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PUBLIC-PRIVATE SECTOR WAGE GAP IN ESTONIA

Master's Thesis

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I have written this Master's Thesis independently. Any ideas or data taken from other authors or other sources have been fully referenced.

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1. Introduction

The wage gap between the public and private sectors has long been a persistent and widely discussed issue, since the earliest studies were conducted in the 1970s (Smith, 1976). Organizational funding, public authority and control, and organizational tasks are three characteristics that have typically distinguished organizations in the public and private sectors (Perry & Rainey, 1988; Rainey & Bozeman, 2000). In one of the most extensive studies to date, the database containing 86 countries from the 1990s to 2020s, public workers earned 10% more, with higher premiums for women, low-skilled and in developing countries on average. The public wage premium was found to be counter-cyclical, rising in downturns and before elections (Abdallah et al., 2023). The dominance of the private and public sectors in wage settings varies depending on the country (Lamo et al., 2012). In recent years, countries in the Baltic region—such as Estonia’s neighbors—have carried out several studies on this topic (Garcia-Louzao & Jonuškaitė, 2025a; Vilerts, 2018). In Estonia, however, most wage inequality research has focused on the gender wage gap (Aavik et al., 2024; Meriküll & Tverdostup, 2023), which has also been a major issue in the European Union in recent years. A smaller number of studies have explored wage differences between the public and private sectors in Estonia (Unt et al., 2021). Besides, the previous studies focused on the public-private wage gap in Estonia are Leping (2005) and Leping (2006), using the earlier and transition period data. Given the limited recent research on the public-private wage gap in Estonia, this thesis seeks to address this wage gap.

This thesis aims to examine the wage gap between the public and private sectors in Estonia from 2010 to 2020, a decade characterized by recovery from the Great Recession and pre-COVID-19 economic growth within a relatively stable economic environment. Since regaining independence in the early 1990s, Estonia, as a small and open economy country, has seen substantial changes in its labor market. Estonia is especially interesting for research in Central and Eastern European nations because of its low unionization rate and flat-rate income tax with little progressivity (OECD, 2024). Additionally, this thesis will address three primary questions: Is there a significant wage gap between the public and private sectors? To what extent can this gap be explained by observable individual characteristics such as age, gender, education, etc? How about the heterogeneity of the impact of various factors between the public and private wage gap at different wage levels?

The Estonian Labour Force Survey (ELFS), which offers a comprehensive and nationally representative dataset of people aged 15 to 74 who are registered residents of Estonia, is the source of data used in this thesis. Age, educational attainment, employment

status, type of employment, net wage, and workplace are just a few of the individual's personal and household characteristics that are documented in the ELFS and are crucial to this thesis.

Descriptive statistics provide an initial overview before the regression analysis. The entire sample, broken down into the public and private sectors, is displayed together with all means and standard deviations of individual observations from 2010 to 2020. Additionally, how the public sector's composition and share have evolved throughout time are studied. Without using regressions, the employment status of employees in the public and private sectors earning below 2/3 of the average income and the raw wage gap changes over time in the public and private sectors are shown. Kernel density estimations for 2010, 2015, and 2020 further illustrate the wage distribution patterns.

To address the questions mentioned before, this thesis employs several methodological approaches. Mincer wage regressions are commonly used to analyze the relationship between wages and individual characteristics. The Oaxaca-Blinder decomposition is mainly used to decompose the wage gap into an explainable part, which is caused by differences in characteristics, and an unexplainable part, which is usually considered to be caused by factors such as discrimination. Quantile regression can study the impact of various factors on wages at different wage quantiles, mainly 10th, 25th, 50th, 75th and 90th quantiles are considered. Different from ordinary least squares, such as Mincer wage regressions, quantile regression can capture the heterogeneity of the impact of various factors at different wage levels.

The study is structured as follows: Section 2 reviews existing literature on the differences between the public and private sectors, as well as key influencing factors such as gender, occupation and skills, macroeconomic environment, unions, and immigration. Section 3 provides a detailed introduction to the data and methods. Section 4 presents the empirical research results on the wage gap pattern between the public and private sectors in Estonia. Finally, Section 5 summarizes the main findings and discusses the policy impact of reducing wage inequality in Estonia.

Keywords:

Wages, Public sector, Private sector, Gender wage gap

CERCS code: S180 Economics, econometrics, economic theory, economic systems, economic policy

2. Literature Review

Since the earliest studies were conducted in the 1970s (Smith, 1976), the presence of a wage disparity between the public and private sectors has been investigated in the literature. Because the public and private sectors have different objectives, resources, and constraints, they make different judgments about employment and pay policy (Gregory & Borland, 1999). Organizational funding, public authority and control, and organizational tasks are three characteristics that have typically distinguished organizations in the public and private sectors (Perry & Rainey, 1988; Rainey & Bozeman, 2000). Since the private sector's primary goal is to maximize profits, it strives to optimize wages and set them at a level that corresponds to workers' productivity. Additionally, it is reasonable to assume that the private sector will respond to economic developments more rapidly, particularly if trade unions have limited involvement in pay negotiating (Afonso & Gomes, 2014).

To explain the correlation between the wage gap in the public and private sectors. Lamo et al. (2012) focused on the causal two-way relationship between public and private wage settings. They found that generally, the private sector had a stronger influence on public sector wages rather than vice versa. Besides, the dominance of the private and public sectors in wage settings varies depending on the country. However, this thesis focuses on factors that can explain the wage differences between the public and private sectors rather than the two-way relationship between these two sectors.

This literature review mainly studies and explains the main factors behind the wage gap between the public and private sectors. After generalizing, the primary factors that can demonstrate the wage difference between the public and private sectors are gender, occupation and skills, macroeconomic environment, unions, and immigration.

Gender is the first factor. When examining the differences in wages between the public and private sectors, gender considerations are crucial. Gender is mentioned in the majority of studies on the disparity in salaries between the public and private sectors. Furthermore, many papers have various focuses on the gender element. Some people are aware of the fixed floors and glass ceiling, some focus on gender discrimination and segregation, while others are concerned with occupational choices and job features. A small number of people attempt to address issues like double selection.

Research consistently shows that the glass ceiling or barriers to advancement to higher positions, and the sticky floor or keeping lower level positions for workers, have an impact on wage differences in both developed and developing economies. Ghignoni & Pastore (2023) analyzed Egypt's gender wage gap between public and private sectors over 20

years. Using Oaxaca-Blinder decomposition and re-centered influence function methods, they found a growing private-public sector gap almost fully being driven by discrimination, with a sticky floor effect. The public sector showed a glass ceiling. Cultural barriers significantly limited female participation. Barón & Cobb-Clark (2010) analyzed Australian gender wage gaps across public and private sectors using 2001-2006 data. In both sectors, they found that for low-paid workers, wage-related characteristics fully explained the gender gap, while for high-wage workers, the gap remained largely unexplained, suggesting glass ceilings rather than sticky floors. Their results showed that occupational segregation advantaged most women except those in high-paid jobs such as high-skilled managerial and administrative occupations, while experience differences significantly explained private-sector wage gaps, disparities in education and demographic characteristics generally had minimal impact on the gender wage gap. Wahlberg (2010) examined gender wage differentials in Sweden's private and public sectors using quantile regression on 2006 data. The study found a glass ceiling effect for women in both sectors, particularly in the public sector. The gender wage differentials across the whole distribution in the private sector were lower in Sweden than in the USA and 11 European countries, whereas the opposite could be said about the public sector; here the gap was higher across the entire distribution in Sweden.

In addition, discrimination and segregation of gender are also reflected in the public and private wage gap. Moreno-Mencía et al. (2022) analyzed Spain's gender wage gap using quantile regression on Wage Structure Survey data. They found that wage differences attributed to different returns between genders and sectors vary across the wage distribution, considering sample selection bias. Public sector wages were higher on average, with a wider gap for women. The explained gender wage gap by different characteristics was larger at the bottom, while discrimination in the gender wage gap was higher at the top. Albæk et al. (2017) examined the public-private wage gap due to segregation and gender in Denmark from 2002 to 2012. They found that segregation, which was measured as the proportion of females in occupations, industries, establishments and job cells (occupations within establishments), respectively, played a substantially more important role in accounting for the gender wage gap in the public sector than in the private sector. Over time, segregation's impact on wages decreased more in the public sector than in the private sector. Remaining the gender wage gap and controlling for segregation, the wage gap was nearly zero in the public sector, while a substantial within-job cell differential remains in the private sector.

Some papers state that women's education and professional level have a certain impact on the wage gap. Stritch & Villadsen (2018) used 25 years of employee-level data

from Denmark to examine gender wage gaps in the public versus private sectors. They found that female professionals in the Danish public sector face smaller wage penalties than their private sector counterparts, likely due to merit-based employment systems and wage transparency in public employment. However, their findings also revealed a paradox: while the public sector promoted greater pay equality between men and women, it simultaneously placed structural limitations on women's ability to leverage individual qualities such as educational attainment to further reduce the wage gap. In the meanwhile, based on occupational choices and job characteristics, some papers suggest that the public sector wage premium is more favorable for women. Bonaccolto-Töpfer et al. (2022) by using the data from the German Socio-Economic Panel (1984-2017) decomposed the wage gap across the wage distribution and controlled for unobservable factors endogenously affecting occupational choice. They revealed gendered outcomes, with women benefiting more from public sector employment. Besides, they found men were unambiguously disadvantaged, with higher remuneration in the private sector across the entire wage distribution. Cai & Liu (2011) analyzed public-private wage gaps in Australia using quantile regressions on six waves of survey data. For females, public sector wage premiums were relatively stable for almost the entire distribution. For males, they decreased monotonically and were negative for the top half of the distribution. The decomposition results showed that the observed differences in individuals and job characteristics explained a substantial proportion of the sectoral wage gap. Further more, to deal with problems such as the double selection problem, Christofides & Pashardes (2002) tried Probit models to address the double selection problem in employment choice in Cyprus. They decomposed the public-private wage gap using a modified Oaxaca and Ransom procedure, identifying differences in characteristics, sector advantages, and unobserved selection effects. The human capital model described the wage determination process satisfactorily. The study found that the size and distribution of public sector rents between men and women were similar to those in North America and were bracketed by results for developing countries.

When examining gender factor, certain papers frequently highlight occupation and skills. However, the following papers mainly focus on the wage gap between the public and private sectors due to occupation and skills. Education and job experience are discussed because they are linked to occupation and skills.

The public sector often provides higher wages for low-skilled workers, while the private sector offers more rewards to high-skilled workers. Lucifora & Meurs (2006) analyzed public-private wage determination in France, Britain, and Italy using non-

parametric and quantile regression methods. They showed that the public-private wage gap varied by quantity, gender and skill. In all countries, the public sector, compared to the private sector, paid low-skilled workers more, but on the contrary for high-skilled workers. In the public sector, countries with more regulated pay systems (France, Italy) had smaller gaps, while more market-driven systems (Britain) showed larger gaps, especially at lower wages. Besides, there are differences in the impact of education and work experience on employees with different income levels. Li & Zhang (2022) examined China's public-private wage gaps using Urban Household Survey data employing OLS, Heckman selection models, Oaxaca-Blinder decomposition, and recentered influence function analysis. They found that public sector workers consistently earned more than private sector workers, with this gap widening over time, especially in upstream industries where state-owned enterprises hold monopoly status. Their decomposition analyses revealed that differences in labour endowments (characteristic effect) were the main cause of the wage gap, with work experience impacting middle/lower-income employees more significantly, while education, occupation, and industry had greater effects on high-income employees. Melly (2005) analyzed public-private employees wage distributions in Germany from 1984 to 2001. At the low end of wages, differences in characteristics explained less than the raw wage gap, while it was the opposite at high wages. Separate analyses by work experience and educational groups revealed that the most experienced employees and those with basic education did best in the public sector. All these results were stable over the 80s and 90s.

The macroeconomic environment is the third factor. In addition to being impacted by individual characteristics, the public-private wage gap also varies in response to shifts in the macroeconomic environment. The economic cycle and significant economic events are part of the macroeconomic environment.

