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A Contribution to the Public-Private  
Wage Inequality Debate: The Iconic Case of Romania





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Shortly after the end of the Kosovo war, the last of the Yugoslav dissolution wars, the Balkan Reconstruction Observatory was set up jointly by the Hellenic Observatory, the Centre for the Study of Global Governance, both institutes at the London School of Economics (LSE), and the Vienna Institute for International Economic Studies (wiiw). A brainstorming meeting on Reconstruction and Regional Co-operation in the Balkans was held in Vouliagmeni on 8-10 July 1999, covering the issues of security, democratisation, economic reconstruction and the role of civil society. It was attended by academics and policy makers from all the countries in the region, from a number of EU countries, from the European Commission, the USA and Russia. Based on ideas and discussions generated at this meeting, a policy paper on Balkan Reconstruction and European Integration was the product of a collaborative effort by the two LSE institutes and the wiiw. The paper was presented at a follow-up meeting on Reconstruction and Integration in Southeast Europe in Vienna on 12-13 November 1999, which focused on the economic aspects of the process of reconstruction in the Balkans. It is this policy paper that became the very first Working Paper of the wiiw Balkan Observatory Working Papers series. The Working Papers are published online at [www.balkan-observatory.net](http://www.balkan-observatory.net), the internet portal of the wiiw Balkan Observatory. It is a portal for research and communication in relation to economic developments in Southeast Europe maintained by the wiiw since 1999. Since 2000 it also serves as a forum for the Global Development Network Southeast Europe (GDN-SEE) project, which is based on an initiative by The World Bank with financial support from the Austrian Ministry of Finance and the Oesterreichische Nationalbank. The purpose of the GDN-SEE project is the creation of research networks throughout Southeast Europe in order to enhance the economic research capacity in Southeast Europe, to build new research capacities by mobilising young researchers, to promote knowledge transfer into the region, to facilitate networking between researchers within the region, and to assist in securing knowledge transfer from researchers to policy makers. The wiiw Balkan Observatory Working Papers series is one way to achieve these objectives.



# The wiiw Balkan Observatory

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## **A contribution to the public-private wage inequality debate: the iconic case of Romania<sup>a</sup>**

Liviu Voinea<sup>\*,b</sup> and Flaviu Mihaescu<sup>c</sup>

### Abstract

This paper studies the public-private wage inequality in Romania. Although public sector employment is perceived as safer and offers more benefits, we find that in Romania it also offers higher wages, after controlling for experience, education, and gender. Decomposing the public-private wage premium into the effect of personal characteristics, coefficients, and residuals, we show that only about half of this premium can be attributed to personal characteristics. The premium is increasing across the wage distribution, leading to more inequality in the public sector. We also find the effects of self-selection are negligible, the premium being still positive and significant after controlling for this.

Keywords: Romania, wage premium, public sector

JEL Classification: J45, J31, J24

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## **I. Introduction and context**

The global economic crisis sparked a worldwide debate over the need to restructure the public sector. Public wages are at the center of this debate, with issues ranging from a perceived inequality to efficiency.

In any country the public sector is an important employer, hence its wage-setting policy has an impact on the entire economy, both at micro and macroeconomic level. Compared to the private sector, public sector jobs are perceived to be safer and the pay more equitable, as the state often strives to be a ‘model’ employer and it is not subject to profit constraints. However, absent a unified public sector compensation framework and clear performance benchmarks, the wage-setting process can be uneven, politically-driven and a source of inequality.

Romania seems an iconic case study for the public sector pay debate. The public sector still employs about 30 percent of the workforce, and the wage bill is around 20 percent of the current budget expenditures. These figures may seem reasonable compared to developed economies (for comparison, in the UK 50 percent of the government spending goes to wages, as the public sector employs a fifth of the total UK work force – see Chatterji *et al.*, 2007), but it may still be unsustainable for an emerging economy.

An unparalleled increase in the public sector wage bill, from 4.8 percent to 8.6 percent of GDP, took place between 2004 and 2008. Moreover, the public sector wage bill increased to 9 percent of GDP in 2009 – a recession, but also an election year. Examples of unjustified pay differences within the public sector abound: assistant professors paid less than a city hall office assistant, junior surgeons paid less than cleaning workers.

To underscore the growing concern over public pay, one of the conditions of the IMF loan package granted to Romania in 2009 was the adoption of a unified public sector compensation framework. Later on, in mid-2010, all wages in the public administration were cut by a uniform 25 percent. The public sector was blamed for its lack of efficiency and lower productivity, although no measure of productivity in the public sector was ever presented, and the public employees were portrayed as the public enemies. The private sector, on the other hand, was seen as the idyllic employer, flexible and more efficient. This black and white picture made us raise some interesting research questions.

Therefore, the purpose of our current research is to shed light on the determinants of the public-private wage differential and on the dynamics and decomposition of wage inequality between the private and public sector in 2004 and 2009. This research is the first of its kind for Romania, and provides a valuable input to the policy debate not only in Romania, but also in other economies where the public wage bill is now under scrutiny.

The next section reviews the findings regarding the public-private wage inequality in transition and developing economies. It also summarizes the challenges arising in the empirical estimation of this premium, especially the self-selection issue.

The third section presents the data and descriptive statistics for Romania. Descriptive statistics focus on the standard Mincerian model, where the wage depends on education, work experience, and gender.

