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## THE PUBLIC SECTOR WAGE PREMIUM AND FISCAL CONSOLIDATION IN SERBIA

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**ABSTRACT:** *Responding to a high fiscal deficit, the Serbian government introduced a set of fiscal consolidation measures at the beginning of 2015, including a 10% public sector wage cut. This paper analyses the difference in wages between the public and the private sector in Serbia and changes in the public sector wage premium after the measures were introduced. The results show that, similarly to many other countries, wages in the Serbian public sector are on average higher than in the private sector, partially due to the better labour market characteristics of public sector workers. The*

*public sector wage premium was 17.4% in 2014 and was mainly driven by higher returns to education, work experience, and occupation in this sector. In 2015 the premium dropped by 6 percentage points due to a lessening of the difference in returns between the sectors. Therefore, in addition to reducing budget expenditures, fiscal consolidation in Serbia has reduced wage inequality between these sectors.*

**KEY WORDS:** *Public-private wage gap, Fiscal consolidation, Wage decomposition, Serbia.*

**JEL CLASSIFICATION:** J31, J45, J38

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## 1. INTRODUCTION

In the majority of European countries, wages in the public sector are on average higher than wages in the private sector (European Commission 2014). This difference, i.e., the unadjusted pay gap between public and private sectors, is partly due to differences in the labour market characteristics between the sectors, since public sector workers typically have higher levels of education, longer tenure, etc. As these characteristics are valued more by the employer, the better labour market characteristics of public sector workers partly account for the difference in wages.

The use of individual micro-level data and statistical techniques allows us to control for differences in characteristics and to calculate the difference in wages between the sectors for the same job, i.e., to estimate the public sector wage premium. According to recent research by the European Commission (2014), the average EU public sector wage premium is estimated to be 3.6%.<sup>1</sup> This means that even when differences in workers' labour market characteristics are statistically controlled for, public sector wages are, on average, higher. The European Commission's research further shows that there is large variability across countries, with some countries having positive and some negative public sector wage premiums.<sup>2</sup>

In most transition countries, public sector wages were, *ceteris paribus*, lower than private sector wages at the beginning of the transition, but as the transition unfolded they reached the same level or became higher (Laušev 2014). In Serbia these trends were even more pronounced, as the distinctly negative public sector wage premium from the 1990s was replaced by a high positive premium in the 2010s (Vladisavljević et al. 2017).

The public sector wage premium has been of particular importance in recent years, when due to the economic crisis and large public debt a number of countries decided to reduce their public expenditure by implementing austerity

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<sup>1</sup> The research was based on Structure of Earnings Survey data for all EU27 countries except Sweden.

<sup>2</sup> According to the same study, the size of the public sector wage premium is negatively correlated with the size of the public sector via the monopsonic role of the state in wage formation and job security in the private sector, as higher job security in the private sector requires stronger monetary compensation in the public sector. Since the focus of this paper is on the effects of fiscal consolidation we do not discuss these factors in detail here. For further discussion see Vladisavljević et al. (2017).

(fiscal consolidation) measures. Reduction of public sector salaries was considered less harmful to the countries' general economic performance than reduction of other public expenditure items such as public investment (de Castro et al. 2013), and higher wages in the public sector were often used as an additional argument that the wage cut was justified, not only from the perspective of efficiency but also from the perspective of equity.

In Serbia in 2014 the fiscal deficit stood at 6.6% of GDP and was among the highest in Europe, which is why at the end of 2014 the government introduced a fiscal consolidation programme. The programme included a 10% reduction in public sector wages higher than RSD 25,000<sup>3</sup> (for a full-time job) as of November 2014 (Republic of Serbia 2014), thus protecting public sector workers with the lowest wages. At the same time, the 'solidarity tax' (Republic of Serbia 2013) on the highest wages (over RSD 60,000) ceased to exist to avoid a double tax increase on the highest wages. Fiscal consolidation also imposed a public sector wage freeze until the end of 2017.<sup>4</sup> The programme also cut pensions (above the minimum pension level) and announced rationalization of the number of employees.

According to a recent study (Vladislavljević 2016) that investigates wage trends in public administration and the manufacturing sector (sectors dominated by public and private ownership, respectively), the fiscal consolidation programme decreased the unadjusted wage gap between these two sectors. The unadjusted gap in wages between the sectors, which stood at 27.5%, on average, in 2014, dropped to 14.6% in 2015, and then continued to fall.

However, as mentioned before, changes in the unadjusted wage gap can be affected by changes in employment structure within the sectors. Therefore, the aim of this paper is to investigate the changes in the public sector wage premium trends in Serbia that occurred after the fiscal consolidation measures. We estimate the public sector wage premium in Serbia using Labour Force Survey (LFS) data from 2014, before the fiscal consolidation measures were implemented, and from 2015, after the measures were introduced. In order to estimate the public sector wage premium we use a Mincer-type wage equation

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<sup>3</sup> In Serbia in 2014 the minimum wage for a full-time job was around RSD 20,000, while a wage of RSD 25,000 represented the start of the second decile in the distribution of public wages, according to LFS data.

<sup>4</sup> However, at the beginning of 2016 and again in 2017, the government approved increases in public sector wages by varying amounts depending on the sector of activity.

(Mincer 1974) and the frequently used Blinder-Oaxaca decomposition (Blinder 1973; Oaxaca 1973).