Some studies examined the effects of austerity measures and economic downturns on wages in the public and private sectors, including the Great Recession (2008-2014). Sławińska (2021) examined the impact of austerity measures and deteriorating economic conditions on incomes from 2008 to 2013 using the EU-SILC data and the Oaxaca-Blinder decomposition method. Between 2008 and 2013, earnings declined in both sectors in the majority of the countries under analysis. In most European nations during the crisis, the overall public-private wage gap decreased or stayed the same. Michael & Christofides (2020) examined the influence of public sector austerity measures on the pay gap between the public and private sectors in several European nations during the 2008-2014 crisis. They suggested that countries should think about adopting wage-setting mechanisms that connect to their

private sector that recognize significant worker and job characteristics (such as occupation and education), and maintain appropriate pay gaps at all quantiles, to keep the public-private sector wage gap at appropriate levels across the quantile function for austerity measures under external shocks. In the Baltic states, Masso & Espenberg (2013) pointed out that the economic recession of 2008-2009 had a profound impact on the public sector, cuts of nominal hourly wages as well as a reduction in bonuses and fringe benefits were employed. That was different from much of the European Union, where public sector reforms primarily began in response to the debt crisis of 2010-2011. Nikolic et al. (2017) analyzed crisis adjustments of the public and private sectors in Croatia and Serbia during the 2008-2011 crisis, using Oaxaca-Blinder decomposition with RIF regressions. During the crisis, both countries experienced a wage premium increase. The wage distribution, further exacerbated by the crisis in the public sector, was more compressed compared to the private sector in both countries. Despite the introduced austerity measures, public sector workers still enjoyed well-protected and privileged wages relative to the private sector. Additionally, other studies concentrate on the cyclical fluctuations of wage inequalities, or how income in the public sector adapts to shifts in the economic cycle. Rattsø & Stokke (2019) proposed an identification strategy for the private-public sector wage gap to address bias from unobservable characteristic heterogeneity. Using a fixed effect difference-in-difference model with event study design and Norwegian register data (1993-2010), they found the model, which represented a positive selection of shifters to the private sector compared to stayers in the public sector, overestimated the gap by 20% due to positive selection. The overestimation was similar for male and female workers and robust across business cycles, though the gap size was pro-cyclical. In Finland, Maczulskij (2013), using microeconomic data from 1990 to 2004, found that the wage disparity between the public and private sectors was countercyclical. The cyclicity of the wage gap was greatest in years such as 1990-1992 and 1999-2004 when labor markets were in decline. Compared to central government employees, the salary disparity varied more for local government employees. To benefit from a significant salary premium and increased job stability, residents of areas with high unemployment rates might look for more public work.

Last but not least, unions and immigration respectively have influences on differences between the public and private sectors. Developing labor policies requires an understanding of how unions affect the wage difference between the public and private sectors. The following studies emphasize important policy consequences and shed light on how unionization affects pay gaps in Ghana, the UK, and China. Ma (2024) by using 5-time points

from 2010 to 2018 from the China Family Panel Studies and the Blinder-Oaxaca decomposition method, found that a significant positive union wage premium in the public sector was greater compared to private, but with fixed effects union wage premium was non-significant. Besides, the union coverage difference (the endowment effect) widened the public-private wage gap, while the union wage premium difference (the price effect) narrowed the wage gap. Blanchflower & Bryson (2010) showed a widening gap in the UK union wage premium between public and private sector workers. The addition of three-digit occupational controls reduced the gap between the membership premiums in the public and private sectors, but the public-sector union membership wage premium was about twice as high as the private-sector membership premium. Owusu-Afriyie et al. (2023) used 2010s data in Ghana and concluded that public sector unions had a greater positive impact on member wages than private sector unions, which may worsen wage inequality between private and public sector employees. They found two possible reasons. Firstly, perhaps due to the coverage advantage of public sector unions over private sector unions, public sector unions had a higher positive impact on their members' wages through collective bargaining than private sector unions. Secondly, public sector unions could also push their wage demands by influencing the political process of selecting employers or management like the government to participate in negotiations. In Estonia, generally very little sectoral collective bargaining exists, but there is some in the public sector, like education and medicine.

The wage disparity between immigrants and native-born workers remains a persistent issue in labor markets worldwide. With the following studies, we can see how immigrants influence wage disparities in France, Canada and Germany. Berson (2016) examined the public-private wage gap among French second-generation immigrants. All second-generation immigrants were not treated equally on the job. If the wage gap between North African and French-origin workers was explained by productive characteristics, a gap among some Southern European workers in the public sector remained unexplained. Southern European workers were paid less in the private sector with one immigrant parent. Differences in education, behavior, and housing as the main factors contributing to the wage gap. Ansah & Mueller (2021) used 2006-2018 monthly data in Canada and found that the wage gap among immigrants was often negative, with the largest in the private sector. The premium of immigrants in the public sector relative to the private sector was also higher than that of Canadian-born immigrants. In conclusion, public sector wages were crucial for narrowing the overall wage gap among immigrants. Peters & Melzer (2022) combined administrative and survey information on German employees in the 2010s and found that the processes in the

workplace are accidental in terms of system, and diversified policies such as mixed teams had reduced inequality in the public sector, while diversified policies such as language courses had exacerbated existing inequality in the private sector. Immigrants earned lower wages in public sector workplaces where locals held higher relationship positions. Overall, immigrants experience a relatively narrower wage gap in the public sector. However, this thesis mainly focuses on the local people, the papers focuses on the immigrants can be the related reference.

The findings on the main factors of the wage disparity between the public and private sectors are gathered. Compared to the private sector, women in the public sector typically perform better, but glass ceilings and sticky flooring persist in both sectors. The public sector often provides more wage equality, but at the same time may also limit promotion opportunities. High-skilled workers usually have more earnings in the private sector, while low-skilled workers often receive wage premiums in the public sector. The influence of education and experience varies greatly in wage distribution. Macroeconomic environment has an impact on the difference between public and private wages, and there is evidence that these differences frequently exhibit countercyclical patterns. Wage differences are impacted by the presence and reach of trade unions, particularly in the public sector. In addition, public sector employment may help alleviate some of the disadvantages faced by immigrant workers.

3. Methods and Data

3.1. Methods

As the literature review showed, most papers use Oaxaca-Blinder decomposition and quantile regression, and Mincer wage regression is also used as a reference regression. In this thesis, these three methods will be used for further analysis.

Mincer wage regressions are commonly used to analyze the relationship between wages and individual characteristics. By using a Mincer equation, Depalo et al. (2015) assessed how much of the differential depended on differences in endowments like various skills and how much on differences in the remuneration of such skills. This thesis uses several individual characteristics referred to by Morikawa (2016), which are associated with the public-private wage differences, focusing on wage structures by gender, age, education, and working region, but also adds more characteristics, like tenure, working industry and occupation type for analysis.

$$\ln(w_i) = \beta_0 + \beta_1 public_i + \beta_2 female_i + \beta_3 age_i + \beta_4 agesq_i + \beta_5 tenure_i + \beta_6 tenuresq_i + \beta_7 industry_n + \beta_8 educ_i + \beta_9 occupation_j + \beta_{10} loc_k + \beta_{11} union_i + \beta_{12} estonian_i + \beta_{13} fulltime_i + \epsilon_i \quad (1)$$

where

β_0 - the intercept term; $\beta_1 - \beta_{10}$ - the coefficients to be estimated; ϵ_i - error term.

Table 1 Description of the variables

| Variables | Description |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| w_i | The hourly net wage of the i - th individual. |
| $public_i$ | A dummy variable for the public-private sector. It takes the value of 1 if the i - th individual works in the public sector and 0 if in the private sector. |
| $female_i$ | A dummy variable, which takes the value of 1 if the i - th individual is female and 0 otherwise. |
| age_i | The age of the i - th individual. |
| $agesq_i$ | The squared age of the i - th individual is used to capture the non-linear impact of age on wages. |
| $tenure_i$ | The tenure of the i - th individual. |
| $tenuresq_i$ | The squared tenure of the i - th individual is used to capture the non-linear impact of tenure on wages. |
| $industry_n$ | Generate a set of dummy variables that contains mainly six industries for alternative economic activity (n represents different industries), used to control for the impact of industrial factors on wages. $industry_1 - industry_6$ represent primary, secondary, energy, construction, other business services and public services. |
| $educ_i$ | The education level of the i - th individual, dummies for primary, secondary and tertiary education. |
| $occupation_j$ | A set of dummy variables for occupations (j represents different occupation categories), the 1-digit occupational codes, used to control for the impact of occupation differences on wages. ISCO 1-3 represent white-collar high-skilled, ISCO 4-5 represent white-collar low-skilled, ISCO 6-7 represent blue-collar high-skilled, and ISCO 8-9 represent blue-collar low-skilled. |
| loc_k | A series of dummy variables for regions (k represents different regions) is used to control for the impact of regional factors on wages. Divided into five working locations based on NUTS 3 regions. $loc_1 - loc_5$ represent Northern Estonia, Central Estonia, North Eastern Estonia, Western Estonia and Southern Estonia. |
| $union_i$ | A dummy variable, which takes the value of 1 if the i - th individual has trade union membership and 0 otherwise. |
| $estonian_i$ | A dummy variable, which takes the value of 1 if the i - th individual is Estonian and 0 otherwise. |
| $fulltime_i$ | A dummy variable, which takes the value of 1 if the i - th individual works full-time and 0 otherwise. |

The Oaxaca-Blinder decomposition is mainly used to decompose the wage gap into an explainable part, which is caused by differences in characteristics, and an unexplainable part,

which is usually considered to be caused by factors such as discrimination (Ghignoni & Pastore, 2023; San & Polat, 2012). In this thesis, the population is mainly divided into the public sector and the private sector, and the wage equations are as follows.

$$\text{For the public sector:} \quad \ln(w_p) = \beta_{p0} + \sum_{m=1}^n \beta_{pm} X_{pm} \quad (2)$$

$$\text{For the private sector:} \quad \ln(w_s) = \beta_{s0} + \sum_{m=1}^n \beta_{sm} X_{sm} \quad (3)$$

where

w_p, w_s - wages of the public sector and the private sector, respectively.

X_{pm}, X_{sm} - vectors of characteristics of individuals in the public sector and the private sector, respectively (including gender *female*, age *age*, tenure *tenure*, industry *industry* education *educ*, occupation *occupation*, location *loc*, etc.).

β_{pm}, β_{sm} - the corresponding coefficients.

The overall wage gap $\Delta \ln(w) = \ln(w_s) - \ln(w_p)$, the private sector is group 1 and the public sector is group 2 can be decomposed as follows.

$$\Delta \ln(w) = \overline{\ln(w)}_{sm} - \overline{\ln(w)}_{pm} = (\beta_{s0} - \beta_{p0}) + \sum_{m=1}^n (\bar{X}_{sm} - \bar{X}_{pm}) \beta_{pm} + \sum_{m=1}^n \bar{X}_{pm} (\beta_{sm} - \beta_{pm}) + \sum_{m=1}^n (\bar{X}_{sm} - \bar{X}_{pm}) (\beta_{sm} - \beta_{pm}) \quad (4)$$

where

$\bar{X}_{pm}, \bar{X}_{sm}$ - the mean values of characteristic variables in the public sector and the private sector, respectively.

The endowments are $\sum_{m=1}^n (\bar{X}_{sm} - \bar{X}_{pm}) \beta_{pm}$, show the differences in characteristics. Coefficient effects are differences in returns to characteristics, $\sum_{m=1}^n \bar{X}_{pm} (\beta_{sm} - \beta_{pm})$. Interaction effects are simultaneous differences in both, $\sum_{m=1}^n (\bar{X}_{sm} - \bar{X}_{pm}) (\beta_{sm} - \beta_{pm})$. Positive results mean advantages to the private sector, while negative results mean advantages to the public sector. More detailed, to figure out how the wage gap is measured, taking the gender wage gap as an example, the gender wage gap equals to (wages of females minus wages of males) divided by the wages of males.