The fourth section presents estimates of the public-private wage premium from OLS regressions. On top of the standard determinants of wage mentioned above, we also include dummy variables for employees living in Bucharest and for occupational sector.

To account for the possibility of worker self-selection into the public or private sector, we use an instrumental variable approach. Although the instruments prove to be significant, there is little case for self-selection and the conclusion we reach using OLS regressions is still valid.

The fifth section decomposes the wage premium into three factors: the impact of personal characteristics, coefficients, and residuals. This approach enables us to ascertain the existence of a ceiling or a floor in the public sector wages. The last section concludes.

## **II. Literature review**

There is a large body of empirical literature on the pay differential between the public and private sector, starting with Smith (1976) and Gunderson (1979). The interested reader can consult Disney (2007) or Borjas (2002) for a more thorough review. Our literature review will focus on the most recent empirical methods and results, as well as the relevant literature regarding transition countries.

The strand of the literature on public-private wage differential in transition countries is scant, most probably due to the limited availability of relevant panel or cross-section data. Usually the public-private wage gap transition and developing countries is negative (higher wages in the private sector), as public sector pay is regulated and the wage bill is under intense scrutiny. A number of authors found this gap to be negative: Adamchick and Bedi (2000) for Poland, Leping (2005) for Estonia (the median wage differential was about 3 percent,), and Jovanovich and Lokshin (2004) for the Moscow region (a gap of 14.3 percent for men and 18.3 percent for women was uncovered). An

opposite conclusion was reached by Terrell (1993), who found that wages are higher in the public sector in Haiti. An interesting paper by Newell and Socha (2007) showed the wage distribution was more unequal in the Polish private sector compared to the public one. While in Poland it was the private sector wage growth that led to an increase in inequality between 1998 and 2002, in Romania it was the public sector that pushed up wages and inequality between 2004 and 2009.

A controversial issue when estimating public-private wage differences is self-selection: the workers' allocation between the two sectors may not be exogenous, and there may be unmodelled factors that affect both a worker's sector selection and her wage. Some authors (Blackaby *et al.*, 1999) argued that treating for endogeneity doesn't bring any additional benefits, and doesn't change the magnitude and significance of the premium, while others do not even take it into account (for example, Melly, 2005b).

One self-selection criterion is age: more experienced individuals tend to prefer public sector employment, as documented by Falaris (2003) for Bulgaria and Jovanovich and Lokshin (2004) for Moscow. Two reasons were cited for this: more experienced people may prefer a safer employment, and the public sector offers more generous retirement benefits. Another criterion is education, more educated individuals preferring to work in the private sector, where their performance and skills are better rewarded (Adamchick and Bedi, 2000 document this for Poland). Women may also prefer to work in the public sector, as the hours are more flexible and there is virtually no overtime. Self-selection can also stem from a vocation for a particular profession, like nurse or teacher, although there are private-sector jobs for these professions as well.

Different variables have been used in the literature to control for endogeneity in



the selection equation. Dustmann and van Soest (1998) used parental occupation (public/private) to instrument for a worker's public private choice. Falaris (2003) used the amount of land received during Bulgaria's property restitution programme as an instrument. For workers in the Moscow region, Jovanovich and Lokshin (2004) used the industry of employment pre-1992, the number of children, and marital status as instruments in the selection equation.

Because our dataset surveys entire families and not only individuals, we are in a position to see if there are any family members working in the public sector. To our knowledge, this is a novel way of instrumenting for the public-private sector choice. In addition to the existing studies, we can also account for the vocational source of self-selection, as our dataset also registers the individual's employment sector (agriculture, mining, education, and so on).

Another empirical strategy is decomposing the premium into differences in personal characteristics (covariates) and returns to these characteristics (coefficients) following the approach of Machado and Mata (2005). Our strategy follows Melly (2005a) where the premium is decomposed into three factors (changes in coefficients, covariates, and residuals) for every quantile of the wage distribution. This decomposition method allows us to investigate the existence of a floor and ceiling in public sector wages. The existence of a public sector 'high floor and lower ceiling' was highlighted, among others, by Melly (2005b), and is evident in the unconditional wage distribution in Fig. 1 – the right tail is longer and the left tail is thicker in the private sector.

In transition economies the size of the informal sector also influences public sector choice and pay (Adamchik and Bedi, 2000; Reilly, Krstic and Litchfield, 2007)

and is a cause of the ‘high floor’ mentioned above. Public sector jobs are always in the formal sector, and when the informal sector is sizeable people may queue to get a job in the public sector. However, our survey data survey data includes a question on revenues from the informal sector, so our estimates will not suffer of this bias.

### **III. Data Description**

We use the 2004-2009 waves of the Romanian Household Budget Survey (HBS), which samples about 3000 households per month. We only report here the data for the extremities of this relevant time interval (2004 - 2009), but we analyzed the data for each year in between. Trends are stable (the ends of the interval are not outliers in any respect) and the signs and significance of the regression variables do not change in the other years.