The paper is structured as followed. After the introduction, in the next section we review the literature on the public sector wage premium in transition countries with a special focus on previous research for Serbia. In section three we introduce the data that will be used in this paper. The fourth section deals with descriptive evidence of employment and wage trends before and after the fiscal consolidation. In section five we present the methodology that will be used to estimate the changes in the public sector wage premium in Serbia between 2014 and 2015, and in section six we present the results of our estimates. Section seven concludes.

## **2. THE PUBLIC SECTOR WAGE PREMIUM IN TRANSITION COUNTRIES AND SERBIA**

In the developed economies, regardless of the estimation method, the public sector wage premium is usually estimated to be around zero or positive (e.g., Ghinetti 2007; Bargain & Melly 2008; Giordano et al. 2011; de Castro et al. 2013). Numerous factors contribute to the positive public sector wage premium in developed economies, such as political decisions that influence the wage-setting process in the public sector, higher trade union participation in the public sector, etc. (Giordano et al. 2011).

In countries in transition from a socialist to a market economy it was the private rather than the public sector that usually paid *ceteris paribus* higher wages at the beginning of the transition, (Laušev 2014). Adamčik and Bedi (2000) argue that one of the reasons for the lower public sector wages at the beginning of the transition was fiscal and inflationary pressure on these countries' budgets. According to Brainerd (2002), the reasons behind the higher private sector wages were lower job security and employers' desire to motivate their workers when starting new companies, so that they paid 'effective' wages. Additional factors contributing to lower wages in the public sector were privatisation of state-owned enterprises and increased migration possibilities. Both processes led to disproportionately high transitions of high-paid qualified workers from the public sector as they opted for higher wages in the private sector or abroad (Lausev 2014).

However, as the transition unfolded the wages in the public sector became equal to or even higher than those in the private sector. Laušev (2014) provides an excellent review of the papers that estimate public-private wage differences in the Eastern European economies. She reports that at the beginning of the transition the wages in transition countries' public sectors were on average 20% lower than in the private sector, while at the end of the transition the difference was not statistically significant. Furthermore, in almost all empirical studies the advantage of the private sector disappears after the economic transition. Laušev (2014) concludes that the market mechanisms that are responsible for the positive public sector wage premiums in developed economies took over as the impact of transition mechanisms started to fade.

### **The public sector wage premium in Serbia**

In one of the first papers that investigated public-private wage differences in Serbia, Jovanovic and Lokshin (2003) found a negative public sector wage premium of 9.4% for men and 4% for women, using Labour Force Survey data from 2000. According to the authors the higher wages in the private sector were due to higher non-wage benefits and higher job security in the public sector. In other words, in order to compete for workers with the public sector, the private sector had to offer higher wages to compensate for less favourable working conditions (Jovanovic and Lokshin 2003).

Krstić, Litchfield, and Reilly (2007) also use Labour Force Survey data to investigate male wage inequality in Serbia. Their results suggest that between 1995 and 2003 the negative public sector wage premium for men was reduced from 28.5% to 8%. The authors attribute this result to a decrease in overall wage inequality due to the minimum wage reform, and to formalization of the private sector, which lowered differences in job security between the sectors.

According to Laušev (2012), in the period between 2004 and 2008 the public sector wage premium went from zero to positive for workers with low education, and from negative to positive for workers with high education. The reason behind the public sector wage premium increase during the 2000s seems to be an exaggerated increase in public wages. The increase has been assessed as fiscally irresponsible, although at first motivated by "good intentions" (Arandarenko 2011).

Latest estimates, based on data from the Survey on Income and Living Conditions (SILC) from 2013, suggest a very high public sector wage premium

of 17.2% (Vladisavljević & Jovančević 2016). A recent review of public–private wage differences in Western Balkan countries (Vladisavljević et al. 2017) suggests that the level of public sector wages in Serbia differs across activity sectors. Compared to trends in OECD countries, the ratio of the average sector wage to average country wage is low in the education and health sectors and medium in public administration. Recent evidence suggests that due to better working conditions in the public sector (better job security, shorter working hours, higher levels of job satisfaction, etc.) the public sector wage premium in Serbia created a strong public–private duality in the Serbian labour market (Vladisavljević 2017). On the other hand, most jobs in the private sector are characterized by lower job security and lower wages, and a difficult transition to the primary labour market (Arandarenko 2011).

### **3. DATA**

To analyse employment and wage trends in 2014 and 2015 and to estimate the changes in the public sector wage premium we use Labour Force Survey (LFS) data. The survey, conducted on a quarterly basis by the Statistical Office of the Republic of Serbia (SORS), provides nationally and regionally representative data on the labour market in Serbia<sup>5</sup> and is the essential instrument for assessing key labour market indicators (employment rate, unemployment, and inactivity) in Serbia, as well as in the European Union (according to Eurostat). The data includes weights, calculated by the SORS, to correct the descriptive statistics and econometric estimates of the probability that a household is selected into the sample from a population of Serbian households.

The sample for each quarter consists of five rotating groups that are independent subsamples, and each subsample is representative of the whole population. The rotation panel is introduced in order to ensure comparability of the results between waves. Each of the subsamples rotates based on the 2–2–2 system, according to which each subsample is first selected into the sample for two waves, then is out of the sample for two waves, and then once again twice selected into the sample.

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<sup>5</sup> According to the SORS, the target population is “Households and persons referring to the usual population that reside in the territory of the Republic of Serbia without the Region of Kosovo and Metohia. Excluded are persons in collective households (students’ and pupils’ dormitories, homes for children and youth with disabilities, homes for socially vulnerable children, homes for pensioners, retirement nursing homes care, homes for adult disabled persons, monasteries etc.)”.