Quantile regression can study the impact of various factors on wages at different wage

quantiles, mainly 10th, 25th, 50th, 75th and 90th quantiles are considered (Cai & Liu, 2011; Moreno-Mencía et al., 2022; Wahlberg, 2010). Different from ordinary least squares, such as Mincer wage regressions, quantile regression can capture the heterogeneity of the impact of various factors at different wage levels. Taking the τ - th quantile, the equation can be expressed as:

$$Q_{y_i}(\tau|X_i) = \beta_0(\tau) + \beta_1(\tau)public_i + \beta_2(\tau)female_i + \beta_3(\tau)age_i + \beta_4(\tau)agesq_i + \beta_5(\tau)tenure_i + \beta_6(\tau)tenuresq_i + \beta_7(\tau)industry_n + \beta_8(\tau)educ_i + \beta_9(\tau)occupation_j + \beta_{10}(\tau)loc_k \quad (5)$$

where

$Q_{y_i}(\tau|X_i)$ - the τ -th quantile of wage y_i given characteristics X_i ; $\beta_0(\tau) - \beta_6(\tau)$ - the coefficients to be estimated at the τ -th quantile.

3.2. Data

The Estonian Labour Force Survey (ELFS) is the source of the data because many countries do not include information on wages. The period of the dataset is from 2010 to 2020, focusing on the wage gap between the public sector and private sector in Estonia over the decade.

The ELFS dataset covers individuals aged 15-74 years, which contains the registered residents in Estonia, most of whom are Estonians. It provides a comprehensive and nationally representative set of data on individuals' personal and household characteristics like age, educational attainment, working status, type of employment, net wage, workplace, etc. These mentioned characteristics will be used in the thesis. For better analysis, the net wages are calculated with working hours, then changed into hourly net wages for interpretation and visualization.

Table 2 contains all means and standard deviations with the observations of individuals between 2010 and 2020, the total sample is shown first, and then it is divided into two sectors, the Public sector and the Private sector. Between 2010 and 2020, there were 221,317 individuals in the sample, and 35,206 worked in the public sector and 100,507 worked in the private sector. The number of employees in the public sector is significantly less than in the private sector, according to the observations between 2010 and 2020. Compared to the private sector, the person who works in the public sector is more likely to be

female and older. This is consistent with the analysis conducted by Garcia-Louzao & Jonuškaitė (2025) based on Lithuanian data. In addition, data from Estonia shows that employment relationships are more stable in the public sector and have higher education, as white-collar, located in the Northern Estonia, gathered in the public service industry. Besides, the public sector employees work relatively less than the private sector employees for full-time work, and the public sector has more Estonians compared to the private sector due to the knowledge of Estonian is required in the public sector.

Following Table 3 shows how the share and composition of the public sector have changed over time. The corresponding data for the private sector and how the public and private sector workforce differ can be found in the appendix. Overall, there is a trend within the public sector, characterized by an aging population, gender inequality, steady wage growth, and industry transformation. The educational level of public sector employees has improved significantly, with more employees having higher education, while the proportion of high-skilled positions, especially ISCO 2 (Professionals), which is the most important occupational category, has also increased. Employees are on average older and have worked longer. Women continue to dominate and maintain a very stable position in the public sector, accounting for almost 69% of employees. The average log hourly net salary in the public sector increased by 76.5% from 2010 to 2020. The largest employment category is the public service industry, with an average share of 28.4%. The decline in primary and secondary industry employment indicates that Estonia has rather little state-owned enterprise. Additionally, in both sectors, most employees work in the Northern Estonia, where the capital Tallinn is located, are not union members, work full-time, and are Estonian nationals.

Table 2 All means and standard deviations about variables

| | All | | Public Sector | | | | Private Sector | | | | | |
|---------------------------|--------|--------|---------------|--------|--------|--------|----------------|--------|--------|--------|--------|--------|
| | Male | | Female | | Male | | Female | | Male | | Female | |
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Public sector work | 0.162 | 0.368 | 0.357 | 0.479 | 1.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Ln(Hourly Netwage) | 1.767 | 0.800 | 1.531 | 0.801 | 1.839 | 0.800 | 1.618 | 0.808 | 1.751 | 0.800 | 1.477 | 0.791 |
| Age | 43.389 | 16.702 | 45.554 | 16.668 | 46.096 | 12.990 | 47.833 | 12.076 | 43.154 | 12.831 | 44.332 | 12.829 |
| Squared Age | 2161.5 | 1480.4 | 2352.9 | 1512.3 | 2293.5 | 1211.8 | 2433.7 | 1142.6 | 2026.9 | 1136.6 | 2129.9 | 1140.1 |
| Tenure | 50 | 12 | 42 | 04 | 54 | 47 | 94 | 39 | 00 | 29 | 48 | 58 |
| Squared Tenure | 12.436 | 8.383 | 13.904 | 9.585 | 14.929 | 9.688 | 16.576 | 10.617 | 11.836 | 7.922 | 12.040 | 8.299 |
| Industry-Tenure | 224.92 | 310.37 | 285.20 | 385.15 | 316.69 | 409.13 | 387.49 | 458.80 | 202.85 | 277.01 | 213.84 | 304.32 |
| Industry-Primary | 0 | 0 | 1 | 5 | 9 | 7 | 4 | 1 | 1 | 1 | 3 | 7 |
| Industry-Secondary | 0.074 | 0.262 | 0.030 | 0.172 | 0.059 | 0.236 | 0.008 | 0.087 | 0.091 | 0.287 | 0.045 | 0.208 |
| Industry-Energy | 0.194 | 0.395 | 0.139 | 0.346 | 0.079 | 0.270 | 0.010 | 0.101 | 0.264 | 0.441 | 0.243 | 0.429 |
| Industry-Construction | 0.007 | 0.081 | 0.002 | 0.049 | 0.020 | 0.139 | 0.004 | 0.062 | 0.006 | 0.077 | 0.002 | 0.044 |
| Industry-Business service | 0.147 | 0.354 | 0.013 | 0.114 | 0.017 | 0.131 | 0.000 | 0.021 | 0.202 | 0.401 | 0.022 | 0.146 |
| Industry-Public service | 0.216 | 0.411 | 0.243 | 0.429 | 0.102 | 0.303 | 0.053 | 0.224 | 0.315 | 0.464 | 0.423 | 0.494 |
| Education-Primary | 0.108 | 0.311 | 0.127 | 0.333 | 0.412 | 0.492 | 0.227 | 0.419 | 0.086 | 0.281 | 0.132 | 0.338 |
| Education-Secondary | 0.216 | 0.411 | 0.153 | 0.360 | 0.051 | 0.220 | 0.035 | 0.184 | 0.138 | 0.345 | 0.084 | 0.278 |
| Education-Tertiary | 0.576 | 0.494 | 0.532 | 0.499 | 0.480 | 0.500 | 0.404 | 0.491 | 0.644 | 0.479 | 0.610 | 0.488 |
| ISCO1-White Collar High | 0.208 | 0.406 | 0.314 | 0.464 | 0.469 | 0.499 | 0.561 | 0.496 | 0.218 | 0.413 | 0.305 | 0.461 |
| Skilled | 0.141 | 0.348 | 0.080 | 0.272 | 0.122 | 0.327 | 0.072 | 0.259 | 0.144 | 0.351 | 0.085 | 0.279 |
| ISCO2-White Collar High | 0.116 | 0.321 | 0.262 | 0.440 | 0.258 | 0.437 | 0.440 | 0.496 | 0.089 | 0.285 | 0.163 | 0.370 |
| Skilled | 0.111 | 0.314 | 0.145 | 0.353 | 0.156 | 0.363 | 0.159 | 0.366 | 0.102 | 0.303 | 0.138 | 0.345 |
| ISCO3-White Collar Low | 0.030 | 0.171 | 0.079 | 0.269 | 0.024 | 0.154 | 0.071 | 0.257 | 0.031 | 0.174 | 0.083 | 0.276 |
| Skilled | 0.060 | 0.237 | 0.204 | 0.403 | 0.125 | 0.331 | 0.158 | 0.365 | 0.047 | 0.212 | 0.230 | 0.421 |

| | All | | | Public Sector | | | Private Sector | | | |
|---------------------------------|-------|-------|--------|---------------|-------|--------|----------------|-------|--------|-------|
| | Male | | Female | Male | | Female | Male | | Female | |
| | Mean | SD | Mean | Mean | SD | Mean | SD | Mean | SD | |
| ISCO6-Blue Collar High Skilled | 0.027 | 0.161 | 0.015 | 0.010 | 0.123 | 0.099 | 0.052 | 0.030 | 0.170 | 0.147 |
| ISCO7-Blue Collar High Skilled | 0.243 | 0.429 | 0.032 | 0.086 | 0.176 | 0.280 | 0.055 | 0.273 | 0.445 | 0.214 |
| ISCO8-Blue Collar Low Skilled | 0.196 | 0.397 | 0.071 | 0.100 | 0.256 | 0.300 | 0.086 | 0.214 | 0.410 | 0.307 |
| ISCO9-Blue Collar Low Skilled | 0.070 | 0.255 | 0.110 | 0.076 | 0.313 | 0.264 | 0.278 | 0.069 | 0.253 | 0.330 |
| Workplace-Northern Estonia | 0.482 | 0.500 | 0.469 | 0.419 | 0.499 | 0.493 | 0.490 | 0.496 | 0.500 | 0.500 |
| Workplace-Central Estonia | 0.127 | 0.334 | 0.125 | 0.113 | 0.330 | 0.317 | 0.335 | 0.130 | 0.337 | 0.328 |
| Workplace-NorthEastern Estonia | 0.092 | 0.289 | 0.087 | 0.158 | 0.281 | 0.365 | 0.302 | 0.078 | 0.269 | 0.269 |
| Workplace-Western Estonia | 0.101 | 0.301 | 0.113 | 0.104 | 0.317 | 0.305 | 0.331 | 0.100 | 0.300 | 0.309 |
| Workplace-Southern Estonia | 0.198 | 0.398 | 0.207 | 0.206 | 0.405 | 0.405 | 0.428 | 0.196 | 0.397 | 0.390 |
| Trade Union Membership Estonian | 0.029 | 0.167 | 0.042 | 0.131 | 0.200 | 0.337 | 0.349 | 0.026 | 0.158 | 0.149 |
| Fulltime work Observations | 0.754 | 0.431 | 0.738 | 0.787 | 0.440 | 0.409 | 0.391 | 0.750 | 0.433 | 0.446 |
| | 0.956 | 0.205 | 0.957 | 0.931 | 0.203 | 0.253 | 0.254 | 0.961 | 0.193 | 0.176 |
| | 10598 | | 11533 | 10915 | | | 24291 | 56669 | | 43838 |
| | 3 | | 4 | | | | | | | |

Source: Authors' calculations based on Estonian LFS data.

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| ISCO6-Blue Collar High Skilled | 0.006 | 0.005 | 0.005 | 0.005 | 0.007 | 0.007 | 0.006 | 0.005 | 0.005 | 0.003 | 0.002 | 0.005 |
| ISCO7-Blue Collar High Skilled | 0.038 | 0.041 | 0.033 | 0.030 | 0.032 | 0.030 | 0.026 | 0.031 | 0.027 | 0.021 | 0.016 | 0.029 |
| ISCO8-Blue Collar Low Skilled | 0.040 | 0.044 | 0.043 | 0.050 | 0.038 | 0.036 | 0.032 | 0.032 | 0.033 | 0.030 | 0.025 | 0.036 |
| ISCO9-Blue Collar Low Skilled | 0.102 | 0.085 | 0.086 | 0.095 | 0.088 | 0.078 | 0.079 | 0.077 | 0.066 | 0.072 | 0.080 | 0.082 |
| Workplace-Northern Estonia | 0.302 | 0.313 | 0.359 | 0.367 | 0.349 | 0.338 | 0.345 | 0.370 | 0.579 | 0.599 | 0.625 | 0.408 |
| Workplace-Central Estonia | 0.136 | 0.126 | 0.123 | 0.122 | 0.119 | 0.126 | 0.122 | 0.114 | 0.140 | 0.123 | 0.117 | 0.124 |
| Workplace-NorthEastern Estonia | 0.123 | 0.134 | 0.118 | 0.106 | 0.101 | 0.112 | 0.100 | 0.102 | 0.147 | 0.148 | 0.138 | 0.119 |
| Workplace-Western Estonia | 0.145 | 0.151 | 0.143 | 0.126 | 0.124 | 0.128 | 0.138 | 0.125 | 0.074 | 0.068 | 0.065 | 0.118 |
| Workplace-Southern Estonia | 0.294 | 0.275 | 0.256 | 0.280 | 0.307 | 0.296 | 0.295 | 0.289 | 0.060 | 0.062 | 0.054 | 0.231 |
| Trade Union Membership | 0.194 | 0.172 | 0.150 | 0.140 | 0.120 | 0.112 | 0.120 | 0.121 | 0.139 | 0.149 | 0.128 | 0.139 |
| Fulltime work Estonian | 0.963 | 0.983 | 0.972 | 0.979 | 0.945 | 0.953 | 0.857 | 0.893 | 0.912 | 0.918 | 0.909 | 0.931 |
| | 0.775 | 0.781 | 0.792 | 0.802 | 0.811 | 0.812 | 0.811 | 0.814 | 0.815 | 0.810 | 0.807 | 0.804 |

Source: Authors' calculations based on Estonian LFS data.

