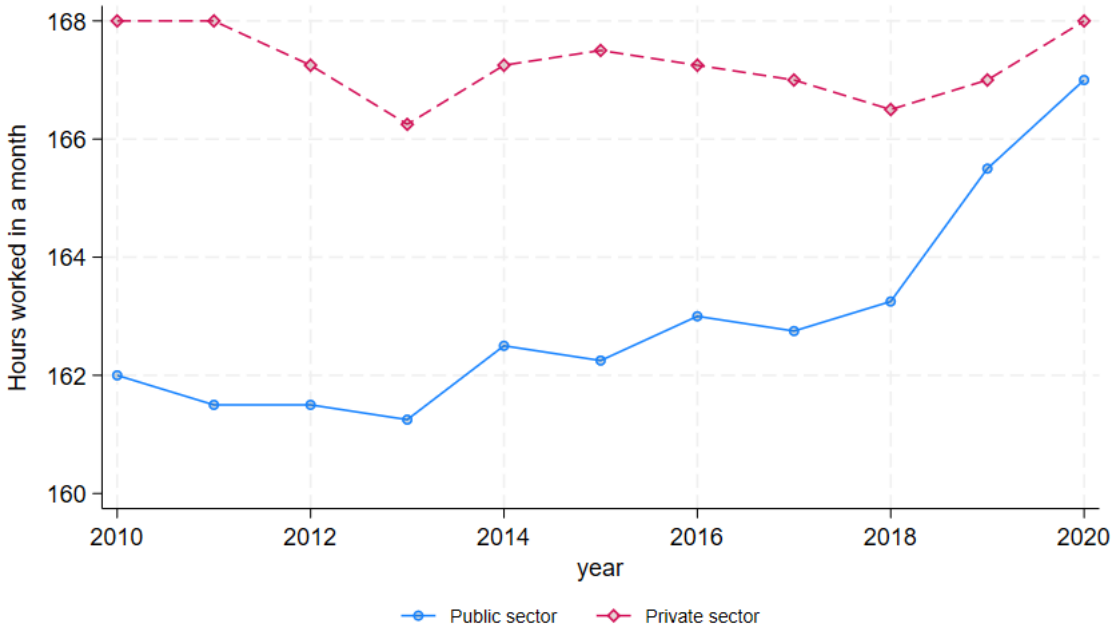
Occupation categories. Occupations are based on ISCO-08 classification that refers to three different broad skill categories: (i) *low-skill* jobs refer to ISCO-08 codes 91 to 96, (ii) *medium-skill* jobs correspond to codes 41 to 81, and (iii) *high-skill* jobs are codes 11 to 35. More information on ISCO-08 classification and aggregation guidelines can be found here: https://isco-ilo.netlify.app/en/isco-08/

Sector of activity. Economic activities are based on 2-digit NACE2 classification: (i) *primary sector* correspond to NACE2 codes 1 to 9, (ii) *industry* are coded 10 to 39, (iii) *construction* 40 to 43, (iv) *wholesale, transport, and storage* are 45 to 46 and 49 to 53, (v) *retail, accommodation, and restaurants* codes 47 and 55 to 56, (vi) *IT and finance* groups 58 to 66, (vii) *professional activities* are 69 to 75, (viii) *real estate, and other admin activities* 55 to 56, 68, and 77 to 82, (ix) *public administration, education, and health* 84 to 88 and 99, and (x) *other activities* are 90 to 98. More information on NACE2 classification and aggregation guidelines can be found here: https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF

Firm location. The 60 municipalities are aggregated into broader administrative regions (counties) to create 10 locations referring to *Vilnius*, *Kaunas*, *Klaipėda*, *Šiauliai*, *Panevėžys*, *Alytus*, *Marijampolė*, *Tauragė*, *Utena*, and *Telšiai*. Detailed information on the administrative division of Lithuanian can be found here: https://osp.stat.gov.lt/lietuvos-regionai-2022/lietuvos-suskirstymas