Income from all sources and personal characteristics are registered in the survey. In 2004, 33,200 families and 70,773 adults were surveyed, while the 2009 wave comprises 31,600 families and 66,182 adults. Out of the total number of adults surveyed, about 50 percent are retired (46.4 percent in 2004 and 39.5 percent in 2009), so no employment data is registered. The remaining active population is divided into six employment categories: state, private, mixed, cooperative, public (national or local), and other. Because the aim of this paper is to uncover the public-private wage premium, we merge both state and public employment into one category (‘public’), as wages are paid from the consolidated public budget in both cases. Descriptive statistics for all variables used are shown in Appendix 1.<sup>1</sup>

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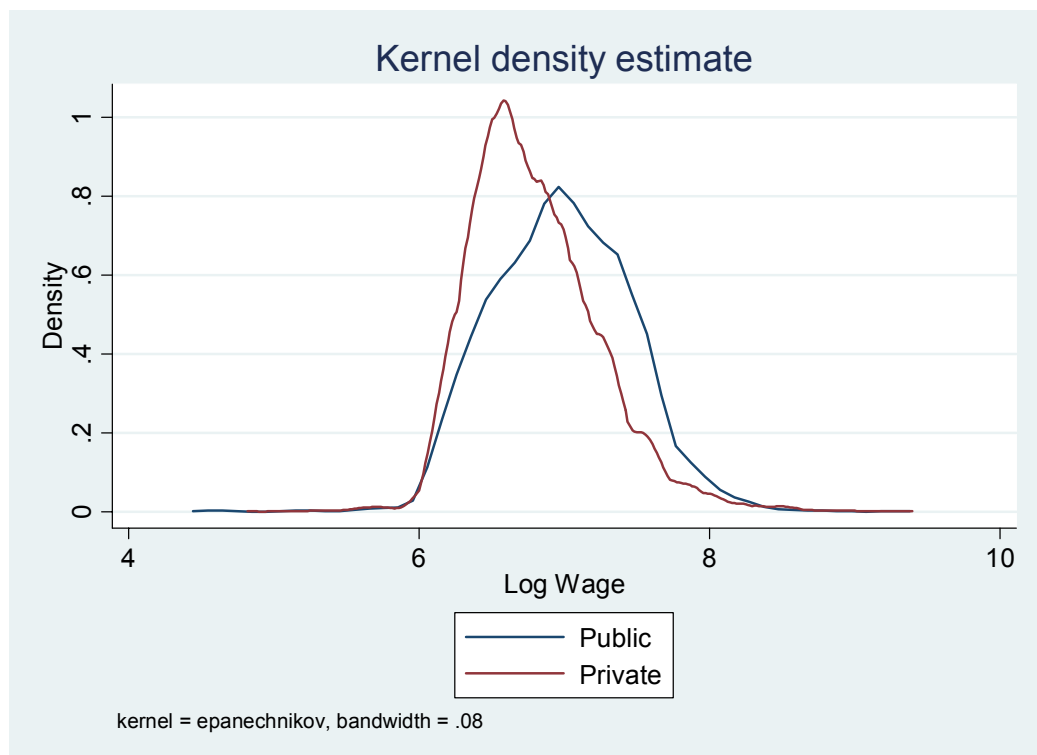
<sup>1</sup> Unless otherwise specified, all the statistics, figures and tables in this paper are authors’ calculations based on the Romanian Household Budget Survey.

The majority of the active labour force works in the private sector, as its share has increased between 2004 and 2009 from 77.3 percent to 83.4 percent of employees. This increase occurred mostly at the expense of those working in the public sector (state-owned firms and public services), whose share declined from 20 percent to 15.5 percent. However, while the number of employees in stated-owned firms decreased as a result of privatization, the share of the public administration and services (national and local) increased by 44 percent (from 3.75 to 5.4 percent percent of the labour force between 2004 and 2009); by comparison, real GDP only grew by an aggregated 29.5 percent during the same period.

The average wage was higher in the public sector compared to the private one: the unconditional premium evaluated at the mean was 20.5 percent in 2009 and 22.4 percent in 2004. The same can be said about the unconditional premium evaluated at the median wage: 27.9 percent in 2009. The distribution of log of wages in the public and private sector (shown in Fig. 1) also supports this conclusion: compared to the public sector, a larger number of employees in the private sector are located in the left tail of the wage distribution, right above the minimum wage. One reason for this is the extent of the 'grey economy' in the private sector, where many employees are officially employed with the minimum wage, and receive the unreported difference in cash, in order to avoid the high labour taxes (particularly the social contribution tax). However, with the introduction of the flat tax in January 2005, there are less incentives to avoid a higher marginal tax rate (see Voinea and Mihaescu, 2009 for an analysis of the flat tax impact in Romania). At higher wage levels the wage density function in the public sector lies on top of the private one; for example, a fraction of 5.5 percent of the private sector employees earned in 2009

between 1600 and 1800 RON (EUR 380 to 425, at the average 2009 exchange rate), while the fraction of public sector employees in this bracket was almost double (10 percent).