Table 4 further reveals the low-wage employment situation of the public and private sectors with income below a certain threshold, which is 2/3 of the average wage from 2010 to 2020. The data reflects the more compressed wage distribution in the public sector workers. In both sectors, the proportion of female employees among low-wage workers is significantly higher, with the proportion of low-wage women almost twice that of men. This is consistent with the study by Masso & Espenberg (2013). In addition, from 2010 to 2020, the overall trend of low-wage employment in both sectors showed a gradual decline.

Table 4 Share of low-wage employees in the public and private sectors in Estonia (2010-2020)

| Year | Public Sector | | | Private Sector | | |
|-------|---------------|-------|--------|----------------|-------|--------|
| | All | Male | Female | All | Male | Female |
| 2010 | 0.251 | 0.153 | 0.289 | 0.348 | 0.236 | 0.470 |
| 2011 | 0.279 | 0.133 | 0.338 | 0.365 | 0.255 | 0.487 |
| 2012 | 0.305 | 0.150 | 0.368 | 0.359 | 0.245 | 0.482 |
| 2013 | 0.290 | 0.143 | 0.353 | 0.323 | 0.201 | 0.458 |
| 2014 | 0.276 | 0.151 | 0.332 | 0.302 | 0.187 | 0.434 |
| 2015 | 0.278 | 0.145 | 0.335 | 0.336 | 0.235 | 0.457 |
| 2016 | 0.269 | 0.139 | 0.320 | 0.342 | 0.228 | 0.465 |
| 2017 | 0.285 | 0.141 | 0.340 | 0.326 | 0.218 | 0.445 |
| 2018 | 0.239 | 0.134 | 0.283 | 0.319 | 0.231 | 0.419 |
| 2019 | 0.221 | 0.135 | 0.257 | 0.309 | 0.218 | 0.414 |
| 2020 | 0.212 | 0.128 | 0.249 | 0.293 | 0.204 | 0.397 |
| Total | 0.258 | 0.140 | 0.308 | 0.325 | 0.222 | 0.442 |

Note: Low-wage employees are defined as 2/3 of the average wage.

Source: Authors' calculations based on Estonian LFS data.

To figure out how the raw wage gap changes over time, Table 5 displays the log hourly net wages used to reduce the impact of extreme values between the public and private sectors from 2010 to 2020, and calculates the wage gap between the public and private sectors as a percentage change. The year 2014 is the only negative value, meaning that the private sector has slightly higher mean wages than the public sector that year, although the wage gap is less than 1%. In the remaining years, the logarithmic hourly net wages in the public sector are higher than those in the private sector, with a total average gap showing the average hourly wage in the public sector is about 5.2% higher than that in the private sector throughout the entire period. The largest wage gap was in 2010, approximately 9.2%, which quickly narrowed to 6% in 2011 and almost approached 0% from 2012 to 2014. From 2010 to 2014, the wage gap decreased from 9.2% to -0.7%, indicating that the wages of the two

sectors tended to be consistent during this period. From 2015 to 2020, the wage gap widened again, especially from 2018 to 2020, where the wage gap increased year by year, especially in 2020 when the hourly net wages in the public sector were about 8.8% higher than those in the private sector.

Table 5 Raw wage gap changes over time in the public and private sectors in Estonia (2010-2020)

| Year | Public Sector | Private Sector | Wage Gap |
|-------|---------------|----------------|----------|
| 2010 | 1.112 | 1.020 | 9.2% |
| 2011 | 1.147 | 1.087 | 6.0% |
| 2012 | 1.170 | 1.163 | 0.7% |
| 2013 | 1.240 | 1.238 | 0.2% |
| 2014 | 1.322 | 1.329 | -0.7% |
| 2015 | 1.380 | 1.361 | 1.9% |
| 2016 | 1.464 | 1.425 | 3.9% |
| 2017 | 1.529 | 1.509 | 2.0% |
| 2018 | 1.720 | 1.651 | 6.9% |
| 2019 | 1.818 | 1.741 | 7.7% |
| 2020 | 1.877 | 1.789 | 8.8% |
| Total | 1.468 | 1.433 | 5.2% |

Note: The data are calculated by nature log on hourly net wage.

Source: Authors' calculations based on Estonian LFS data.

In order to examine the wage distribution between the public and private sectors in France, Italy, and Great Britain, Lucifora & Meurs(2006) fitted the hourly wage density using a kernel density estimator. In Figure 1, Kernel density graphs, changing the countries into different years, generating for three years 2010, 2015, and 2020, that are the beginning of the sample, middle of the sample and the end of the sample. In 2010, the overall wage distribution in the public sector is slightly skewed to the right, and the peak was also higher than that in the private sector. There is a large gap between the two distribution curves, indicating a significant wage gap between the two sectors, consistent with the 9.2% wage gap in the previous table. In 2015, the two curves basically overlapped, indicating that the wage levels of the two sectors are closer than in 2010, but the peak of the wage distribution in the public sector is still higher than that in the private sector. In 2020, the public sector curve clearly shifted to the right compared to the private sector curve in 2015, indicating that the wage gap distribution between the two sectors has widened again, consistent with the wage gap of 8.8% in the previous.

Overall, the wage in the public sector is always higher than in the private sector. The public sector curve wages are concentrated within a certain range, with obvious peaks and log hourly net wages are mostly concentrated in a narrow range. It can be seen that the distribution of public sector wages is concentrated, the wage structure is relatively balanced and the fluctuations are small. In contrast, the private sector curve extends longer towards both ends, especially towards the left end. The private sector spans a wider range, with more pronounced differences in high and low wages and higher levels of income inequality.

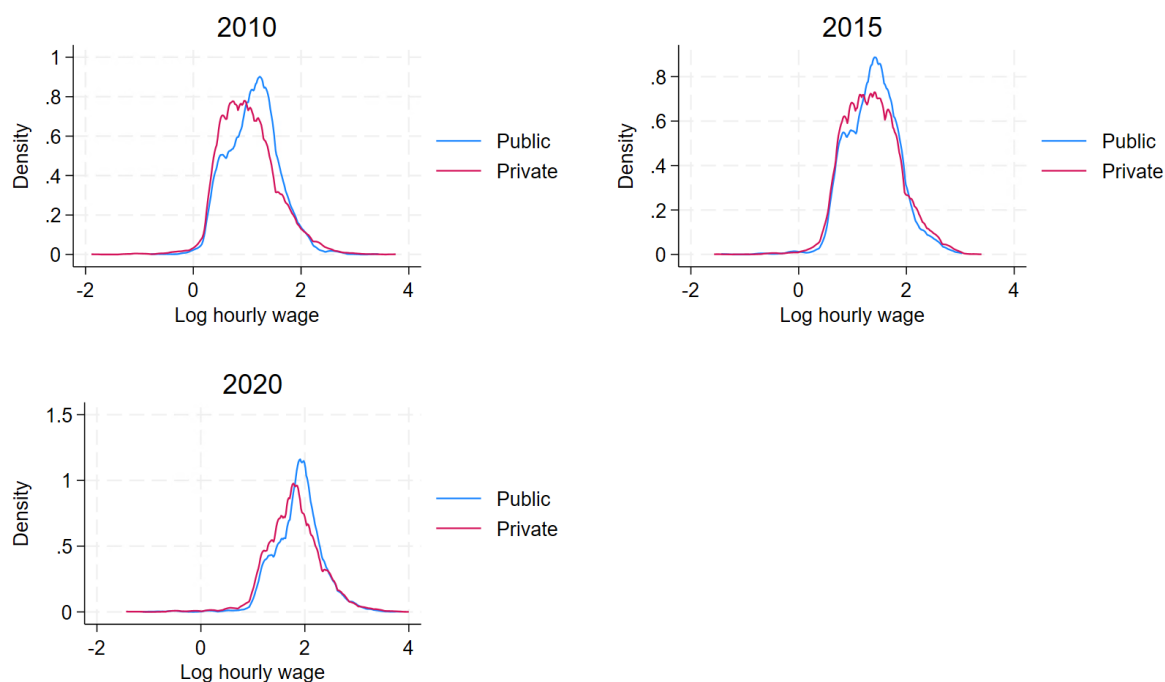


Figure 1 Kernel density graphs in the public and private sectors in Estonia (2010, 2015, 2020)

Source: Authors' calculations based on Estonian LFS data.

4. Results

4.1. Mincer wage regression

Table 6 shows the results of the Mincer regression on log hourly net wage, which are statistically significant at the 1% level. Six columns show different regressions, with each column gradually adding more control variables to explain the determinants of wages and changes in the wage gap between the public and private sectors.

Explanation of variables in the six models is as follows: (1) Basic public sector dummy variable model, only looking at the wage gap between the public and private sectors; (2) Add gender (female) dummy variable controls for gender differences; (3) Add age, tenure

and their squared terms control for human capital; (4) Add education level and industry dummy variables control for educational background and industry; (5) Add occupation and workplace dummy variables control job hierarchy and workplace; (6) Complete models with trade union membership, nationality, full-time status, controlling for individual and structural characteristics.

Sławińska (2021) found that in most EU countries, public-sector employees received higher salaries than private-sector employees. The analysis based on Estonia is consistent with it. In all six models, employees in the public sector have higher hourly net wages than those in the private sector. Although public sector wages are higher, after controlling for factors such as industry, education, occupation, workplace, nationality, and full-time status, the wage gap is not statistically significant. This indicates that the wage gap between the public and private sectors is more due to structural factors.

The coefficient of the female dummy variable is highly significant and negative, indicating that women's wages are, on average, about 20% lower than men's. Even after controlling for numerous variables, the gender wage gap still exists. When explaining income inequality, emphasis should be placed on years of work experience rather than age, and school education is also a major element of human capital (Mincer, 1974). In this thesis, age and tenure are considered together, while different types of education are also taken into account. The positive coefficient of age and tenure indicates that salary will increase with increasing age and experience. However, the negative coefficients of squared age and squared tenure indicate that although wages initially increase, the growth rate slows down over time. Tenure is associated with wages differently in the public and private sectors, the employees in the public sector have steadily increased wages with tenure but not in the private sector. Besides, the employees with primary or secondary education earn significantly less than those with higher education. The education variable remains highly significant in the six models, indicating that education has a significant impact on wages.

Occupation and industry categories could serve as indicators for measuring the basic task requirements of a job (Sanders & Taber, 2012). Occupations such as ISCO 1 (Managers) and ISCO 2 (Professionals) which are high-skilled white-collar ones, have significantly higher wages than other occupations, but ISCO 3 (Technicians and associate professionals), which are also high-skilled white-collar, has a lower wage than other occupations. ISCO 5 (Service workers and shop and market sales workers) and ISCO 9 (Elementary) which are low-skilled have the lowest wage than other occupations. Blue-collar occupations generally have lower wages than white-collar. High-skilled occupations have higher wages than low-

skilled occupations in both white-collar and blue-collar. These results show that occupational level is an important factor in determining wages. Besides, almost all industries generally have higher wages in the incomplete models, but in the complete model, most industries are no longer significant, meaning that wage differences within these industries are related to other control factors.

Compared to Northern Estonia which contains Tallinn and Harjumaa, wages in Northeast Estonia are the lowest, with 23.3% lower, while other regions are around 11.5% to 22.7% lower. Wages in Central Estonia are relatively higher than in other regions, except for Northern Estonia. There is a certain regional wage gap, which may be related to the level of economic development in the region. The average wage for employees who have trade union members is 12.6% higher than non-union members, reflecting the bargaining power of the union. Estonians earn 9.8% more than other nationalities, which may be influenced by local labor market requirements such as language and culture. The salary of full-time employees is 68% higher than that of part-time workers.