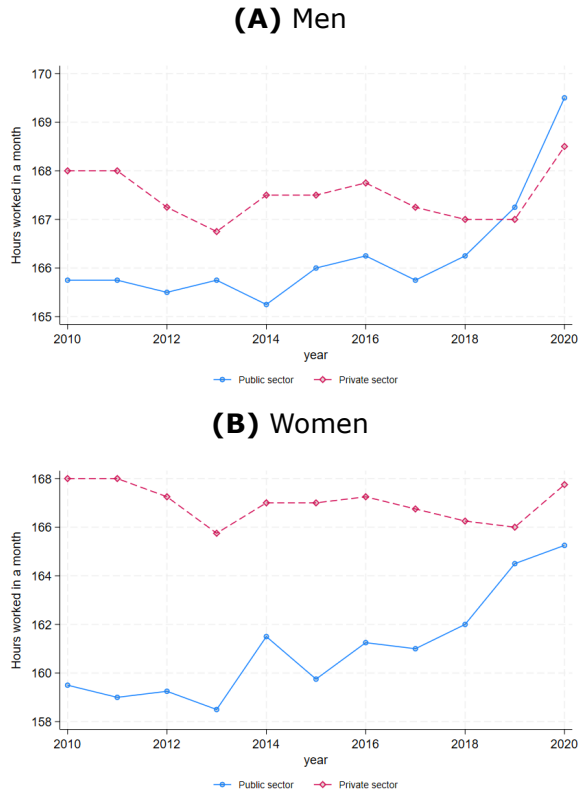
C Supplementary material

Figure C.1: Paid hours worked per month by sector



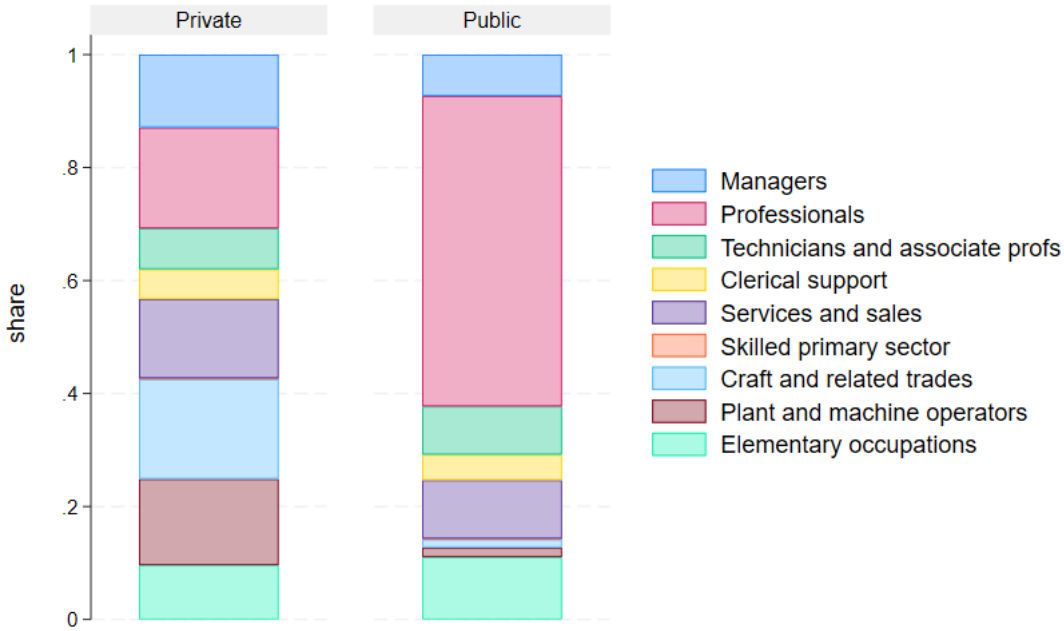
Source: Statistics Lithuania and own calculations.
Notes: The figure shows the average number of paid hours worked per month between 2010 and 2020 separately for the public and private sectors.

Figure C.2: Paid hours worked per month by sector and sex



Source: Statistics Lithuania and own calculations.
Notes: The figure shows the average number of paid hours worked per month between 2010 and 2020 by sex separately for the public and private sectors.