**Fig. 1. Distribution of log net wages in the private and public sector (2009)**

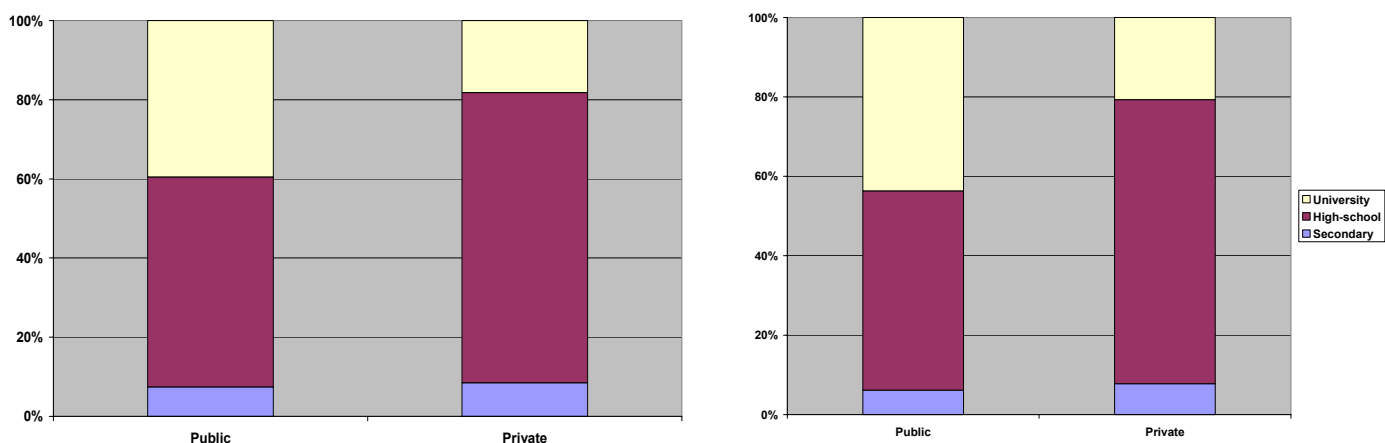


Of course there are different factors that influence wages, and a Mincerian human capital model is usually employed in the literature in order to compare them. Wages are thus assumed to depend on education, experience, and gender. We divide educational attainment into secondary (eight grades or less completed), high-school (high-school or less completed), and university (any degree higher than high-school completed).

From Fig. 2 we see that the public sector employs significantly more university graduates compared to the private sector—about 40 percent compared to 20 percent of

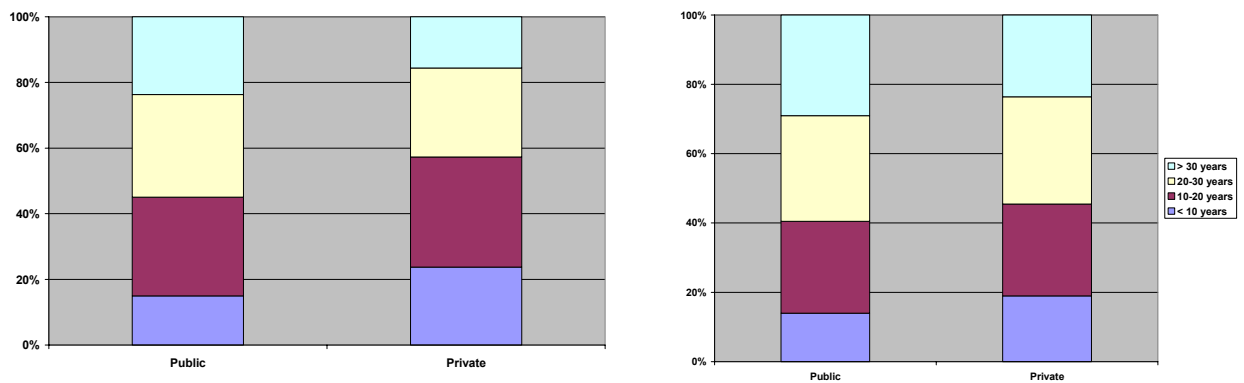
the total employment. The share of university graduates also increased between 2004 and 2009, for both sectors. This can be explained by the labour force becoming more educated, as employees with only a secondary school retire, and more and more of those coming on the labour market have a university degree. Sanfey and Krstic (2011), for example, found out that educational qualifications accounted for 45-50 percent of the explained level of inequality in Serbia. Another determinant of earning power is work experience. We compute work experience assuming education starts at seven years, and subtracting this and the number of years spent in school (eight for secondary school and fifteen for college) from the actual age. University or high-school full time students earning a wage are assumed to have one year of experience. This measure has its drawbacks, as it does not take into account on the job training, part-time studies completed after entering the labour force, or does not account for unemployment spells. However, no country-level survey provides such detailed information.