Table 6 Mincer wage regression

| Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|---------------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Public sector | 0.047*** (0.004) | 0.109*** (0.004) | 0.108*** (0.004) | 0.031*** (0.006) | 0.069*** (0.006) | 0.010 (0.023) |
| Female | | -0.264*** (0.003) | -0.271*** (0.004) | -0.270*** (0.005) | -0.258*** (0.004) | -0.193*** (0.021) |
| Age | | | 0.019*** (0.001) | 0.015*** (0.001) | 0.018*** (0.001) | 0.019*** (0.004) |
| Squared Age | | | -0.000*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) |
| Tenure | | | 0.009*** (0.001) | 0.004*** (0.001) | 0.007*** (0.001) | 0.010*** (0.003) |
| Squared Tenure | | | -0.000*** (0.000) | -0.000** (0.000) | -0.000*** (0.000) | -0.000* (0.000) |
| Industry Primary | | | | 0.035*** (0.012) | 0.117*** (0.012) | 0.004 (0.059) |
| Industry Secondary | | | | 0.093*** (0.008) | 0.136*** (0.008) | -0.009 (0.036) |
| Industry Energy | | | | 0.118*** (0.024) | 0.147*** (0.023) | -0.036 (0.114) |
| Industry Construction | | | | 0.164*** (0.011) | 0.112*** (0.011) | 0.027 (0.045) |
| Industry Business service | | | | 0.135*** (0.007) | 0.128*** (0.007) | 0.039 (0.028) |
| Industry Public | | | | 0.104*** | 0.094*** | -0.050* |

| Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|------------------------|----------|----------|----------|-----------|-----------|-----------|
| service | | | | (0.006) | (0.006) | (0.028) |
| Primary Education | | | | -0.280*** | -0.255*** | -0.284*** |
| | | | | (0.008) | (0.008) | (0.033) |
| Secondary Education | | | | -0.205*** | -0.189*** | -0.166*** |
| | | | | (0.005) | (0.005) | (0.022) |
| ISCO1 | | | | 0.102*** | 0.135*** | |
| | | | | (0.024) | (0.024) | |
| ISCO2 | | | | 0.064*** | 0.089*** | 0.055 |
| | | | | (0.024) | (0.023) | (0.048) |
| ISCO3 | | | | -0.055** | -0.024 | -0.102** |
| | | | | (0.024) | (0.023) | (0.051) |
| ISCO4 | | | | -0.193*** | -0.173*** | -0.255*** |
| | | | | (0.024) | (0.024) | (0.054) |
| ISCO5 | | | | -0.351*** | -0.309*** | -0.419*** |
| | | | | (0.024) | (0.023) | (0.053) |
| ISCO6 | | | | -0.284*** | -0.325*** | -0.243** |
| | | | | (0.034) | (0.033) | (0.123) |
| ISCO7 | | | | -0.191*** | -0.197*** | -0.383*** |
| | | | | (0.024) | (0.024) | (0.059) |
| ISCO8 | | | | -0.252*** | -0.236*** | -0.341*** |
| | | | | (0.024) | (0.024) | (0.060) |
| ISCO9 | | | | -0.448*** | -0.432*** | -0.453*** |
| | | | | (0.024) | (0.024) | (0.050) |
| Central Estonia | | | | | -0.130*** | -0.115*** |
| | | | | | (0.006) | (0.030) |
| North Eastern Estonia | | | | | -0.216*** | -0.233*** |
| | | | | | (0.007) | (0.031) |
| Western Estonia | | | | | -0.154*** | -0.188*** |
| | | | | | (0.006) | (0.025) |
| Southern Estonia | | | | | -0.159*** | -0.227*** |
| | | | | | (0.005) | (0.021) |
| Trade Union Membership | | | | | | 0.126*** |
| | | | | | | (0.030) |
| Estonian | | | | | | 0.098*** |
| | | | | | | (0.022) |
| Fulltime Work | | | | | | 0.680*** |
| | | | | | | (0.041) |
| Constant | 3.784*** | 3.911*** | 3.636*** | 3.962*** | 3.900*** | 3.235*** |
| | (0.007) | (0.007) | (0.031) | (0.037) | (0.037) | (0.113) |
| Observations | 99,152 | 99,152 | 54,950 | 51,826 | 46,880 | 4,368 |
| R-squared | 0.568 | 0.593 | 0.732 | 0.798 | 0.827 | 0.783 |

Note: Reported are the parameter estimates from the regressions on the log hourly net wage.

All the regressions also included year dummies. * significant at 10%; ** significant at 5%;

*** significant at 1%.

Source: Authors' calculations based on Estonian LFS data.

4.2. Oaxaca-Blinder decomposition

Following the Mincer wage regression analysis, Table 7 presents the Oaxaca-Blinder decomposition results to further investigate the sources of wage disparities between the public and private sectors in Estonia. This method decomposes the wage gap into three components: the endowments effect (differences in observable characteristics), the coefficients effect (differences in returns to these characteristics), and the interaction effect. In this analysis, the private sector is used as the reference group, group 1. While controlling for numerous variables reduces statistical significance, several key findings emerge from the significant results.

The decomposition results reveal that average wages in the public sector exceed those in the private sector by 8.9% with a statistically significant difference. The endowments component accounts for a significant portion of this wage gap, indicating that differences in observable characteristics between the sectors explain much of the disparity. If workers in both sectors possessed identical observable characteristics, the wage gap would be reduced substantially. The -3.5% coefficients component and 5.3% interaction component are not statistically significant. Therefore, the wage differential primarily stems from structural differences in worker and job characteristics between sectors rather than from differing returns to those characteristics.

Although most results are not significant, the significant results can be analyzed. Because of the positive endowment effect, the public sector employs more women, while the wage return rate for women in the public sector is relatively low, which reduces the wage advantage of the public sector. Due to the negative coefficient effect, under the same characteristics, unexplained factors such as discrimination and institutional bias might cause this negative result. The combined effect of endowment effects and interaction effects partially offsets the negative impact of coefficient effects, but the overall gender gap remains significant. When the private sector is at a significant disadvantage or when there is progress in public sector pay policies, it may lead to a larger gender pay gap between the public and private sectors (Christofides et al., 2013).

Human capital variables reveal important structural differences between sectors. Tenure demonstrates a strong positive endowment effect, while Squared Tenure shows a significant negative endowment effect. This pattern suggests that employees in the private sector work longer on average, and the negative squared term confirms the diminishing

marginal returns in both sectors. This finding reflects the characteristic concave wage-experience profile documented. A higher proportion of highly educated employees in the public sector due to negative endowments and coefficients of tertiary education, as well as positive interactions, increasing average public sector wages. The endowments of Trade Union Membership are significantly negative, but insignificant coefficients and interaction, which means that more union members in the public sector result in slightly higher wages. Full-time work with positive endowments and coefficients, indicating more full-time jobs in the private sector and an increase in average wages.

Table 7 Oaxaca-Blinder decomposition (private sector as the base sector)

| VARIABLES | Overall | Endowments | Coefficients | Interaction |
|---------------------------|---------|----------------------|----------------------|---------------------|
| Female | | 0.011** (0.005) | -0.164** (0.067) | 0.016** (0.007) |
| Age | | 0.038 (0.030) | 1.188 (0.876) | -0.049 (0.038) |
| Squared Age | | -0.027 (0.027) | -0.900* (0.498) | 0.060* (0.036) |
| Tenure | | 0.226*** (0.044) | 0.016 (0.162) | -0.006 (0.059) |
| Squared Tenure | | -0.185*** (0.039) | -0.014 (0.098) | 0.008 (0.059) |
| Industry Primary | | 0.013 (0.011) | -0.004 (0.003) | -0.018 (0.012) |
| Industry Secondary | | 0.003 (0.041) | 0.000 (0.002) | 0.004 (0.042) |
| Industry Energy | | 0.001 (0.001) | 0.002 (0.003) | -0.001 (0.001) |
| Industry Construction | | 0.000 (0.000) | 0.000 (0.000) | 0.001 (0.006) |
| Industry Business service | | 0.060* (0.034) | -0.007 (0.007) | -0.044 (0.039) |
| Industry Public service | | -0.008 (0.010) | -0.006 (0.013) | -0.006 (0.014) |
| Primary Education | | -0.008 (0.008) | 0.006 (0.008) | 0.008 (0.010) |
| Secondary Education | | 0.000 (0.000) | -0.001 (0.023) | -0.000 (0.009) |
| Tertiary Education | | -0.048*** (0.015) | -0.107*** (0.033) | 0.048*** (0.015) |
| ISCO1 | | 0.002 (0.004) | -0.006 (0.013) | -0.002 (0.004) |
| ISCO2 | | -0.147 (0.142) | -0.218 (0.218) | 0.149 (0.149) |
| ISCO3 | | 0.014 (0.017) | -0.053 (0.042) | -0.022 (0.018) |

| VARIABLES | Overall | Endowments | Coefficients | Interaction |
|------------------------|----------------------|----------------------|--------------------|--------------------|
| ISCO4 | | -0.001 (0.004) | -0.010 (0.033) | -0.001 (0.004) |
| ISCO5 | | -0.008 (0.028) | -0.030 (0.037) | -0.023 (0.029) |
| ISCO6 | | 0.000 (0.000) | -0.003* (0.002) | -0.004* (0.002) |
| ISCO7 | | -0.004 (0.026) | -0.003 (0.005) | -0.019 (0.028) |
| ISCO8 | | -0.011 (0.023) | -0.002 (0.004) | -0.013 (0.024) |
| ISCO9 | | -0.007 (0.047) | -0.071 (0.056) | -0.063 (0.050) |
| Northern Estonia | | -0.001 (0.012) | 0.008 (0.044) | 0.003 (0.017) |
| Central Estonia | | 0.000 (0.000) | 0.006 (0.011) | -0.001 (0.002) |
| North Eastern Estonia | | -0.001 (0.002) | -0.026* (0.013) | 0.006 (0.004) |
| Western Estonia | | 0.003 (0.006) | 0.007 (0.014) | -0.003 (0.006) |
| Southern Estonia | | 0.006 (0.004) | -0.014 (0.031) | 0.002 (0.005) |
| Trade Union Membership | | -0.031*** (0.010) | -0.002 (0.034) | 0.002 (0.031) |
| Estonian | | -0.011 (0.010) | -0.093 (0.070) | 0.016 (0.012) |
| Fulltime Work | | 0.015*** (0.005) | 0.242* (0.131) | 0.007 (0.004) |
| Group 1: public = 0 | 1.650*** (0.022) | | | |
| Group 2: public = 1 | 1.740*** (0.025) | | | |
| Difference | -0.089*** (0.033) | | | |
| Endowments | -0.107* (0.060) | | | |
| Coefficients | -0.035 (0.060) | | | |
| Interaction | 0.053 (0.078) | | | |
| Constant | | | 0.227 (0.578) | |
| Observations | 4,368 | 4,368 | 4,368 | 4,368 |

Note: Reported are the parameter estimates from the regressions on the log hourly net wage.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Source: Authors' calculations based on Estonian LFS data.

Oaxaca-Blinder decomposition results complement and extend our previous Mincer regression findings. While the Mincer models identified a public sector wage premium that diminished when controlling for various variables, the decomposition analysis clarifies that this premium primarily comes from differences in individual characteristics rather than from sector-specific wage-setting practices. The significant endowment effects for tenure, tertiary education, trade union membership, and full-time work status correspond to the significant coefficients for these variables in the Mincer regression, highlighting their importance as determinants of wage levels in the Estonian labor market. However, the decomposition reveals that these factors contribute differently to the public-private wage gap, with some variables like tenure favouring the private sector despite the overall public sector premium.

4.3. Quantile regression

Based on Mincer regression and Oaxaca-Blinder decomposition analyses, this thesis now uses quantile regression to examine how the public-private wage differential varies across different levels of wage distribution. While previous analyses focused on average effects, quantile regression allows us to investigate whether these effects differ for low-paid versus high-paid workers. Table 8 presents the results at five key quantiles 10th, 25th, 50th, 75th and 90th in the wage distribution.