The LFS provides the only data which includes all the information necessary to analyse the public sector wage premium: monthly wages, sector of ownership, demographic and other workers' characteristics (gender, age, education, etc.), job characteristics (hours worked, occupation, sectors of activity, etc.), and regional and household identifiers. The dependent variable in the analysis is the hourly wage, calculated using the information on monthly wage and usual weekly working hours during a 'normal' week.

The sample for the analysis does not include the self-employed, as their wages are not registered in the LFS. Additionally, as a standard approach in the literature, we exclude the informally employed,<sup>6</sup> farmers, and occasional and seasonal workers, as their wages are not comparable to those of formal salary workers. We further restrict the sample by excluding persons in education, those working below 16 hours per week, those refusing to report their wages or reporting zero wages,<sup>7</sup> and those whose sector of ownership is 'other',<sup>8</sup> and by including only individuals aged 20–64. Finally, we drop the respondents who fall within the top or bottom 1% of the hourly wage distribution and whose wages would have an exaggerated influence on the regression estimations (Cameron & Trivedi 2010, p. 96).

The total sample for the analysis comprises 32,698 respondents, 17,322 working in the private sector and 15,376 working in the public sector. The dependent variable in all econometric analyses is hourly wages, calculated based on monthly wages and usual hours worked.<sup>9</sup>

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<sup>6</sup> According to the official definition given by the SORS that we also use in this paper, informal employment includes unpaid family members, persons working in unregistered businesses, and persons working in registered businesses but without formal contracts and without paying pension and social security contributions.

<sup>7</sup> In 16.4% of the cases, respondents refused to give any information about wages and in 1.9% of the cases the respondents reported zero wages.

<sup>8</sup> The main independent variable, sector of ownership, is based on the question, "What type of ownership do you work under?" and is not available in alternative datasets such as EU-SILC. Respondents answer the question by choosing from four alternatives: "Private-registered", "Private-unregistered", "Public", and "Other". In the analysis we drop "Private-unregistered" employees as they are informally employed, and "Other" as the ownership of the business does not belong to either of the groups.

<sup>9</sup> The LFS contains both usual and actual working hours. According to the LFS questionnaire, actual working hours refer to the hours worked in the observed (last) week, while wages refer to monthly income. Since the actual (i.e., weekly) working hours might be subject to weekly fluctuations, we opted to use the usual working hours to compute hourly wages.

#### **4. EMPLOYMENT AND WAGE TRENDS BEFORE AND AFTER THE FISCAL CONSOLIDATION**

##### **4.1. Employment trends**

Public sector employees in Serbia represent a large share of the total employment in the country. According to the LFS data (Table 1), public sector workers represent about one-third of total employment in Serbia, one of the highest shares in Europe (Vladisavljević et al. 2017). In 2014 the estimated number of public sector workers was 764,127 (29.9%), which decreased to 729,828 (28.3%) in 2015. At the same time the total number of workers in the private sector in Serbia increased by approximately 40,000 employees (from 1,744,477 to 1,785,324).

The weighted share of the public sector workers in the estimation sample of about 45% (Table 1) is higher than that reported in the official statistics (and in the ‘Total sample’ column in Table 1) due to the fact that many sample restrictions apply almost exclusively to workers from the private sector (self-employed, unpaid family members, informal employment, etc.). The trends of the estimation sample correspond to the trends of the total sample: the number of employees in the private sector is increasing, while the number of employees in the public sector is decreasing.

**Table 1:** Number of employed by sector of ownership in 2014 and 2015

	Total sample			Estimation sample		
	2014	2015	Change	2014	2015	Change
Total	2,559,441	2,574,159	14,718	1,167,596	1,174,476	6,880
Private sector	1,744,477	1,785,324	40,847	607,682	643,205	35,522
Public sector	764,127	729,828	-34,299	559,914	531,271	-28,643

**Source:** Author's calculation based on LFS data (weighted sub-samples).

**Notes:** Workers who state that their sector of ownership is ‘private-unregistered’ or ‘other’ are excluded from the table and the analysis of wage trends.

Table A1 in the Appendix presents basic descriptive data on private and public sector workers. Compared to the private sector, workers in the public sector are more likely to be female, married, older (and with longer working experience), and to live in urban areas, in Belgrade, and in East Serbia. They are on average better educated than workers in the private sector, with a significantly higher share of workers with tertiary education (35.2% vs. 16.7%). Educational

differences are also reflected in the occupational structure, as public sector workers are more frequently in better-paid ISCO occupation groups such as Managers (ISCO group 1), Professionals (ISCO 2), Technicians (ISCO 3) or Clerks (ISCO 4), however, they also have a higher share of workers in elementary occupations (ISCO 9). In both groups the share of part-time workers is negligible (below 2%), while the share of temporary contracts is significantly higher in the private sector (15.4% vs. 8.2% in the public sector), indicating higher job security in the public sector.

The educational and occupational structure of private sector workers has not changed over the years, indicating that new workers in the private sector come from all educational levels and occupations. However, the share of temporary workers in the private sector has increased significantly (from 15.4% to 19.3%), indicating that most new workers are employed on temporary contracts.<sup>10</sup> On the other hand, the decrease in public sector workers is mainly due to the lower number of people with two or three years of secondary education (Table A1 in Appendix), therefore on average improving the educational structure of the public sector.