**Fig 2. Public and private employment by education, 2004 (left) and 2009**

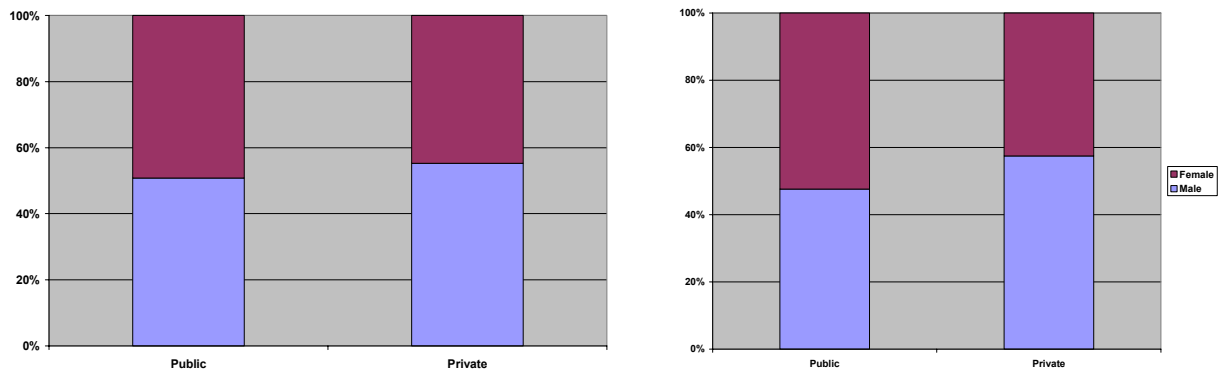


The public sector therefore employs more experienced workers (30+ years of experience), and less ‘inexperienced’ ones (less than 10 years of experience), as Fig. 3 shows. One reason for this is the more generous pension system in the public sector, some employees (armed forces, ministry of interior employees and others) being part of a ‘final salary’ pension scheme. Another reason is that a job in the public sector is perceived to be safer and less demanding. This probably leads to a self-selection process, where senior employees prefer a job in the public sector. Apart from that we notice an aging of the population, the median number of years of experience being 20 in 2004, and 21 in 2009. There are two factors contributing to this: first, people working beyond their retirement age, and second, younger people migrating abroad.

**Fig 3. Public and private employment by experience, 2004 (left) and 2009.**



**Fig 4. Public and private employment by gender, 2004 (left) and 2009**



The gender composition of the public sector labour force is balanced, while the private sector has more male employees. This fact, evident from Fig. 4, can also be due to a selection bias, women preferring a public sector job can be easier reconciled with family life, as working overtime is an exception in the public sector. Another hypothesis we consider is gender-based wage discrimination is less pronounced in the public sector. It is also evident from Fig. 4 that between 2004 and 2009 the share of women working in the private sector has decreased, which can be traced to the decreasing share of women in total employment (from 46.4 percent to 45.1 percent).

#### **IV. Estimating the public-private wage premium**

Our paper's first contribution to the policy debate on public sector wages is establishing the existence and statistical significance of a wage premium over the private sector. The simplest way to test for the existence of a premium is to regress the log of

wage on education, experience, gender, employment contract type (as the survey doesn't offer data on hours worked, this variable captures the lower earnings for those working part-time), and a dummy variable if the worker lives in Bucharest. The results are shown in Table 1 below (the 'No Sector' column).

**Table 1. OLS Regression, dependant variable: log of wage<sup>2</sup>**

Independent Variable	2004		2009	
	No Sector	With Sector	No Sector	With Sector
is Public	0.106***	0.071***	0.098***	0.073***
Secondary Edu	-0.193***	-0.176***	-0.241***	-0.229***
Univ Edu	0.434***	0.436***	0.464***	0.456***
Work Exper <= 5y	-0.296***	-0.224***	-0.171***	-0.123***
Work Exper 5-10y	-0.183***	-0.147***	-0.09***	-0.063***
Work Exper 11-15y	-0.082***	-0.072***	-0.06***	-0.047***
Work Exper 16-20y	-0.065***	-0.062***	-0.029***	-0.025**
Work Exper 26-30y	-0.011	-0.005	0.005	0.006
Work Exper 31-35y	-0.04***	-0.025**	-0.002	0.005
Work Exper > 35y	-0.066***	-0.047**	-0.037***	-0.028**
Sex	-0.197***	-0.163***	-0.215***	-0.187***
Term Contract	-0.217***	-0.201***	-0.249***	-0.244***
Bucharest	0.188***	0.19***	0.24***	0.237***
Agriculture	N/A	-0.213***	N/A	-0.171***
Mining	N/A	0.235***	N/A	0.231***
Manufacturing	N/A	-0.086***	N/A	-0.074***
Utilities	N/A	0.082***	N/A	0.065**
Construction	N/A	-0.112***	N/A	-0.014
Retail	N/A	-0.154***	N/A	-0.1***
Financial Services	N/A	0.178***	N/A	0.16***
Real Estate Intermediation	N/A	-0.062*	N/A	-0.084**
Education	N/A	-0.141***	N/A	-0.091***
Health and social assistance	N/A	-0.17***	N/A	-0.104***
Other social services	N/A	-0.192***	N/A	-0.103***
Housewives	N/A	-0.238**	N/A	-0.053
International Organisations	N/A	-0.075	N/A	0.292**
Constant	6.053***	6.136***	6.813***	6.865***
No Obs	19 900	19 900	18 516	18 516
Adj R-squared	0.4096	0.3291	0.3599	0.3982

<sup>2</sup> \*\*\* means statistically significant at 1 percent, \*\* at 5 percent, and \* at 10 percent



The base case in our model is a male, full-time employee educated to secondary school level, at the peak of his earning power (between 25 and 30 years of work experience), and living outside Bucharest. The results of this Mincerian specification are in line with the theory, with wages increasing with education and experience, and being lower for women and part-time employees. The results show the existence of a positive wage premium for working in the public sector: given the same characteristics and skills, a public sector worker earned 10.6 percent more in 2004, and 9.8 percent in 2009. The other dummy variables have the expected sign: the wages were 19 percent higher in Bucharest in 2004 compared to the rest of the country, and this difference increased to 24 percent in 2009.

The third and fifth column of Table 1 (labeled ‘With Sector’) contrast the results in the second and fourth column discussed above with an OLS regression with occupational sector dummies. The base sector is transportation, chosen because is well represented in both public and private sectors (see Table 2 for a breakdown). After accounting for occupation, the wage premium is still strongly significant, albeit lower (about 7 percent compared 10 percent before). Compared to the transportation sector, the wages are distributed as expected: higher in the financial services, mining and utilities, lower in education, health and social assistance.