The public sector tends to increase wages for low-income earners, but there is a certain inhibitory effect among high-income groups, as public sector wages are slightly higher at the 25th quantile and significantly lower than those in the private sector at the 90th quantile. The public-private wage differential is negative for the higher quantiles, which means that working in the public sector increases the wages of the low-paid workers and decreases the wages of high-paid workers, consistent with (Leping, 2005). Besides, the gain of the low-wage earners and the gain of the high-wage earners are larger than in Leping (2005). Unt et al., (2021) studied the gender wage gap in Estonia and found that there is a significant difference in the size of the wage distribution. The gender wage gap is significantly present throughout the entire wage distribution, and is particularly prominent in the 75th quantile, indicating that women not only have lower overall wage levels but also face greater disadvantages in high-income groups, reflecting a 'glass ceiling'. Meriküll & Tverdostup (2023) found that unexplained gender wage gaps persist, and as of 2018, Estonia's gender wage gap remains the largest in the region and even in the European Union. With an observed upward trend in the low quantiles 10th and 25th and a downward tendency in the high quantiles 75th and 90th, tenure is especially relevant for those with low incomes.

The pattern for the age variable is similar. In high-income groups, skill depreciation or promotion barriers may exist, and age and tenure may not always translate into compensation increases.

Primary and secondary education have a significantly negative impact on most quantiles of educational variables, particularly in the medium and low-income groups, while the higher level of tertiary education is used as a base level. This suggests that the less education a person has, the less favorably they will be treated in wages. White collar workers can explain wage differences significantly, especially in high quantiles. The coefficients of ISCO 1-3, which are high-skilled white-collar, are relatively high at the 90th quantile, indicating that the higher the occupational level, the greater the wage gap it brings. Industry differences are also quite evident, with some industries, such as business services, showing higher wage levels across multiple percentiles, while the overall return of the public service industry is relatively low. The energy industry is significantly negative in the 10th and 90th percentiles, indicating the risk of wage polarization in this industry. Besides, there are clear disparities between industries, with the energy industry and public service industry yielding relatively low wages while other industries, such as the secondary sector and business services industry, display higher wages throughout several quantiles.

Across all quantiles, Northern Estonia shows significant wage advantages. The disparity in regional economic development is especially observable among high-income groups, as evidenced by the relative advantages that Central and Western Estonia exhibit in high quantiles. Union membership has a good impact on protecting lower-class workers, as seen by the fact that it mostly affects middle- and low-income groups when it comes to increased wages. A policy expanding union coverage in the private sector may effectively narrow the wage gap between both sectors (Ma, 2024). In all quantiles, but particularly in the 90th quantile, full-time employment exhibits both economically and statistically significant effects.

Table 8 Quantile regression

| VARIABLES | q10 | q25 | q50 | q75 | q90 |
|---------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Public sector | 0.052 (0.035) | 0.036* (0.019) | -0.039 (0.027) | 0.002 (0.055) | -0.157* (0.088) |
| Female | -0.224*** (0.027) | -0.197*** (0.018) | -0.229*** (0.024) | -0.307*** (0.055) | -0.268*** (0.100) |
| Age | 0.022*** (0.006) | 0.002 (0.004) | -0.001 (0.009) | -0.043*** (0.014) | 0.018 (0.014) |
| Squared Age | -0.000*** | -0.000* | -0.000 | 0.000** | -0.000 |

| VARIABLES | q10 | q25 | q50 | q75 | q90 |
|---------------------------|-----------|-----------|-----------|-----------|-----------|
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Tenure | 0.013*** | 0.018*** | 0.005 | -0.101*** | -0.127*** |
| | (0.004) | (0.002) | (0.004) | (0.014) | (0.014) |
| Squared Tenure | -0.000 | -0.000*** | 0.000 | 0.002*** | 0.002*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Industry Primary | -0.089 | 0.085 | -0.019 | -0.076 | -0.001 |
| | (0.110) | (0.085) | (0.080) | (0.223) | (0.341) |
| Industry Secondary | 0.116** | 0.138*** | 0.042 | 0.050 | 0.139 |
| | (0.058) | (0.049) | (0.038) | (0.085) | (0.232) |
| Industry Energy | -0.390** | -0.110 | -0.023 | -0.232 | -0.701** |
| | (0.182) | (0.264) | (0.099) | (0.231) | (0.287) |
| Industry Construction | 0.101 | 0.090 | 0.052 | 0.164 | -0.265 |
| | (0.107) | (0.061) | (0.096) | (0.185) | (0.164) |
| Industry Business service | 0.054 | 0.090*** | 0.073* | 0.137* | 0.062 |
| | (0.061) | (0.027) | (0.038) | (0.082) | (0.097) |
| Industry Public service | -0.041 | -0.046 | -0.067* | -0.109 | -0.101 |
| | (0.040) | (0.033) | (0.036) | (0.099) | (0.157) |
| Primary Education | -0.284*** | -0.259*** | -0.285*** | -0.060 | 0.181 |
| | (0.068) | (0.044) | (0.049) | (0.116) | (0.201) |
| Secondary Education | -0.131*** | -0.135*** | -0.183*** | -0.005 | -0.060 |
| | (0.039) | (0.029) | (0.030) | (0.046) | (0.126) |
| ISCO1 | 0.183*** | 0.330*** | 0.423*** | 0.483*** | 0.786*** |
| | (0.063) | (0.054) | (0.050) | (0.176) | (0.275) |
| ISCO2 | 0.351*** | 0.493*** | 0.526*** | 0.664*** | 0.545*** |
| | (0.049) | (0.036) | (0.046) | (0.104) | (0.129) |
| ISCO3 | 0.235*** | 0.285*** | 0.390*** | 0.412*** | 0.298* |
| | (0.060) | (0.038) | (0.049) | (0.112) | (0.174) |
| ISCO4 | 0.055 | 0.145*** | 0.216*** | 0.297*** | 0.118 |
| | (0.052) | (0.049) | (0.052) | (0.075) | (0.131) |
| ISCO5 | -0.032 | 0.071*** | 0.006 | 0.223* | -0.022 |
| | (0.067) | (0.024) | (0.052) | (0.120) | (0.136) |
| ISCO6 | -0.314 | 0.063 | 0.061 | 0.388 | 0.160 |
| | (0.441) | (0.148) | (0.151) | (0.321) | (0.354) |
| ISCO7 | -0.018 | 0.078 | 0.149* | 0.336* | 0.532** |
| | (0.066) | (0.056) | (0.078) | (0.188) | (0.252) |
| ISCO8 | 0.083 | 0.052 | 0.034 | -0.052 | -0.154 |
| | (0.062) | (0.062) | (0.053) | (0.111) | (0.228) |
| Northern Estonia | 0.197*** | 0.216*** | 0.284*** | 0.182*** | 0.129* |
| | (0.044) | (0.031) | (0.029) | (0.069) | (0.071) |
| Central Estonia | 0.105** | 0.105* | 0.153*** | 0.236** | 0.325** |
| | (0.041) | (0.055) | (0.048) | (0.100) | (0.162) |
| North Eastern Estonia | 0.086 | 0.081* | 0.097** | 0.067 | -0.025 |

| VARIABLES | q10 | q25 | q50 | q75 | q90 |
|------------------------|----------|----------|----------|----------|----------|
| | (0.071) | (0.048) | (0.049) | (0.104) | (0.156) |
| Western Estonia | 0.022 | 0.069* | 0.098** | 0.094 | 0.336** |
| | (0.053) | (0.037) | (0.045) | (0.138) | (0.170) |
| Trade Union Membership | 0.179** | 0.169*** | 0.171*** | 0.236*** | 0.245 |
| | (0.085) | (0.057) | (0.034) | (0.055) | (0.237) |
| Estonian | 0.067* | 0.069*** | 0.112*** | 0.003 | -0.080 |
| | (0.037) | (0.020) | (0.030) | (0.074) | (0.129) |
| Fulltime Work | 0.690*** | 0.512*** | 0.506*** | 0.670*** | 1.036*** |
| | (0.145) | (0.038) | (0.038) | (0.063) | (0.134) |
| Constant | -0.423** | 0.293** | 0.842*** | 3.486*** | 2.910*** |
| | (0.194) | (0.120) | (0.235) | (0.314) | (0.312) |
| Observations | 4,368 | 4,368 | 4,368 | 4,368 | 4,368 |

Note: Reported are the parameter estimates from the regressions on the log hourly net wage.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Source: Authors' calculations based on Estonian LFS data.

The findings from Mincer regression and Oaxaca-Blinder decomposition are expanded by quantile regression analysis. Quantile regression showed significant wage distribution heterogeneity, despite Mincer regression's finding that the public sector's overall premium vanished after adjusting for individual characteristics and decomposition analysis's finding that the public-private wage gap was primarily due to individual characteristics. In Estonia, the public sector appears to operate on a wage compression paradigm, which puts an upper limit on the wages of high income while favoring low-income workers in comparison to those in the private sector.

Analyzing the average effect will overlook the heterogeneity effects in wage distribution, according to the findings of our research on the influence of gender, education, occupation, industry, and workplace. These findings have important policy implications for Estonia's wage inequality problem. Education and skill development may be the main goals of policies aimed at low-income workers, particularly for those employed except in Northern Estonia. Gender inequality problems also need to be considered.

5. Conclusion

The findings on the main factors of the wage disparity between the public and private sectors can be summarized as follows. Compared to the private sector, women in the public sector typically perform better, but glass ceilings and sticky flooring persist in both sectors. The public sector often provides more wage equality, but at the same time, may also limit

promotion opportunities. High-skilled workers usually have higher earnings in the private sector, while low-skilled workers often receive wage premiums in the public sector. The influence of education and experience varies greatly across the wage distribution, those with higher wages tend to have higher education and higher skills. Macroeconomic environment has an impact on the difference between public and private wages, and there is evidence that these differences frequently exhibit countercyclical patterns. Wage differences are impacted by the presence and reach of trade unions, particularly in the public sector. In addition, public sector employment may help alleviate some of the disadvantages faced by immigrant workers, but the issue is that the public sector is probably stricter in terms of wage requirements. These findings help deepen the understanding of the gap between the public and private sectors and are also helpful in conducting empirical analysis on the wage gap between the public and private sectors in Estonia based on different influencing factors.

This thesis mainly aims to answer three primary questions: Is there a significant wage gap between the public and private sectors? To what extent can this gap be explained by observable individual characteristics such as age, gender, education, etc? How about the heterogeneity of the impact of various factors between the public and private wage gap at different wage levels? Using data from the Estonian Labour Force Survey (2010-2020) and three methods of regression analysis, Mincer regression, Oaxaca-Blinder decomposition and quantile regression, the answers are found.

Regarding the first question, this thesis found that there is indeed a certain wage gap between the public and private sectors in Estonia. Mincer regression analysis shows that public sector employees exhibit wage advantages when other factors are not controlled. However, after controlling for individual characteristics, this wage gap became statistically insignificant, indicating that the original wage gap was mainly due to differences in employee characteristics rather than the sector itself. For the second issue, the Oaxaca-Blinder decomposition results further reveal the specific sources of wage differences. The analysis shows that the observable differences in individual characteristics between two sectors (endowment effect) are the main factor explaining the wage gap, rather than the coefficient effect. Specifically, compared to the private sector, the public sector has a fairer workplace for women, and employees in the public sector are higher educated, higher skilled and more with union membership, which has a positive impact on public sector wages. In the meanwhile, the private sector benefits from a higher proportion of longer working years and full-time workers. Quantile regression analysis provides important insights for the research question on the heterogeneity of various salary levels that can be overlooked. The public

sector in Estonia uses a wage compression model, giving low-income workers (the 25th quantile) wage premiums while penalising high-income workers (the 90th quantile) with wage penalties. Besides, the gain of the low-wage earners and the gain of the high-wage earners are larger than in Leping (2005).

These results have important policy implications for Estonia's wage gap problem between the public and private sectors. Specific education and skill-building initiatives for low-paid workers can contribute to closing the wage gap as a whole. Besides, removing the obstacles that women face when applying for high-paying jobs is crucial to closing the gender wage gap. Furthermore, reducing the economic disparity between northern Estonia and other regions ought to be the main goal of regional development plans. These policy measures improve wage differences caused by individual characteristics and structural factors, thereby alleviating the wage gap between the public and private sectors more systematically.

This thesis acknowledges several limitations. Neither the effect of wage inequality on the intersection of labor mobility nor the influence of employer conduct or recruitment preferences on wage disparities has been investigated. The time range from 2010 to 2020 excludes significant macroeconomic environment changes like the Great Recession and COVID-19 to examine the cycle of relative economic stability.