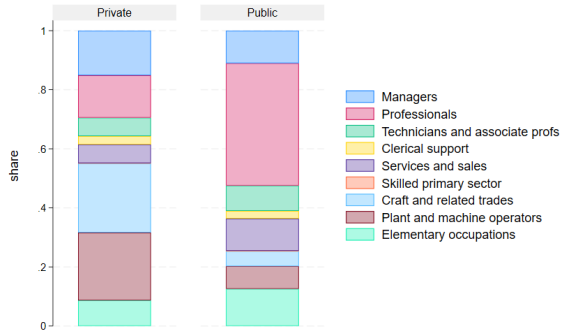
Figure C.3: Distribution of 1-digit occupations within sectors



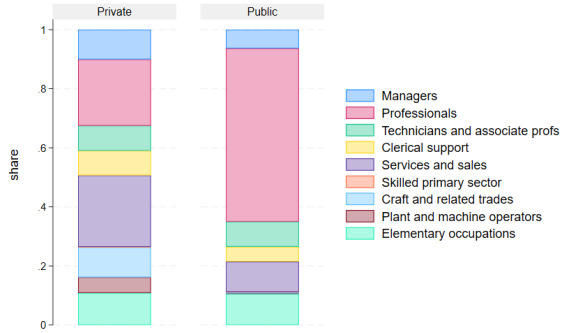
Source: Social Security records and own calculations.
Notes: The figure shows the distribution of 1-digit occupations within the public and private sectors.

Figure C.4: Distribution of 1-digit occupations within sectors by sex

(A) Men



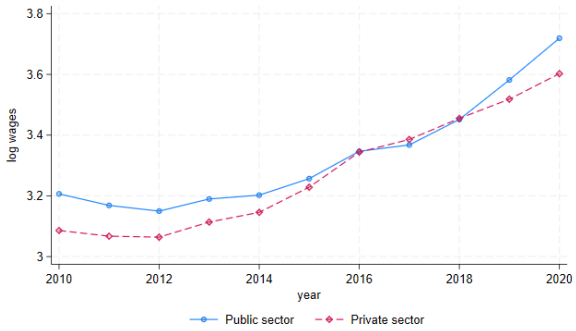
(B) Women



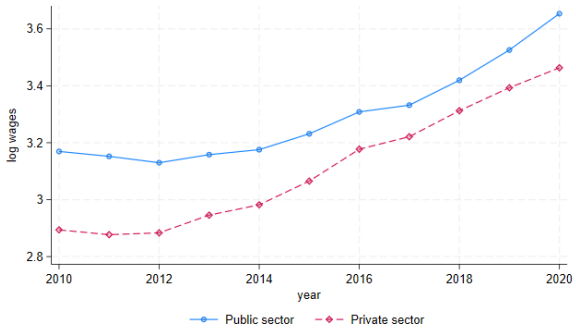
Source: Social Security records and own calculations.
Notes: The figure shows the distribution of 1-digit occupations by sex separately for the public and private sectors.

Figure C.5: Time series of (log) wages by sector and sex

(A) Men



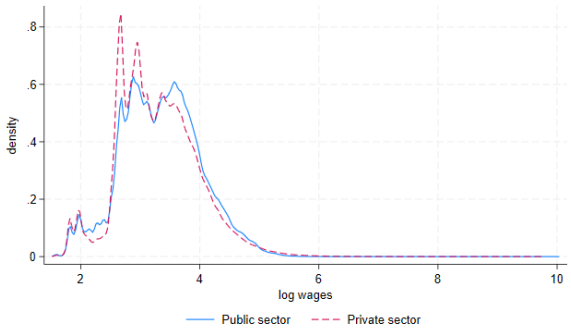
(B) Women



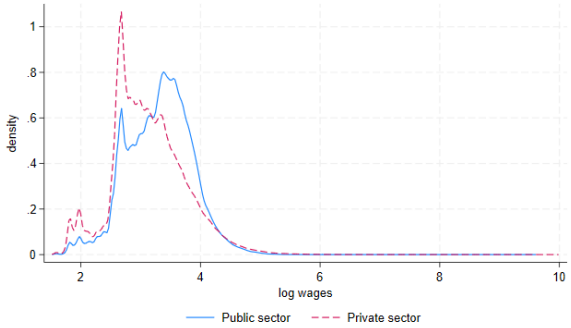
Source: Social Security records and own calculations.
Notes: The figure shows (log) real daily earnings by sex for the public and private sectors over time.