**Table 2. Share of public sector employment for different occupations**

Occupational Sector	Share of Public Sector Employment	
	2004	2009
Agriculture	32.4%	25.6%
Mining	76.0%	56.4%
Manufacturing	10.0%	4.3%
Utilities	73.1%	45.3%
Construction	11.4%	5.2%
Retail	5.6%	2.4%
Transportation, communications	43.0%	25.6%
Financial Services	40.6%	22.7%
Real Estate Intermediation	17.5%	11.1%
Public Administration, Defense	91.5%	89.4%
Education	95.8%	93.1%
Health and social assistance	83.3%	75.8%
Other social services	33.0%	25.7%

However, this approach assumes that both sectors treat the Mincerian characteristics in the same way; for example the impact of having a university degree is constrained to be the same for both sectors. The results in Table 3 relax this assumption by adding an interaction term for each independent variable (the third and the fifth column). This variable therefore separates the impact of a characteristic into public and private sector. For example, if the interaction coefficient of the '*Univ Edu*' (employees having a university degree and working in the public sector) is significant and positive, then we can conclude that the public sector rewards more a university-educated employee compared to the private sector.

**Table 3. Regression with relaxed Mincerian assumptions; dependant variable: log of wage**

	2004		2009	
	Baseline	Interaction Terms	Baseline	Interaction Terms
is Public	0.207***		0.136***	
Secondary Edu	-0.137***	-0.132***	-0.195***	-0.164***
Univ Edu	0.46***	-0.055***	0.469***	-0.053***
Work Exper <= 5y	-0.168***	-0.217***	-0.108***	-0.098***
Work Exper 5-10y	-0.114***	-0.102***	-0.057***	-0.03
Work Exper 11-15y	-0.057***	-0.047*	-0.059***	0.05*
Work Exper 16-20y	-0.044***	-0.048**	-0.029**	0.016
Work Exper 26-30y	0.009	-0.037	-0.001	0.031
Work Exper 31-35y	-0.025	-0.008	-0.001	0.028
Work Exper > 35y	-0.038*	-0.012	-0.035**	0.04
Term Contract	-0.158***	-0.014	-0.218***	-0.084
Sex	-0.182***	-0.043	-0.183***	-0.011
Bucharest	0.213***	-0.067***	0.253***	-0.077***
Agriculture	-0.196***	-0.028	-0.169***	-0.002
Mining	0.092*	0.158***	0.168***	0.085*
Manufacturing	-0.057***	-0.086***	-0.058***	-0.106***
Utilities	0.06*	-0.001	0.065**	-0.027
Construction	-0.078***	-0.172***	0.001	-0.126***
Retail	-0.137***	-0.013	-0.09***	-0.072
Financial Services	0.287***	-0.303***	0.17***	-0.079
Real Estate Intermediation	-0.042	-0.078	-0.089***	0.068
Public Administration, Defense	-0.211***	0.193***	-0.126***	0.138***
Education	-0.106	-0.041	-0.088**	-0.017
Health and social assistance	-0.104***	-0.092**	-0.057	-0.082*
Other social services	-0.145***	-0.128***	-0.081***	-0.089**
Constant	6.083***		6.848***	
No Obs	19,900		18,516	
Adj R-squared	0.3393		0.35199	

The public wage premium is still positive and significantly different from zero, but it decreased between 2004 and 2009 from 20.7 percent to 13.6 percent. The public sector attaches a lower premium on university education, compared to the private sector. For example, if a university degree commanded a 46 percent premium over a high school degree in 2004, and a 47 percent premium in 2009, this premium was 5.5 percent and 5.3

percent lower, respectively, if you worked in the public sector. When it comes to experience, a pattern emerges for those less experienced (less than 5 years experience): they earn less in the public sector compared to their private counterparts. For example, in 2004 an employee with less than 5 years experience earned about 22 percent less in the public sector compared to the private one, while in 2009 the gap was -10 percent. It is not clear from our 2004 or 2009 results, however, that the public sector rewards more those with more experience. Gender discrimination appears to be absent from the public sector, as the gap was statistically insignificant in both 2004 and 2009.

An interesting picture emerges from the interaction coefficients for occupations. The state pays significantly more for public administration and defense, two occupations that imply a vocation for public service. The other occupation that implies a public service vocation, education, does not pay more handsomely in the public sector. In both cases, the state is a near-monopoly employer: it employs about 90 percent of the workers in public administration and defense, and about 95 percent in education. For the other occupations, where the private sector has more market power and the workers have a meaningful public-private choice, the state's pay policy varies, from being more generous in mining and less so in construction, health and financial services. A similar conclusion emerges from estimating the premium with the Mincerian specification (the one in columns two and four in Table 1) for each occupation separately. The results in Table 4 show a positive and significant premium (for both years) in agriculture, mining, transportation, and public administration. The premium for all occupations where the private sector has significant market power (namely, except for public administration, defense, and education) is slightly lower than for the entire sample: 10.2 percent in 2004

and 8.1 percent in 2009 (compared to a full sample estimate of 10.6 percent and 9.8 percent in Table 1).