List of references

- Aavik, K., Ubakivi-Hadachi, P., Raudsepp, M., & Roosalu, T. (2024). The gender pay gap—What's the problem represented to be? Analyzing the discourses of Estonian employers, employees, and state officials on pay equality. *Gender, Work & Organization*, 31(1), 171–191. <https://doi.org/10.1111/gwao.13061>
- Abdallah, C., Coady, D., & Jirasavetakul, L.-B. F. (2023). Public-Private Wage Differentials and Interactions Across Countries and Time. *IMF Working Papers*, 2023(064). <https://doi.org/10.5089/9798400236853.001.A001>
- Afonso, A., & Gomes, P. (2014). Interactions between private and public sector wages. *Journal of Macroeconomics*, 39, 97–112. <https://doi.org/10.1016/j.jmacro.2013.12.003>
- Albæk, K., Larsen, M., & Thomsen, L. S. (2017). Segregation and gender wage gaps in the private and the public sectors: An analysis of Danish linked employer–employee data, 2002–2012. *Empirical Economics*, 53(2), 779–802. <https://doi.org/10.1007/s00181-016-1132-2>
- Ansah, A., & Mueller, R. E. (2021). Public and Private Sector Earnings of Immigrants and the Canadian-Born: Evidence from the Labour Force Survey. *Journal of International Migration and Integration*, 22(4), 1403–1429. <https://doi.org/10.1007/s12134-021-00811-7>
- Barón, J. D., & Cobb-Clark, D. A. (2010). Occupational Segregation and the Gender Wage Gap in Private- and Public-Sector Employment: A Distributional Analysis. *Economic Record*, 86(273), 227–246. <https://doi.org/10.1111/j.1475-4932.2009.00600.x>
- Berson, C. (2016). Private Versus Public Sector Wage Gap: Does Origin Matter? *Metroeconomica*, 67(4), 717–741. <https://doi.org/10.1111/meca.12118>

Blanchflower, D. G., & Bryson, A. (2010). The Wage Impact of Trade Unions in the UK Public and Private Sectors. *Economica*, 77(305), 92–109.

<https://doi.org/10.1111/j.1468-0335.2008.00726.x>

Bonaccolto-Töpfer, M., Castagnetti, C., & Prümer, S. (2022). Understanding the public-private sector wage gap in Germany: New evidence from a Fixed Effects quantile Approach*. *Economic Modelling*, 116.

<https://doi.org/10.1016/j.econmod.2022.106037>

Cai, L., & Liu, A. Y. C. (2011). Public–Private Sector Wage Gap in Australia: Variation along the Distribution. *British Journal of Industrial Relations*, 49(2), 362–390.

<https://doi.org/10.1111/j.1467-8543.2009.00773.x>

Christofides, L. N., & Pashardes, P. (2002). Self/paid-employment, public/private sector selection, and wage differentials. *LABOUR ECONOMICS*, 9(6), 737–762.

[https://doi.org/10.1016/S0927-5371\(02\)00103-3](https://doi.org/10.1016/S0927-5371(02)00103-3)

Christofides, L. N., Polycarpou, A., & Vrachimis, K. (2013). Gender wage gaps, ‘sticky floors’ and ‘glass ceilings’ in Europe. *Labour Economics*, 21, 86–102.

<https://doi.org/10.1016/j.labeco.2013.01.003>

Depalo, D., Giordano, R., & Papapetrou, E. (2015). Public-private wage differentials in euro-area countries: Evidence from quantile decomposition analysis. *EMPIRICAL ECONOMICS*, 49(3), 985–1015. <https://doi.org/10.1007/s00181-014-0900-0>

Garcia-Louzao, J., & Jonuškaitė, K. (2025). The public-private sector wage gap in Lithuania: Evidence from social security data. *Baltic Journal of Economics*, 25(1), 72–87.

<https://doi.org/10.1080/1406099X.2025.2475593>

Ghignoni, E., & Pastore, F. (2023). The gender wage gap in Egypt: Public versus private sector. *International Journal of Manpower*, 44(8), 1511–1534.

<https://doi.org/10.1108/IJM-11-2022-0526>

- Gregory, R. G., & Borland, J. (1999). Chapter 53 Recent developments in public sector labor markets. In *Handbook of Labor Economics* (Vol. 3, pp. 3573–3630). Elsevier.
[https://doi.org/10.1016/S1573-4463\(99\)30044-4](https://doi.org/10.1016/S1573-4463(99)30044-4)
- Lamo, A., Pérez, J. J., & Schuknecht, L. (2012). Public or Private Sector Wage Leadership? An International Perspective. *The Scandinavian Journal of Economics*, 114(1), 228–244. <https://doi.org/10.1111/j.1467-9442.2011.01665.x>
- Leping, K.-O. (2005). Public-Private Sector Wage Differential in Estonia: Evidence from Quantile Regression. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.868487>
- Leping, K.-O. (2006). Evolution of the public-private sector wage differential during transition in Estonia. *Post-Communist Economies*, 18(4), 419–436. Scopus.
<https://doi.org/10.1080/14631370601008548>
- Li, M., & Zhang, F. (2022). *The wage structure and gap between public and private sectors: An empirical study in urban China*.
<https://www.tandfonline.com/doi/full/10.1080/1331677X.2022.2106276>
- Lucifora, C., & Meurs, D. (2006). The public sector pay gap in France, Great Britain and Italy. *REVIEW OF INCOME AND WEALTH*, 1, 43–59.
- Ma, X. (2024). Union membership and the wage gap between the public and private sectors: Evidence from China. *Journal for Labour Market Research*, 58(1), 3.
<https://doi.org/10.1186/s12651-024-00361-2>
- Maczulskij, T. (2013). Public-private sector wage differentials and the business cycle. *Economic Systems*, 37(2), 284–301. Scopus.
<https://doi.org/10.1016/j.ecosys.2012.10.002>
- Masso, J., & Espenberg, K. (2013). *Chapter 3: Early application of fiscal austerity measures in the Baltic states*. <https://www.elgaronline.com/edcollchap-0a/book/9781781955352/book-part-9781781955352-8.xml>

- Melly, B. (2005). Public-private sector wage differentials in Germany: Evidence from quantile regression. *EMPIRICAL ECONOMICS*, 30(2), 505–520.
<https://doi.org/10.1007/s00181-005-0251-y>
- Meriküll, J., & Tverdostup, M. (2023). The gap that survived the transition: The gender wage gap in Estonia over three decades. *Economic Systems*, 47(3), 101127.
<https://doi.org/10.1016/j.ecosys.2023.101127>
- Michael, M., & Christofides, L. N. (2020). The impact of austerity measures on the public—Private sector wage gap in Europe. *Labour Economics*, 63.
<https://doi.org/10.1016/j.labeco.2020.101796>
- Mincer, J. (1974). *Schooling, Experience, and Earnings*. *Human Behavior & Social Institutions No. 2*. National Bureau of Economic Research, Inc.
- Moreno-Mencía, P., Fernández-Sainz, A., & Rodríguez-Poo, J. M. (2022). The gender wage gap in the public and private sectors: The Spanish experience. *European Journal of Women's Studies*, 29(1), 72–91. <https://doi.org/10.1177/1350506820979023>
- Morikawa, M. (2016). A comparison of the wage structure between the public and private sectors in Japan. *Journal of the Japanese and International Economies*, 39, 73–90.
<https://doi.org/10.1016/j.jjie.2016.01.004>
- Nikolic, J., Rubil, I., & Tomić, I. (2017). Pre-crisis reforms, austerity measures and the public-private wage gap in two emerging economies. *Economic Systems*, 41(2), 248–265. <https://doi.org/10.1016/j.ecosys.2016.06.001>
- OECD. (2024). *OECD Economic Surveys: Estonia 2024* (Vol. 2024). OECD Publishing.
<https://doi.org/10.1787/33e6beee-en>
- Owusu-Afriyie, J., Baffour, P. T., & Baah-Boateng, W. (2023). Estimating public and private sectors' union wage effects in Ghana: Is there a disparity? *International Journal of Social Economics*, 51(9), 1109–1122. <https://doi.org/10.1108/IJSE-01-2023-0045>

- Perry, J. L., & Rainey, H. G. (1988). The Public-Private Distinction in Organization Theory: A Critique and Research Strategy. *The Academy of Management Review*, 13(2), 182–201. <https://doi.org/10.2307/258571>
- Peters, E., & Melzer, S. M. (2022). Immigrant–Native Wage Gaps at Work: How the Public and Private Sectors Shape Relational Inequality Processes. *Work and Occupations*, 49(1), 79–129. <https://doi.org/10.1177/07308884211060765>
- Rainey, H. G., & Bozeman, B. (2000). Comparing Public and Private Organizations: Empirical Research and the Power of the A Priori. *Journal of Public Administration Research and Theory*, 10(2), 447–470. <https://doi.org/10.1093/oxfordjournals.jpart.a024276>
- Rattsø, J., & Stokke, H. E. (2019). Identification of the private-public wage gap. *Labour Economics*, 59, 153–163. <https://doi.org/10.1016/j.labeco.2019.04.006>
- San, S., & Polat, O. (2012). Estimation of Public-Private Wage Differentials in Turkey with Sample Correction. *Developing Economies*, 50(3), 285–298. Scopus. <https://doi.org/10.1111/j.1746-1049.2012.00172.x>
- Sanders C., & Taber C. (2012). Life-Cycle Wage Growth and Heterogeneous Human Capital. *Annual Review of Economics*, 4(Volume 4, 2012), 399–425. <https://doi.org/10.1146/annurev-economics-080511-111011>
- Sławińska, K. (2021). Public–private sector wage gap in a group of European countries: An empirical perspective. *Empirical Economics: Journal of the Institute for Advanced Studies, Vienna, Austria*, 60(4), 1747–1775. <https://doi.org/10.1007/s00181-020-01841-3>
- Smith, S. P. (1976). Pay Differentials between Federal Government and Private Sector Workers. *ILR Review*, 29(2), 179–197. <https://doi.org/10.1177/001979397602900201>

- Stritch, J. M., & Villadsen, A. R. (2018). The gender wage gap and the moderating effect of education in public and private sector employment. *Public Administration*, 96(4), 690–706. <https://doi.org/10.1111/padm.12533>
- Unt, M., Rokicka, M., Täht, K., & Roosalu, T. (2021). “Glass Ceiling” and “Sticky Floor” in Estonian Public and Private Sectors. In T. Karabchuk, K. Kumo, K. Gatskova, & E. Skoglund (Eds.), *Gendering Post-Soviet Space: Demography, Labor Market and Values in Empirical Research* (pp. 195–209). Springer. https://doi.org/10.1007/978-981-15-9358-1_9
- Vilerts, K. (2018). The public-private sector wage gap in Latvia. *Baltic Journal of Economics*, 18(1), 25–50. <https://doi.org/10.1080/1406099X.2018.1457356>
- Wahlberg, R. (2010). The gender wage gap across the wage distribution in the private and public sectors in Sweden. *Applied Economics Letters*, 17(15), 1465–1468. <https://doi.org/10.1080/13504850903035915>

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| ISCO5-White Collar Low Skilled | 0.128 | 0.131 | 0.129 | 0.129 | 0.132 | 0.132 | 0.129 | 0.120 | 0.125 | 0.125 | 0.120 | 0.127 |
| ISCO6-Blue Collar High Skilled | 0.033 | 0.037 | 0.035 | 0.034 | 0.030 | 0.029 | 0.027 | 0.022 | 0.019 | 0.018 | 0.018 | 0.026 |
| ISCO7-Blue Collar High Skilled | 0.163 | 0.201 | 0.195 | 0.184 | 0.191 | 0.189 | 0.180 | 0.169 | 0.160 | 0.155 | 0.155 | 0.175 |
| ISCO8-Blue Collar Low Skilled | 0.204 | 0.187 | 0.176 | 0.184 | 0.170 | 0.162 | 0.172 | 0.162 | 0.149 | 0.155 | 0.145 | 0.167 |
| ISCO9-Blue Collar Low Skilled | 0.101 | 0.098 | 0.091 | 0.096 | 0.090 | 0.090 | 0.090 | 0.100 | 0.092 | 0.092 | 0.090 | 0.093 |
| Workplace-Northern Estonia | 0.394 | 0.413 | 0.437 | 0.442 | 0.426 | 0.428 | 0.432 | 0.464 | 0.667 | 0.681 | 0.700 | 0.500 |
| Workplace-Central Estonia | 0.131 | 0.132 | 0.124 | 0.122 | 0.140 | 0.144 | 0.125 | 0.101 | 0.133 | 0.127 | 0.123 | 0.127 |
| Workplace-NorthEastern Estonia | 0.066 | 0.070 | 0.073 | 0.073 | 0.071 | 0.068 | 0.064 | 0.074 | 0.102 | 0.106 | 0.095 | 0.078 |
| Workplace-Western Estonia | 0.143 | 0.132 | 0.136 | 0.135 | 0.117 | 0.110 | 0.118 | 0.111 | 0.054 | 0.044 | 0.042 | 0.103 |
| Workplace-Southern Estonia | 0.266 | 0.254 | 0.229 | 0.228 | 0.246 | 0.250 | 0.261 | 0.250 | 0.044 | 0.043 | 0.040 | 0.192 |
| Trade Union Membership | 0.027 | 0.023 | 0.023 | 0.023 | 0.024 | 0.020 | 0.024 | 0.022 | 0.031 | 0.026 | 0.026 | 0.024 |
| Fulltime work | 0.994 | 0.994 | 0.996 | 0.994 | 0.990 | 0.975 | 0.935 | 0.931 | 0.949 | 0.948 | 0.972 | 0.966 |
| Estonian | 0.741 | 0.745 | 0.746 | 0.735 | 0.751 | 0.750 | 0.760 | 0.746 | 0.740 | 0.717 | 0.717 | 0.740 |

Source: Authors' calculations based on Estonian LFS data.