Figure C.6: Distribution of (log) wages by sector and sex

(A) Men

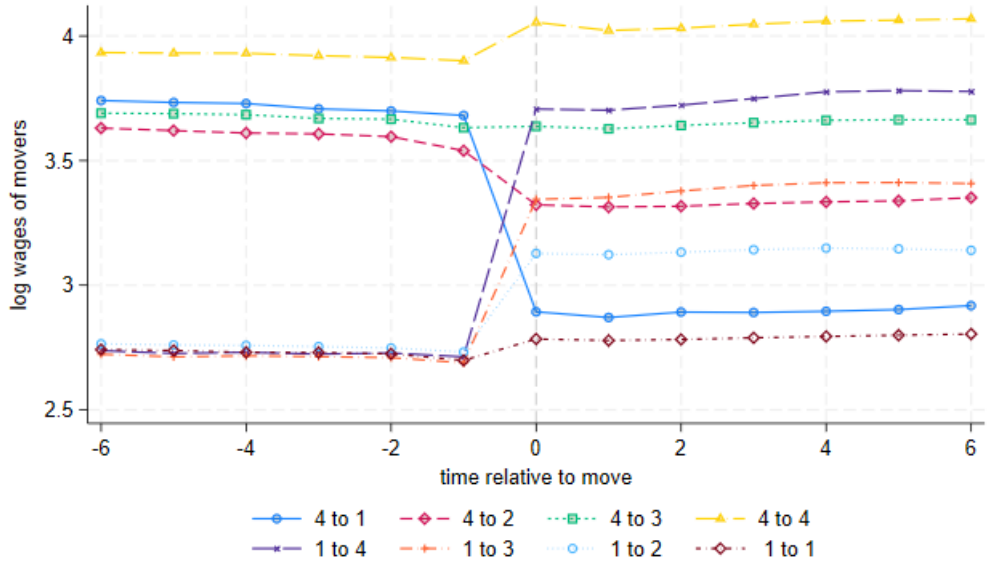


(B) Women



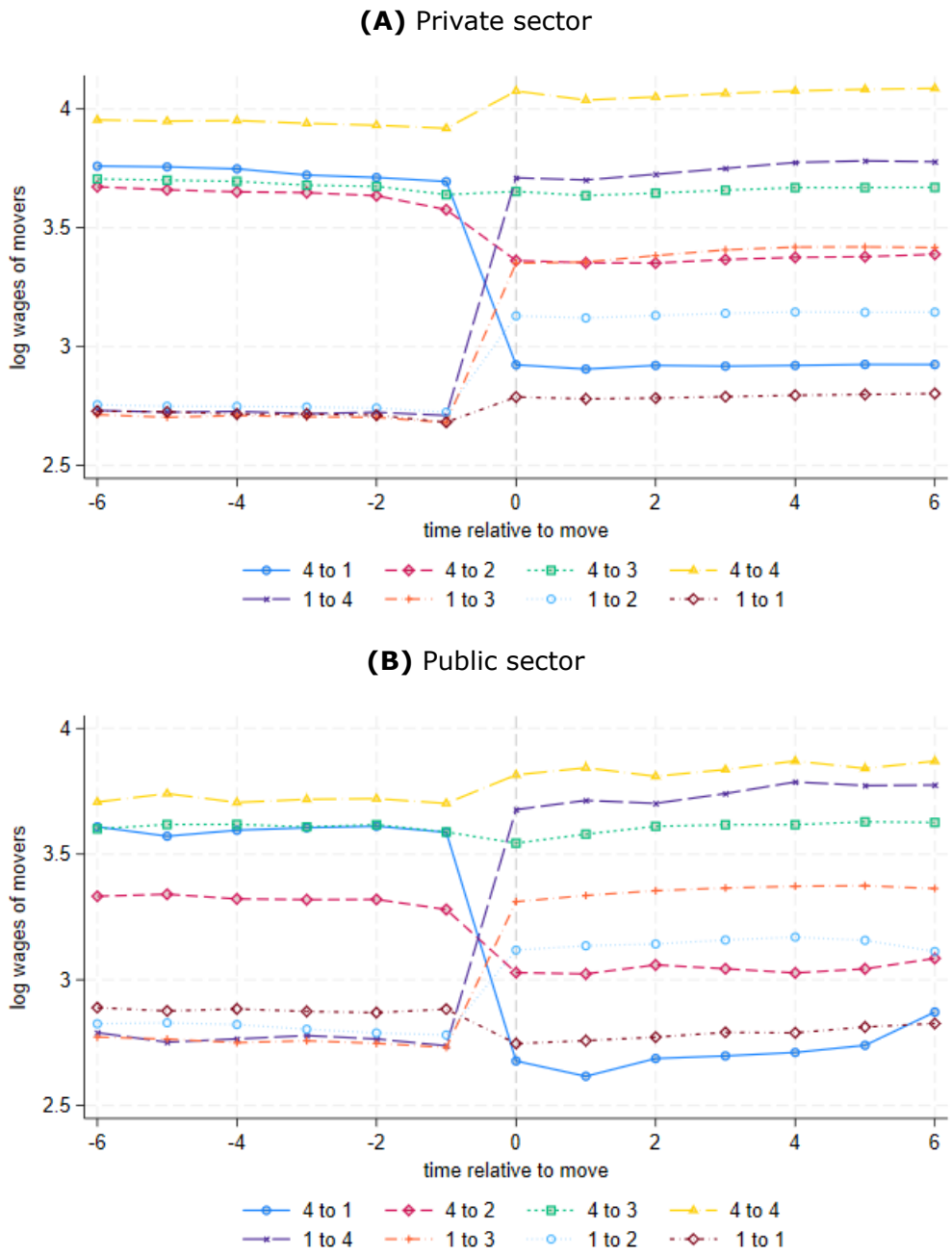
Source: Social Security records and own calculations.
Notes: The figure shows the distribution of (log) real daily earnings net of time effects separately for the public and private sectors.