**Table 4. Wage premium by occupation**

Occupation	2004	2009
Agriculture	0.09909***	0.09741**
Mining	0.29769***	0.19773***
Manufacturing	0.05348***	0.01855
Utilities	0.13228***	0.06778*
Construction	-0.0533	-0.0167
Retail	0.10265***	0.03784
Transportation, communications	0.12351***	0.12286***
Financial Services	-0.166***	0.03459
Real Estate Intermediation	0.0284	0.14559
Public Administration, Defense	0.3132***	0.25625***
Education	0.00294	-0.0139
Health and social assistance	-0.0231	-0.0017
Other social services	-0.0185	-0.0043

To account for the possible public-private selection bias we use a treatment effect model, estimating simultaneously the wage equation and the treatment equation, where the public-private dummy variable is regressed on a set of treatment variables. This procedure will account for the possible correlation between the error terms of the two equations. If this correlation coefficient is positive (negative), the estimated effect of treatment from original estimation will generally be biased away from zero (towards zero). The model we use for the wage equation is the baseline one from column two in Table 1. For the treatment equation, the public dummy variable is regressed (using a probit model) on the Mincerian variables from the wage equation and a number of instruments.

The instruments must be correlated with the public/private employment dummy variable, but should not affect the worker's wage. Our survey records information on all

family members, so we use family-related variables to instrument for the public-private employment choice: the number other of public sector employees in the household, the number of children aged 18 or below, and marital status. To our knowledge, the first instrument is a novel way of instrumenting for the public-private sector choice. There are two reasons why this is a good instrument: first, personal example from close family (living under the same roof) may convince a worker to choose a career in the public sector. Second, someone working in the public sector may refer a close relative for a job. The second instrument affects the public/private choice via the works hours/leisure balance: a person with minor children will prefer more leisure, and overtime in the public sector is an exception in Romania. The expected sign of marital status is positive, as a married person may prefer the work-life balance the public sector has to offer.

The treatment equation results show the correlation coefficient not being significantly different from zero in 2009, and being very small (3.64 percent) but significantly different in 2004. Either way, the estimated premium is significant at 1 percent and its value is in line with the OLS estimates in Table 1, about 10 percent. Therefore we can reject the hypothesis of self-selection in the public/private sector.

**Table 5: Instrumenting for the public-private sector choice<sup>3</sup>**

	2004		2009	
	Wage Eqn	Treatment Eqn (Public/Private choice)	Wage Eqn	Treatment Eqn (Public/Private choice)
is Public	0.107***	N/A	0.102***	N/A
Secondary Edu	-0.2***	0.068***	-0.239***	0.041**

<sup>3</sup> Because in the treatment equation we use binary probit model, the coefficients displayed are marginal effects evaluated at the means.

Univ Edu	0.431***	0.143***	0.456***	0.075***
Work Exper <= 5y	-0.297***	-0.272***	-0.159***	-0.131***
Work Exper 5-10y	-0.184***	-0.181***	-0.075***	-0.076***
Work Exper 11-15y	-0.081***	-0.083***	-0.052***	-0.048***
Work Exper 16-20y	-0.059***	-0.032*	-0.019**	-0.012
Work Exper 26-30y	-0.009	0.004	0.011	0.005
Work Exper 31-35y	-0.036***	0.013	0.012	0.007
Work Exper > 35y	-0.063***	0.062**	-0.025**	0.041***
Term Contract	-0.196***	0.089***	-0.199***	0.059**
Sex	-0.209***	0.034***	-0.253***	0.053***
Bucharest	0.19***	-0.072***	0.239***	-0.04***
Married	Instrument	0.104***	Instrument	0.098***
Minors	Instrument	0.011*	Instrument	0.010**
Family Public Sect	Instrument	0.813***	Instrument	0.523***
Cons	6.05***	-2.238***	6.798***	-2.552***
Lambda	N/A	0.015**	N/A	0.008
Rho	N/A	0.0364	N/A	0.0218
Sigma	N/A	0.4036	N/A	0.3575
Wald-test	0.0000		0.0000	
No Obs	19 900		18 516	

## V. Decomposing the premium

Another caveat of the regression in Table 1 is that the wage premium is estimated around the mean from an OLS regression. To improve on this we use quantile regressions and decompose the differences between the public and private sector wage distributions. The decomposition method pioneered by Melly (2005a) enables us to decompose the difference between the two distributions at every quantile into the impact of the personal characteristics (or covariates, or independent variables), the returns to these (or coefficients), and residuals. This approach is similar to the Machado and Mata (2005) decomposition, but on top of decomposing the inequality in the impact of coefficients and of covariates, it also breaks down the first term into the impact of residuals (within group inequality) and coefficients (between group inequality). This approach therefore allows

for different experiments like what would the distribution of wages in the public sector be when applying the educational levels or the coefficients from the private sector.

For the 50<sup>th</sup> quintile—that is, for the regression around the median—we can write:

$$w^t = X^t \beta^t(0.5) + u^t \quad (1)$$

where  $w^t$  is the log of individual wage,  $X^t$  is a vector of individual characteristics (covariates),  $\beta^t(0.5)$  denotes an estimate of the coefficients around the median (the return to characteristics),  $u^t$  is the error term, and  $t$  is the group index. The same methodology can be applied for the decomposition of the public sector wage inequality between 2004 and 2009 ( $t$  denotes the year), as well as for the public-private wage differential ( $t$  denotes the sector).