#### 4.2. Wage differences between the sectors

Table 2 presents monthly and hourly wages and average usual working hours in 2014 and 2015. In 2014, hourly wages in the public sector were about 39% higher than in the private sector, as the result of both higher monthly wages (by 30.2%) and lower average working hours in the public sector (by 7.3%).

**Table 2:** Average wages and working hours by sector in 2014 and 2015

	Monthly wage (in RSD)		Working hours		Hourly wage (in RSD)		
	2014	2015	2014	2015	2014	2015	Change
Private	29,634	30,449	44.1	44.1	149.1	153.2	2.8%
Public	38,576	37,911	40.9	40.8	206.9	203.1	-1.9%
Public vs. private	30.2%	24.5%	-7.3%	-7.4%	38.8%	32.5%	6.3pp

**Source:** Author's calculation based on LFS data (weighted sub-samples).

<sup>10</sup> This is in line with changes in the Labour Law, according to which fixed-term contracts can last up to three years instead of one.

In 2015, hourly wages in the private sector grew by 2.8%, while, due to fiscal consolidation, wages in the public sector fell by –1.9%, so that the gap between the sectors decreased to 32.5%. The decrease in public sector wages is in accordance with the wage cut introduced as part of the fiscal consolidation measures. The fact that the decrease is lower than the cut (which was set at 10%) is partly the consequence of the fact that low wages are protected by the reform and partly due to changes in the structure of employment. In the next chapter we introduce econometric techniques to account for these factors.

## 5. ESTIMATION OF THE PUBLIC SECTOR WAGE DIFFERENTIAL

We estimate the public sector wage premium for 2014 and 2015 by using regression analysis and Blinder-Oaxaca decomposition (Blinder 1973; Oaxaca 1973). In order to estimate public sector wage differences we regress the log hourly wages on the public sector dummy and X-vector of other individual (gender, age, settlement, region, education) and job (working experience, occupation, part-time and temporary work) characteristics, while  $\theta$  is a vector of the unknown equation parameters to be estimated.

$$y = \ln(Y) = \alpha + \beta \text{Public Sector} + \mathbf{X}'\theta + \varepsilon_i, \quad (1)$$

Coefficient  $\beta$  in Equation (1) is then an estimate of the public sector wage premium. If we do not control for other individual and job characteristics in our regression analysis,  $\beta$  is equal to the unadjusted gap in wages between the public and private sector.

In order to perform the Blinder-Oaxaca decomposition we estimate separate equations for the public and private sector:

$$y^{Pub} = \mathbf{X}^{Pub'}\theta^{Pub} + \varepsilon^{Pub} \text{ – for the public sector} \quad (2a)$$

$$y^{Pri} = \mathbf{X}^{Pri'}\theta^{Pri} + \varepsilon^{Pri} \text{ – for the private sector} \quad (2b)$$

The difference in means between the sectors can, after transformations, be decomposed into two parts (Jann 2008):

$$\bar{y}^{Pub} - \bar{y}^{Pri} = (\bar{\mathbf{X}}^{Pub} - \bar{\mathbf{X}}^{Pri})'\hat{\theta}^* + \bar{\mathbf{X}}^{Pub'}(\hat{\theta}^{Pub} - \hat{\theta}^*) + \bar{\mathbf{X}}^{Pri'}(\hat{\theta}^* - \hat{\theta}^{Pri}) \quad (2c)$$

The first part of the right side of Equation (2c),  $(\bar{X}^{Pub} - \bar{X}^{Pri})' \hat{\theta}_k^*$ , represents the explained part (or the composition or quantity effect), which is due to differences in individual and job characteristics between the sectors, while the second part of the right side of Equation (2c),  $(\bar{X}^{Pub}'(\hat{\theta}^{Pub} - \hat{\theta}^*) + \bar{X}^{Pri}'(\hat{\theta}^* - \hat{\theta}^{Pri}))$ , represents the unexplained part of the gap, which is due to differences in returns to characteristics and to unobservable differences (Jann 2008).

It can be shown that if for the reference coefficients  $\hat{\theta}^*$  in Equation (2c) we use estimates from the pooled model in which the public sector dummy is included, i.e., Equation (1), the unexplained part of the gap is equal to the  $\beta$  coefficient from Equation (1); i.e., the unexplained part of the gap is another estimate of the public sector wage premium.

Bearing in mind the above notion, the main advantage of using Blinder-Oaxaca decomposition is that it enables us to further decompose the explained part and the unexplained part of the contribution of each of the covariates (Avlijaš et al. 2013). The explained part in fact represents a simple sum of individual differences in each of the  $k$  labour market characteristics:

$$(\bar{X}^{Pub} - \bar{X}^{Pri})' \hat{\theta}^* = (\bar{X}_1^{Pub} - \bar{X}_1^{Pri}) \hat{\theta}_1^* + (\bar{X}_2^{Pub} - \bar{X}_2^{Pri}) \hat{\theta}_2^* + \dots + (\bar{X}_k^{Pub} - \bar{X}_k^{Pri}) \hat{\theta}_k^*, \quad (2d)$$