Figure C.7: Average wages of switchers by quartile of firm fixed effects



Source: Social Security records and own calculations.
Notes: Firms are grouped into quartiles according to period-specific AKM fixed effects estimated from the equation (1). Log daily wages are net of the time effects by removing the time-varying AKM observable component from each observation. The vertical line represents the month when the new job starts.

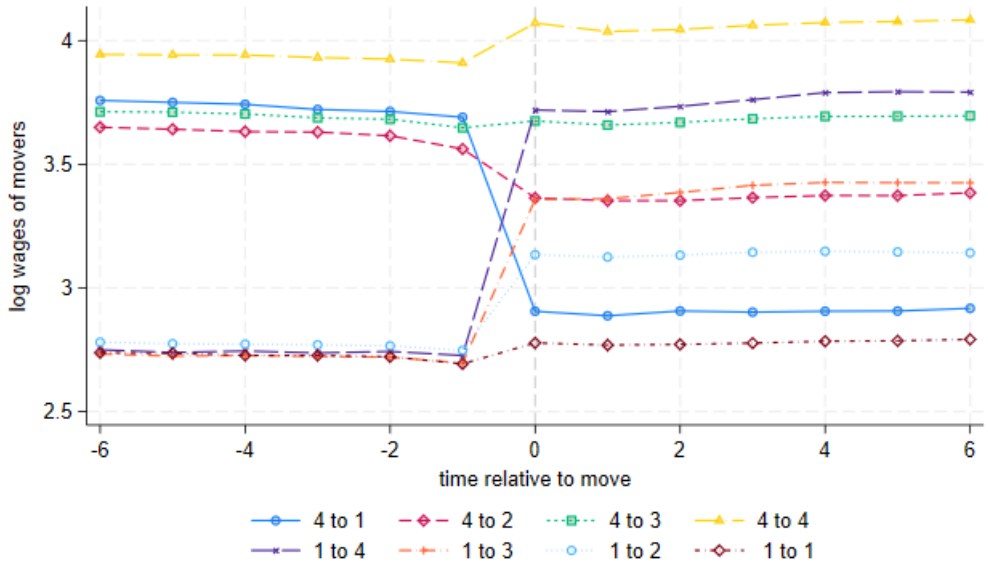
Figure C.8: Average wages of switchers by quartile of firm fixed effects by origin sector