Table 2 The difference between the public and private sector workforce

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Public sector work | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Ln(Hourly Netwage) | 0.092 | 0.060 | 0.007 | 0.002 | -0.007 | 0.019 | 0.039 | 0.020 | 0.069 | 0.077 | 0.088 | 0.061 |
| Female | 0.258 | 0.262 | 0.256 | 0.240 | 0.249 | 0.245 | 0.258 | 0.263 | 0.254 | 0.257 | 0.250 | 0.254 |
| Male | -0.258 | -0.262 | -0.256 | -0.240 | -0.249 | -0.245 | -0.258 | -0.263 | -0.254 | -0.257 | -0.250 | -0.254 |
| Age | 4.146 | 4.428 | 4.339 | 3.973 | 3.637 | 3.564 | 3.938 | 3.414 | 3.266 | 3.178 | 2.965 | 3.626 |
| Squared Age | 351.22 | 376.81 | 379.08 | 350.36 | 317.70 | 320.36 | 344.45 | 297.76 | 285.24 | 286.46 | 271.24 | 318.46 |
| Tenure | 8 | 2 | 5 | 0 | 2 | 9 | 5 | 2 | 8 | 8 | 0 | 9 |
| Squared Tenure | 4.839 | 4.600 | 4.119 | 4.009 | 3.670 | 3.493 | 4.132 | 3.789 | 3.280 | 3.658 | 3.077 | 4.138 |
| Industry-Tenure | 141.18 | 147.09 | 146.34 | 146.22 | 135.10 | 137.49 | 177.17 | 174.30 | 157.02 | 181.28 | 154.56 | 157.79 |
| Industry-Primary | 2 | 7 | 5 | 1 | 5 | 1 | 1 | 6 | 9 | 9 | 3 | 5 |
| Industry-Secondary | -0.051 | -0.063 | -0.058 | -0.058 | -0.061 | -0.049 | -0.053 | -0.045 | -0.029 | -0.032 | -0.036 | -0.047 |
| Industry-Energy | -0.227 | -0.240 | -0.227 | -0.228 | -0.222 | -0.224 | -0.225 | -0.218 | -0.222 | -0.216 | -0.220 | -0.223 |
| Industry-Construction | 0.005 | 0.005 | 0.004 | 0.005 | 0.004 | 0.005 | 0.007 | 0.010 | 0.006 | 0.002 | 0.000 | 0.005 |
| Industry-Business service | -0.115 | -0.125 | -0.119 | -0.117 | -0.125 | -0.127 | -0.123 | -0.113 | -0.109 | -0.108 | -0.118 | -0.117 |
| Industry-Public service | -0.298 | -0.273 | -0.279 | -0.289 | -0.283 | -0.281 | -0.292 | -0.292 | -0.305 | -0.317 | -0.305 | -0.294 |
| Education-Primary | 0.193 | 0.188 | 0.174 | 0.186 | 0.203 | 0.201 | 0.188 | 0.172 | 0.142 | 0.158 | 0.175 | 0.178 |
| Education-Secondary | -0.100 | -0.106 | -0.094 | -0.066 | -0.066 | -0.076 | -0.069 | -0.069 | -0.075 | -0.061 | -0.059 | -0.074 |
| Education-Tertiary | -0.160 | -0.172 | -0.171 | -0.195 | -0.216 | -0.222 | -0.230 | -0.220 | -0.198 | -0.209 | -0.221 | -0.202 |
| ISCO1-White Collar High Skilled | 0.260 | 0.278 | 0.265 | 0.260 | 0.283 | 0.297 | 0.299 | 0.288 | 0.273 | 0.270 | 0.280 | 0.277 |
| ISCO2-White Collar High Skilled | -0.020 | 0.005 | -0.008 | -0.014 | -0.032 | -0.050 | -0.041 | -0.044 | -0.056 | -0.031 | -0.028 | -0.030 |
| ISCO3-White Collar High Skilled | 0.277 | 0.257 | 0.255 | 0.235 | 0.242 | 0.276 | 0.281 | 0.259 | 0.268 | 0.264 | 0.271 | 0.262 |
| ISCO4-White Collar Low Skilled | 0.046 | 0.055 | 0.036 | 0.040 | 0.054 | 0.051 | 0.056 | 0.047 | 0.035 | 0.024 | 0.020 | 0.040 |
| ISCO4-White Collar Low Skilled | 0.001 | 0.019 | 0.012 | 0.019 | 0.012 | 0.002 | -0.006 | 0.004 | 0.003 | -0.009 | -0.017 | 0.002 |

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| ISCO5-White Collar Low Skilled | -0.011 | 0.000 | 0.023 | 0.024 | 0.028 | 0.026 | 0.021 | 0.028 | 0.023 | 0.029 | 0.024 | 0.021 |
| ISCO6-Blue Collar High Skilled | -0.027 | -0.032 | -0.030 | -0.029 | -0.023 | -0.022 | -0.021 | -0.017 | -0.014 | -0.015 | -0.016 | -0.021 |
| ISCO7-Blue Collar High Skilled | -0.125 | -0.160 | -0.162 | -0.154 | -0.159 | -0.159 | -0.154 | -0.138 | -0.133 | -0.134 | -0.139 | -0.146 |
| ISCO8-Blue Collar Low Skilled | -0.164 | -0.143 | -0.133 | -0.134 | -0.132 | -0.126 | -0.140 | -0.130 | -0.116 | -0.125 | -0.120 | -0.131 |
| ISCO9-Blue Collar Low Skilled | 0.001 | -0.013 | -0.005 | -0.001 | -0.002 | -0.012 | -0.011 | -0.023 | -0.026 | -0.020 | -0.010 | -0.011 |
| Workplace-Northern Estonia | -0.092 | -0.100 | -0.078 | -0.075 | -0.077 | -0.090 | -0.087 | -0.094 | -0.088 | -0.082 | -0.075 | -0.092 |
| Workplace-Central Estonia | 0.005 | -0.006 | -0.001 | 0.000 | -0.021 | -0.018 | -0.003 | 0.013 | 0.007 | -0.004 | -0.006 | -0.003 |
| Workplace-NorthEastern Estonia | 0.057 | 0.064 | 0.045 | 0.033 | 0.030 | 0.044 | 0.036 | 0.028 | 0.045 | 0.042 | 0.043 | 0.041 |
| Workplace-Western Estonia | 0.002 | 0.019 | 0.007 | -0.009 | 0.007 | 0.018 | 0.020 | 0.014 | 0.020 | 0.024 | 0.023 | 0.015 |
| Workplace-Southern Estonia | 0.028 | 0.021 | 0.027 | 0.052 | 0.061 | 0.046 | 0.034 | 0.039 | 0.016 | 0.019 | 0.014 | 0.039 |
| Trade Union Membership | 0.167 | 0.149 | 0.127 | 0.117 | 0.096 | 0.092 | 0.096 | 0.099 | 0.108 | 0.123 | 0.102 | 0.115 |
| Fulltime work | -0.031 | -0.011 | -0.024 | -0.015 | -0.045 | -0.022 | -0.078 | -0.038 | -0.037 | -0.030 | -0.063 | -0.035 |
| Estonian | 0.034 | 0.036 | 0.046 | 0.067 | 0.060 | 0.062 | 0.051 | 0.068 | 0.075 | 0.093 | 0.090 | 0.064 |

Note: The difference is calculated by the public sector share minus the private sector share.

Source: Authors' calculations based on Estonian LFS data.

Resume

AVALIK-ERASEKTORI PALGALÕHE EESTIS

Xiaoyin Kong

Käesolev väitekiri uurib avaliku ja erasektori palgalõhet Eestis aastatel 2010–2020, täites hiljutise uurimislünga kirjanduses, kuna antud teemat varasemalt uurinud tööd on valminud aastaid tagasi. Kasutades Eesti Tööjõu-uuringu (ETU) detailseid indiiditaseme andmeid, rakendab uuring kolme meetodit: Mincer'i palgaregressiooni, Oaxaca-Blinderi dekompositsiooni ja kvantiilregressiooni, et vastata kolmele põhiküsimusele avaliku ja erasektori palgalõhe olemasolu, seda selgitavate tegurite ja palgalõhe heterogeensuse kohta. Kirjanduse ülevaade tuvastab nelja peamist sektorite palgaerinevuste mõjutajat, need on sugu, ametiala ja oskused, makromajanduslik keskkond, ametiühingud, ning immigratsioon, mida käsitletakse magistritöö empiirilises osas regressioonianalüüsi kasutades.

Vastuseks peamisele uurimisküsimusele kinnitab analüüs palgalõhe olemasolu avaliku ja erasektori vahel Eestis. Mincer'i regressioonanalüüs näitab, et avaliku sektori töötajatel näib esialgu (ilma muid palku mõjutavaid tegureid arvestamata) olevat kõrgem palk, kuid see lõhe muutub statistiliselt ebaoluliseks pärast individuaalsete omaduste kontrollimist. See tulemus viitab sellele, et vaadeldavad palgaerinevused era- ja avaliku sektori vahel tulenevad peamiselt individuaalsetest omadustest. Oaxaca-Blinderi dekompositsioon toob täpsemalt esile palgaerinevuste allikad, ning näitab, et erinevused palku mõjutavate tegurite väärtustes (vaadeldavad erinevused individuaalsetes omadustes) selgitavad suures osas andmetes nähtavat avaliku sektori palgapreemiat, mis on kooskõlas Mincer'i palgaregressioonide hindamisel saadud tulemustega. Kvantiilregressioonide hindamine paljastab palgajaotuse olulise heterogeensuse, mis viitab palgajaotuse suhtelisele kokkusurutusele Eesti avalikus sektoris võrreldes erasektoriga. Madala sissetulekuga töötajad saavad avalikus sektoris palgalisa, samas kui kõrge sissetulekuga töötajad teenivad avalikus sektoris suhteliselt vähem.

Need tulemused omavad olulisi implikatsioone palgaebavõrdsuse vähendamisele Eestis. Uuring soovib rakendada madala sissetulekuga töötajatele suunatud sihipäraseid haridus- ja oskuste arendamise programme, kõrvaldada takistused naiste edasiliikumisel kõrgema palgaga ametikohtadele, parandada palkade läbipaistvust, edasi vähendada geograafilist lõhet Põhja-Eesti ja teiste piirkondade vahel. Nende struktuuriliste teguritega tegeledes saavad poliitikakujundajad teha tööd suurema palgavõrdsuse liikumise poole, tunnistades samal ajal avaliku ja erasektori palgamustreid mõjutavate muutujate keerulist koostoimet.

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