Similarly, the unexplained part represents the sum of differences in intercepts ( $\hat{\theta}_0$ ) and differences in returns to each of the  $k$  labour market characteristics:

$$\begin{aligned} & (\bar{X}^{Pub}'(\hat{\theta}^{Pub} - \hat{\theta}^*) + \bar{X}^{Pri}'(\hat{\theta}^* - \hat{\theta}^{Pri})) \\ &= (\hat{\theta}_0^{Pub} - \hat{\theta}_0^{Pri}) + \left( \bar{X}_1^{Pub}(\hat{\theta}_1^{Pub} - \hat{\theta}_1^*) + \bar{X}_1^{Pri}(\hat{\theta}_1^* - \hat{\theta}_1^{Pri}) \right) \\ &+ \left( \bar{X}_2^{Pub}(\hat{\theta}_2^{Pub} - \hat{\theta}_2^*) + \bar{X}_2^{Pri}(\hat{\theta}_2^* - \hat{\theta}_2^{Pri}) \right) + \dots \\ &+ \left( \bar{X}_k^{Pub}(\hat{\theta}_k^{Pub} - \hat{\theta}_k^*) + \bar{X}_k^{Pri}(\hat{\theta}_k^* - \hat{\theta}_k^{Pri}) \right) \end{aligned} \quad (2e).$$

The difference between the private and public sector intercepts can be attributed to unobserved differences between the sectors, while the difference in returns to characteristics represent the ‘real’ inequality between the sectors; i.e., the fact that one sector pays for certain characteristics more or less than the other

sector.<sup>11</sup> Therefore the difference in returns indicates the differences in rewards of the labour market characteristics that lie behind the public sector wage premium.

The robustness of the results at mean is checked by using another decomposition method, John, Murphy, and Peirce (JMP) (John, Murphy, and Peirce 1991).<sup>12</sup> JMP decomposition accounts for the fact that wage distribution in sectors can be different and splits the gap into three parts: differences in observable quantities (Q), differences in observable prices (P, i.e., the estimate of the public sector wage premium), and differences in unobservable quantities and prices (U). The first two are equivalent to the Blinder-Oaxaca decomposition's explained and unexplained parts, while the last part is computed by comparing the percentiles of the wage distributions in the public and the private sector.

## **6. RESULTS**

Table A2 in the Appendix presents the estimations of wage Equation (1) separately for 2014 and 2015. The results show the expected signs of all wage determinants. For both years, wages are, *ceteris paribus*, higher for men than for women; higher for workers with higher levels of education, longer working experience, and in better-paid occupations; higher for part-time workers, compared to full-time workers; and higher for workers with permanent contracts compared to temporary workers. Also, wages are, in accordance with expectations, higher in Belgrade than in other regions, as well as for workers from urban compared to rural settlements. Finally, negative returns for age (with working experience also included in the specification) indicate lower wages for older workers with the same level of working experience.

We now turn to the main focus of our analysis, wage differences between public and private sectors. The coefficients in the first part of Table A1 indicate a positive

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<sup>11</sup> This distinction is made in many papers, many of which deal with the gender wage gap rather than the public sector wage premium (e.g., Busch and Holst 2009). This approach is a simplified version of other approaches that deal with the effects of unobservables on the public sector wage premium, which is beyond the scope of this paper (e.g., Heckman selection correction approach).

<sup>12</sup> As we use this method only for robustness checks, we do not present the method in full detail, but rather in intuitive fashion. For full details of JMP decomposition see the quoted work of the authors.

wage premium for working in the public sector for both years. As expected, due to the fiscal consolidation measures the premium is higher for 2014 than for 2015, and is estimated at 17.4% and 11.3% respectively<sup>13</sup> for these two years.

To summarize the results of both changes in the unadjusted wage gap between the sectors (presented in the Table 2) and changes in the public sector wage premium (Table A2), in Table 3 we present the Blinder-Oaxaca decomposition results (Eq. 2c). According to the decomposition, the unadjusted gap in wages can be split into two parts: 1) the explained part, which is due to differences in labour market characteristics between the sectors; and 2) the unexplained gap, which is due to the public sector wage premium.

**Table 3:** Blinder-Oaxaca decomposition, 2014 and 2015

	2014		2015	
Average log wages private sector	4.951***	(0.007)	4.975***	(0.006)
Average log wages public sector	5.274***	(0.007)	5.255***	(0.006)
Difference – Unadjusted wage gap	-0.323***	(0.010)	-0.280***	(0.009)
Explained part	-0.148***	(0.008)	-0.167***	(0.007)
Unexplained part	-0.174***	(0.009)	-0.113***	(0.008)

**Source:** Author's calculation based on LFS data (weighted sub-samples).

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

### 6.1. The unadjusted gap and public sector wage premium in 2014

The unadjusted gap between the public and private sectors in 2014 stood at 32.3%.<sup>14</sup> Almost half of this difference (about 46%; 14.8% of 32.3%) is due to the difference in labour market characteristics between workers from the public and the private sector. As mentioned before, compared to the private sector, public sector workers are more educated, have longer working experience, more often work in better-paid occupations, and have a lower share of temporary contracts (Table A1). As these characteristics are associated with higher wages (Table A2),

<sup>13</sup> The coefficient from the wage equation is approximately equal to the ceteris paribus percentage difference in wages (Cameron & Trivedi 2010).

<sup>14</sup> The difference in log wages is only approximately equal to the percentage difference. Due to this approximation the difference in log wages in Table 3 is slightly lower than the calculated percentage difference in Table 2; however, the main conclusion of lowering the difference between the sectors remains. We comment on the approximate difference to be able to simultaneously explain the unadjusted and the adjusted gap in wages and compare their values.

part of the difference in average wages can be explained by the fact that on average public sector workers have a higher value for their employers simply because of their better labour market characteristics.