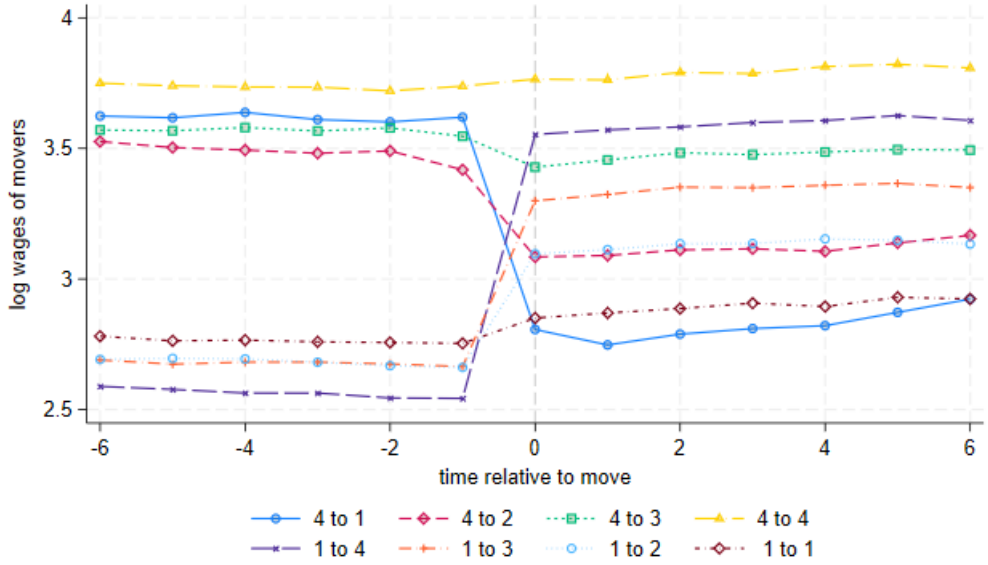
Source: Social Security records and own calculations.
Notes: Panel A shows the average wages of switchers by quartile of firm fixed effects for workers in the private sector before moving, while Panel B focuses on workers originally employed in the public sector. Firms are grouped into quartiles according to period-specific AKM fixed effects estimated from the equation (1). Wages are net of the time effects by removing the time-varying AKM observable component from each observation. The vertical line represents the month when the new job starts.

Figure C.9: Average wages of switchers by quartile of firm fixed effects by destination sector

(A) Private sector

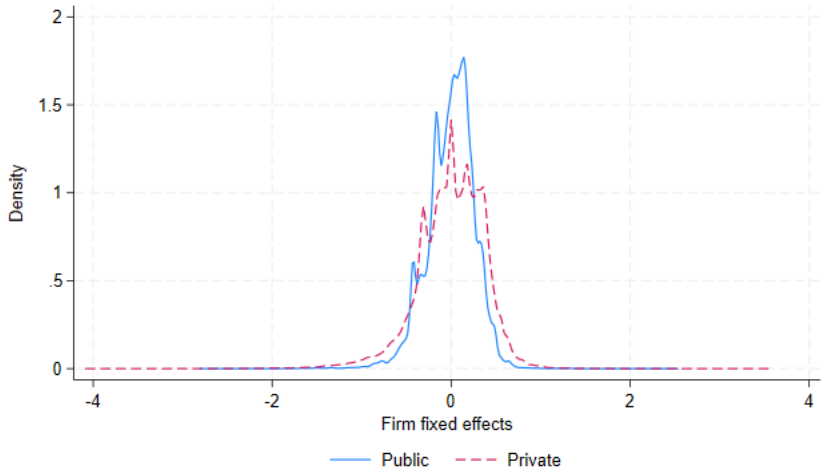


(B) Public sector



Source: Social Security records and own calculations.
Notes: Panel A shows the average wages of switchers by quartile of firm fixed effects for workers in the private sector after moving, while Panel B focuses on workers who ended employed in the public sector. Firms are grouped into quartiles according to period-specific AKM fixed effects estimated from the equation (1). Wages are net of the time effects by removing the time-varying AKM observable component from each observation. The vertical line represents the month when the new job starts.