Table 4 (column ‘Explained part’ for 2014) indicates that most of the wage differences between the sectors can be explained by differences in occupation (7.8%), education (5.1%), and working experience (3.1%). Additional significant contributions to the explained part are due to differences in shares of temporary contracts, part-time work, and settlement. On the other hand, the higher share of women and older workers in the public sector increases the gap between the sectors. In other words, if the share of women and age of workers in the public sector were the same as in the private, the unadjusted differences in wages would be even larger.

When we deduct the part of the gap that is due to differences in labour market characteristics from the unadjusted gap, we arrive at an estimate of the public sector wage premium. The premium represents the gap between sectors for the same job, to the extent that our data allows this comparison, which for 2014 is estimated at 17.4%. As already mentioned, if we use estimates from the pooled model for the reference coefficients in the Blinder-Oaxaca decomposition, the unexplained part of the gap equals the dummy variable for the public sector in the pooled regression (Table A2).

The column ‘Unexplained part’ in Table 4 analyses the reasons for the public sector wage premium. Similarly to the explained part, the largest part of the unexplained gap, i.e., the public sector wage premium, is due to higher returns to occupation (10.7%), education (9.7%), and working experience (7.1%) in the public sector (returns for both sectors can be found in Table A3 in the Appendix). In other words, the main reason for the public sector wage premium in Serbia is higher rewards for higher levels of education and working experience and ‘higher’ occupations.

On the other hand, negative returns to age, working in rural settlements, and temporary contract work are less pronounced in the private sector, which attenuates the level of the public sector wage premium. In other words, if the returns for these characteristics were equal, the premium would be even higher. Furthermore, although the difference in the intercepts in 2014 is not statistically significant, there is a large difference of 7.2% that is due to differences in unobservables.

**Table 4:** Blinder-Oaxaca detailed decomposition, 2014 and 2015

	Explained part				Unexplained part			
	2014		2015		2014		2015	
Gender	0.006***	(0.002)	0.005***	(0.002)	0.007	(0.008)	0.006	(0.007)
Age	0.016***	(0.004)	0.014***	(0.003)	0.114*	(0.067)	0.050	(0.052)
Settlement	-0.002***	(0.001)	-0.002***	(0.001)	0.026**	(0.011)	-0.001	(0.009)
Region	-0.000	(0.002)	0.002	(0.001)	0.014	(0.013)	-0.020*	(0.012)
Education	-0.051***	(0.004)	-0.058***	(0.004)	-0.097***	(0.027)	-0.088***	(0.025)
Working experience	-0.031***	(0.005)	-0.036***	(0.004)	-0.071**	(0.035)	-0.010	(0.027)
Occupation	-0.078***	(0.006)	-0.080***	(0.005)	-0.107***	(0.025)	-0.076***	(0.022)
Part-time	-0.002***	(0.001)	-0.000	(0.001)	0.001	(0.001)	0.000	(0.001)
Temporary contract	-0.006***	(0.001)	-0.011***	(0.001)	0.009***	(0.003)	0.007***	(0.002)
Intercept					-0.072	(0.058)	0.018	(0.050)
Total	-0.148***	(0.008)	-0.167***	(0.007)	-0.174***	(0.009)	-0.113***	(0.008)

**Source:** Author's calculation based on LFS data (weighted sub-samples).

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

## 6.2. Changes in the unadjusted gap and public sector wage premium between 2014 and 2015

The unadjusted gap had a statistically significant<sup>15</sup> decrease of 4.3 percentage points (from 32.3% to 28.0%) between 2014 and 2015. Although the explained part grew from 14.8% to 16.7% (Table 3), this growth was not significant. The increase in the share of temporary workers in the private sector (Table A1) has marginally (at the 0.1 level) increased the gap due to differences in the share of temporary workers, which grew from 0.6% to 1.1%. The increase in the share of temporary workers therefore decreased the 'quality' of the private sector workers even further, so the overall differences in the labour market characteristics between the sectors in 2015 are even stronger than in 2014. The changes in the other covariates had no significant effect on wage differences.

Due to the growth (albeit insignificant) of the explained part, the public sector wage premium (i.e., the unexplained part of the gap) decreased even more than

<sup>15</sup> The statistical significance between the coefficients is tested by comparing the 95% confidence intervals for 2014 and 2015. The coefficient decreases significantly if the lower bound of the confidence interval for 2014 is higher than the upper bound of the confidence interval for 2015.

the unadjusted gap, by 6.1 percentage points (from 17.4% to 11.3%). Detailed decomposition indicates that the decrease in the public sector wage premium is due to the decrease of sector differences in both returns and intercepts (Table 4 and Table A3). Most prominent among these is the lessening of differences in returns to working experience, whose contribution to the total premium dropped from 7.1% to the insignificant level of 1%. Additionally, the differences in returns to the other two most important contributors to the public sector wage premium – occupation and education – also lowered (albeit not significantly), from 10.7% to 7.6% and from 9.7% to 8.8%, respectively. Finally, although insignificant, the difference between intercepts also lessened (from 7.2% to –1.8%), indicating that the fiscal consolidation measures cancelled out the unobserved advantages of public sector workers.

Table A4 in Appendix compares the results of the Blinder-Oaxaca and John, Murphy, and Peirce (JMP) decompositions. The results show that the residual part of the gap in the JMP decomposition is equal to zero, indicating that there are no significant differences between the residual distributions of the private and the public sector wages. Furthermore, the JMP results confirm the results obtained by the Blinder-Oaxaca decomposition. According to JMP estimates the public sector wage premium dropped even more, by 7.6 percentage points (from 18.8% to 11.2%). Bearing in mind that the differences in residual distribution are not significant, the differences between the Blinder-Oaxaca and JMP estimates stem from using different approaches to calculate the explained and unexplained parts of the gap.