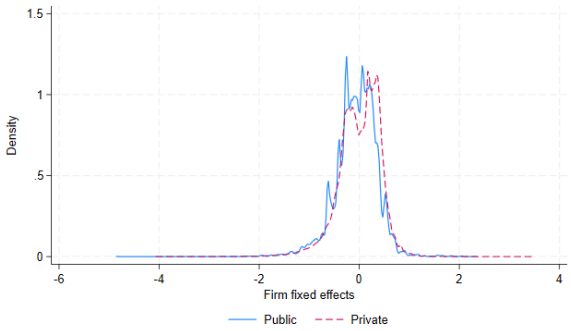
Figure C.10: Distribution of firm fixed effects by sector



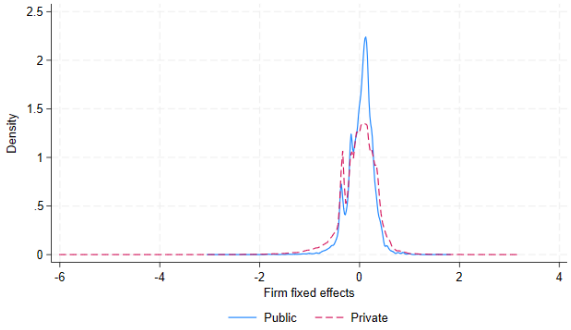
Source: Social Security records and own calculations.
Notes: The figure shows the distribution of firm fixed effects estimated from equation (1).

Figure C.11: Distribution of firm fixed effects by sector and sex

(A) Men

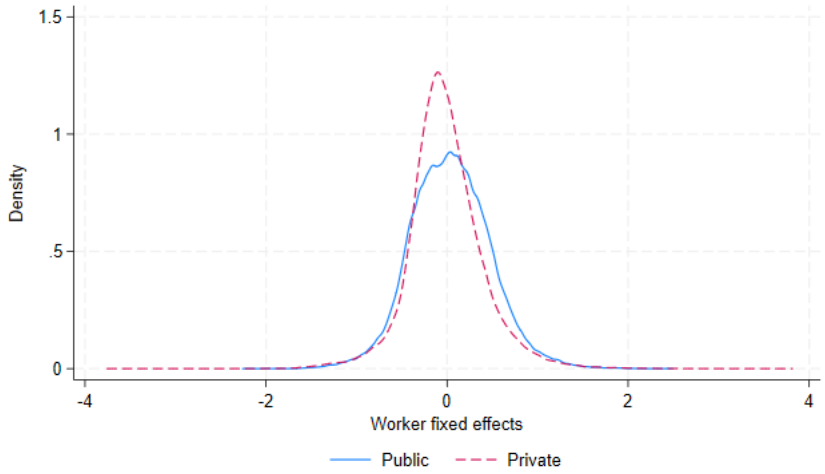


(B) Women



Source: Social Security records and own calculations.
Notes: The figure shows the distribution of firm fixed effects estimated by sex from equation (1).

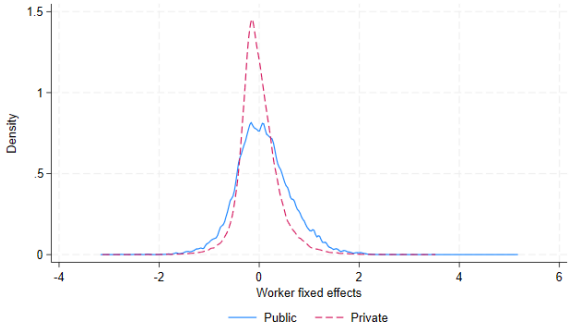
Figure C.12: Distribution of worker fixed effects by sector



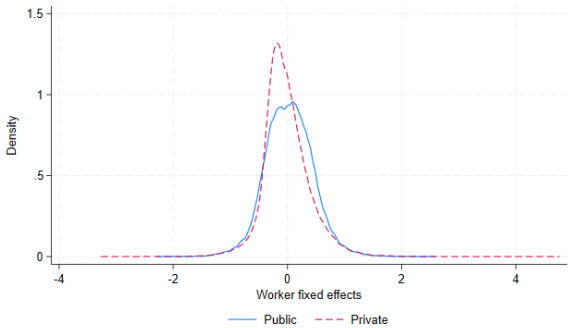
Source: Social Security records and own calculations.
Notes: The figure shows the distribution of worker fixed effects estimated from equation (1).

Figure C.13: Distribution of worker effects by sector and sex

(A) Men



(B) Women



Source: Social Security records and own calculations.
Notes: The figure shows the distribution of worker fixed effects estimated by sex from equation (1).