## **7. DISCUSSION OF THE RESULTS AND CONCLUSIONS**

This paper investigates the effect of fiscal consolidation measures on the size and distribution of the public sector wage premium in Serbia. The measures included a 10% cut in public sector wages and a subsequent wage freeze until the end of 2017. We investigate the effects of the measures by estimating the public sector wage premium for two years, 2014 and 2015 – before and after the measures were introduced.

The results show that public sector wages in Serbia are on average higher than in the private sector. Approximately half of the difference in wages in 2014 was due to the better labour market characteristics of public sector workers, mainly higher levels of education and more frequent work in better paid occupations. In 2015 the difference in average wages had reduced (from about 32% to 28%),

while the difference in labour market characteristics had slightly increased. The increase was mainly due to a higher share of temporary workers in the private sector, which decreased the quality of work. The relative stagnation of workers' educational and occupational structure indicates that although the number of public sector workers decreased, this was probably due to restrictions on employment as a result of fiscal consolidation rather than shifts from the public to the private sector.

The results also show that the public sector wage premium in Serbia in 2014 was very high, 17.4%, indicating a large wage difference between private and public sectors even after controlling for differences in labour market characteristics. The estimated premium is similar to that in a recent paper (Vladisavljević and Jovančević 2016) for 2013 based on EU-SILC data, thus additionally validating the result. Most of the premium can be explained by higher returns to education, occupation, and working experience in the public sector, which indicates that the public sector rewards these characteristics more generously than the private sector.

In 2015, after the fiscal consolidation measures were introduced, the premium dropped by an average of 6.1 percentage points. This result indicates a decrease in wage inequality between public and private sectors. Most of the decrease is due to less difference in returns to working experience, reflecting the nature of the reform. As mentioned in the introduction, the lowest wages in the public sector were exempted from the wage cut. As returns to working experience are positive, people with high levels of working experience have a greater likelihood of higher wages and therefore are more likely to be hit by the fiscal consolidation measures. Therefore, the returns to working experience became lower in the public sector while remaining unchanged in the private sector. Similar changes occurred in returns to occupation and education, although their effect on the public sector wage premium was insignificant.

This research has shown that before fiscal consolidation measures were introduced in Serbia there was a large public sector wage premium. Together with higher job security in the public sector, the premium created a strong duality between private and public sectors and caused a 'waiting-in-line' effect for jobs in the public sector, while leaving the private sector with workers of lower quality. Thus, beside fiscal effects, the cut in public sector wages had the positive effect of lowering both inequality between the sectors and overall wage inequality.

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**APPENDIX**

**Table A1:** Estimation sample descriptive statistics

var	Private sector	Public sector	sig	Private sector	Public sector	sig	Sign. of change between the years	
	2014	2014		2015	2015		Private	Public
Female	0.445	0.485 ***		0.459	0.495 ***		*	
Age	39.747	44.8 ***		40.085	45.3 ***		**	***
Without degree	0.005	0.004		0.004	0.003 *			*
Primary	0.089	0.074 ***		0.091	0.083 *			**
Secondary (2–3 years)	0.308	0.175 ***		0.302	0.153 ***			***
Secondary (4 years)	0.432	0.396 ***		0.431	0.394 ***			
Tertiary (1–3 years)	0.059	0.086 ***		0.06	0.09 ***			
Tertiary (BA, MA, PhD)	0.108	0.266 ***		0.112	0.277 ***			
Belgrade	0.199	0.236 ***		0.205	0.226 ***			
Vojvodina	0.295	0.217 ***		0.293	0.224 ***			
West Serbia	0.284	0.274		0.282	0.295 *			***
East Serbia	0.222	0.273 ***		0.22	0.255 ***			**
Urban	0.61	0.654 ***		0.603	0.654 ***			
Working experience	14.9	20.1 ***		14.9	20.7 ***			***
Senior officials and managers	0.017	0.027 ***		0.016	0.024 ***			
Professionals	0.06	0.265 ***		0.057	0.272 ***			
Technicians and ass. profess.	0.121	0.204 ***		0.104	0.205 ***		***	
Clerks	0.088	0.112 ***		0.089	0.102 ***			**
Service and sales workers	0.269	0.11 ***		0.281	0.118 ***		*	
Craft and trade workers	0.208	0.091 ***		0.204	0.084 ***			
Plant and machine operators	0.165	0.08 ***		0.173	0.076 ***			
Elementary occupations	0.072	0.111 ***		0.077	0.12 ***			
Part-time	0.008	0.018 ***		0.014	0.017 *		***	
Temporary contract	0.154	0.082 ***		0.193	0.091 ***		***	*
	7,642	7,054		9,680	8,322			

**Note:** \*\*\* p<0.01, \*\* p<0.05, \* p<0.1,

Significance test performed on the basis of t-test for independent samples. Standard errors, t-statistics, and exact p-values omitted from the table, available upon request from the author.

**Table A2:** Ordinary least squares estimates

	2014		2015	
Public sector	0.174***	(0.009)	0.113***	(0.008)
Gender	-0.143***	(0.008)	-0.136***	(0.007)
Age	-0.003***	(0.001)	-0.003***	(0.001)
Settlement	0.051***	(0.008)	0.041***	(0.007)
Belgrade (omitted)				
Vojvodina	-0.082***	(0.011)	-0.096***	(0.010)
West Serbia	-0.134***	(0.011)	-0.128***	(0.010)
East Serbia	-0.145***	(0.012)	-0.161***	(0.010)
Primary or no education (omitted)				
Secondary (2–3 years)	0.037**	(0.015)	0.074***	(0.013)
Secondary (4 years)	0.114***	(0.015)	0.149***	(0.013)
Tertiary (1–3 years)	0.181***	(0.021)	0.223***	(0.018)
Tertiary (BA, MA, PhD)	0.358***	(0.021)	0.421***	(0.018)
Working experience	0.013***	(0.002)	0.012***	(0.001)
Working experience squared	-0.000***	(0.000)	-0.000***	(0.000)
Senior officials and managers	0.497***	(0.032)	0.376***	(0.031)
Professionals	0.415***	(0.020)	0.337***	(0.017)
Technicians and ass. professionals	0.312***	(0.017)	0.263***	(0.014)
Clerks	0.244***	(0.017)	0.182***	(0.015)
Service and sales workers	0.040***	(0.015)	-0.013	(0.012)
Craft and trade workers	0.163***	(0.017)	0.101***	(0.014)
Plant and machine operators	0.182***	(0.017)	0.143***	(0.014)
Elementary occupations (omitted)				
Part-time	0.174***	(0.045)	0.198***	(0.029)
Temporary contract	-0.092***	(0.011)	-0.115***	(0.010)
Constant	4.782***	(0.030)	4.837***	(0.026)
Observations	14,696		18,002	
Adjusted R-squared	0.480		0.480	
F	337.0		387.9	
p	0.000		0.000	

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table A3:** Ordinary least squares estimates of the separate models for public and private sectors

	Public 2014		Private 2014		Public 2015		Private 2015	
Gender	-0.140***	(0.012)	-0.124***	(0.012)	-0.129***	(0.011)	-0.115***	(0.010)
Age	-0.005***	(0.001)	-0.002*	(0.001)	-0.003***	(0.001)	-0.002**	(0.001)
Settlement	0.032***	(0.012)	0.071***	(0.011)	0.042***	(0.009)	0.041***	(0.009)
Belgrade (omitted)								
Vojvodina	-0.103***	(0.014)	-0.059***	(0.016)	-0.086***	(0.013)	-0.098***	(0.014)
West Serbia	-0.147***	(0.015)	-0.120***	(0.015)	-0.108***	(0.012)	-0.134***	(0.014)
East Serbia	-0.132***	(0.016)	-0.159***	(0.016)	-0.131***	(0.013)	-0.175***	(0.015)
Primary or no education (omitted)								
Secondary (2–3 years)	0.046*	(0.024)	0.020	(0.019)	0.089***	(0.024)	0.055***	(0.016)
Secondary (4 years)	0.171***	(0.024)	0.064***	(0.019)	0.201***	(0.024)	0.109***	(0.016)
Tertiary (1–3 years)	0.238***	(0.029)	0.136***	(0.030)	0.283***	(0.027)	0.177***	(0.028)
Tertiary (BA, MA, PhD)	0.451***	(0.028)	0.259***	(0.030)	0.505***	(0.027)	0.344***	(0.027)
Working experience	0.015***	(0.003)	0.011***	(0.002)	0.010***	(0.002)	0.013***	(0.002)
Working experience squared	-0.000***	(0.000)	-0.000***	(0.000)	-0.000**	(0.000)	-0.000***	(0.000)
Senior officials and managers	0.499***	(0.044)	0.444***	(0.049)	0.423***	(0.034)	0.297***	(0.054)
Professionals	0.409***	(0.024)	0.420***	(0.039)	0.310***	(0.022)	0.413***	(0.035)
Technicians and ass. professionals	0.315***	(0.023)	0.269***	(0.025)	0.262***	(0.019)	0.246***	(0.024)
Clerks	0.279***	(0.023)	0.160***	(0.025)	0.202***	(0.021)	0.133***	(0.022)
Service and sales workers	0.158***	(0.025)	-0.075***	(0.019)	0.114***	(0.021)	-0.102***	(0.016)
Craft and trade workers	0.236***	(0.030)	0.067***	(0.021)	0.221***	(0.028)	0.018	(0.018)
Plant and machine operators	0.265***	(0.029)	0.082***	(0.021)	0.194***	(0.025)	0.084***	(0.019)
Elem. occup. (omitted)								
Part-time	0.142***	(0.043)	0.249***	(0.096)	0.189***	(0.037)	0.211***	(0.045)
Temporary contract	-0.138***	(0.019)	-0.062***	(0.014)	-0.151***	(0.016)	-0.096***	(0.012)
Constant	4.920***	(0.044)	4.849***	(0.039)	4.877***	(0.037)	4.895***	(0.034)
Observations	7,054		7,642		8,322		9,680	
Adjusted R-squared	0.459		0.365		0.488		0.388	
F	154.2		79.98		196.2		102.6	
p	0.000		0.000		0.000		0.000	

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

**Table A4:** Comparison of the Blinder-Oaxaca and John, Murphy and Pierce (JMP) decompositions.

	Blinder-Oaxaca		JMP	
	2014	2015	2014	2015
Unexplained part	0.174	0.113	0.188	0.112
Explained part	0.149	0.167	0.134	0.168
Residual effect	-	-	0.000	0.000