From the equation above, and bearing in mind that the conditional quintile  $Quant_\tau(w^t | X^t) = X^t \hat{\beta}^t(\tau)$ , it is possible to estimate the  $\tau$ th quintile of the residual distribution of  $u^t$  (within group inequality) as  $X^t(\hat{\beta}^t(\tau) - \hat{\beta}^t(0.5))$ . Using this and assuming  $t = \{State, Private\}$ , we can also define:

$$\hat{\beta}^{mS,rP}(\tau) = \hat{\beta}^S(0.5) + \hat{\beta}^P(\tau) - \hat{\beta}^P(0.5) \quad (2)$$

or

$$X^P \hat{\beta}^{mP,rS}(\tau) = X^P(\hat{\beta}^S(0.5) + \hat{\beta}^P(\tau) - \hat{\beta}^P(0.5)) = X^P \hat{\beta}^S(0.5) + u^P(\tau)$$

In other words, we can generate a counterfactual distribution assuming that median return to characteristics in the public sector ( $\hat{\beta}^S(0.5)$ ) had been applied to the private sector ( $X^P$ ) and with the same distribution of residuals as in the private sector (from Equation 2,  $u^P$ ). The difference between a particular “synthetic” quintile obtained using  $\hat{\beta}^P$  and  $X^P$  (therefore a quintile of  $\hat{w}^P = X^P \hat{\beta}^P(\tau)$ , denoted  $Quant_\tau(\hat{\beta}^P, X^P)$ ) and



the quintile  $Quant_{\tau}(\hat{\beta}^{mP,rS}, X^P)$  is therefore just the impact of the change in residuals for that quintile between the public ( $S$ ) and private ( $P$ ) regressions. By the same token, the impact of the change in coefficients (with respect to the median regression) between the public and private regressions can be expressed as

$$Quant_{\tau}(\hat{\beta}^{mP,rS}, X^P) - Quant_{\tau}(\hat{\beta}^S, X^P) = X^P[(\hat{\beta}^P(\tau) - \hat{\beta}^P(0.5)) - (\hat{\beta}^S(\tau) - \hat{\beta}^S(0.5))]$$

and the impact of the change in covariates as  $Quant_{\tau}(\hat{\beta}^S, X^P) - Quant_{\tau}(\hat{\beta}^S, X^S)$ .

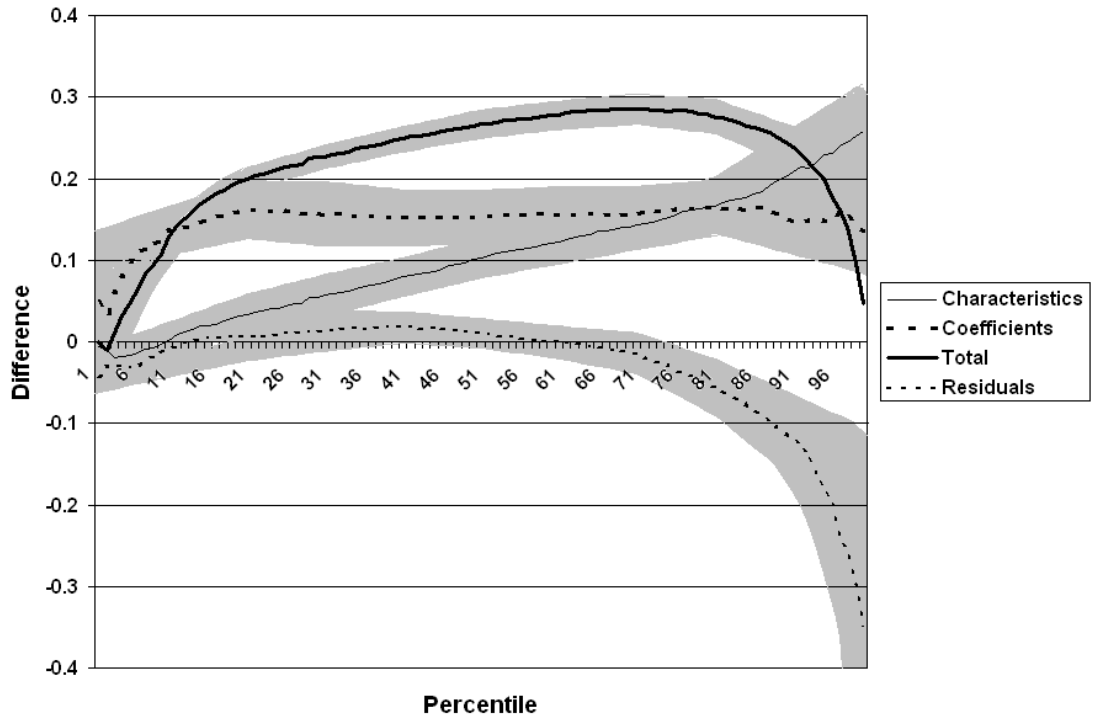
Summing up the three terms we get:

$$\begin{aligned} & Quant_{\tau}(\hat{\beta}^P, X^P) - Quant_{\tau}(\hat{\beta}^{mP,rS}, X^P) + Quant_{\tau}(\hat{\beta}^{mP,rS}, X^P) - Quant_{\tau}(\hat{\beta}^S, X^P) + \\ & Quant_{\tau}(\hat{\beta}^S, X^P) - Quant_{\tau}(\hat{\beta}^S, X^S) = \\ & Quant_{\tau}(\hat{\beta}^P, X^P) - Quant_{\tau}(\hat{\beta}^S, X^S) \end{aligned} \quad (3)$$

thus the variation of an estimated quintile of the wage distribution (across time or between the public and private sector) can be decomposed into changes in residuals, coefficients, and covariates.

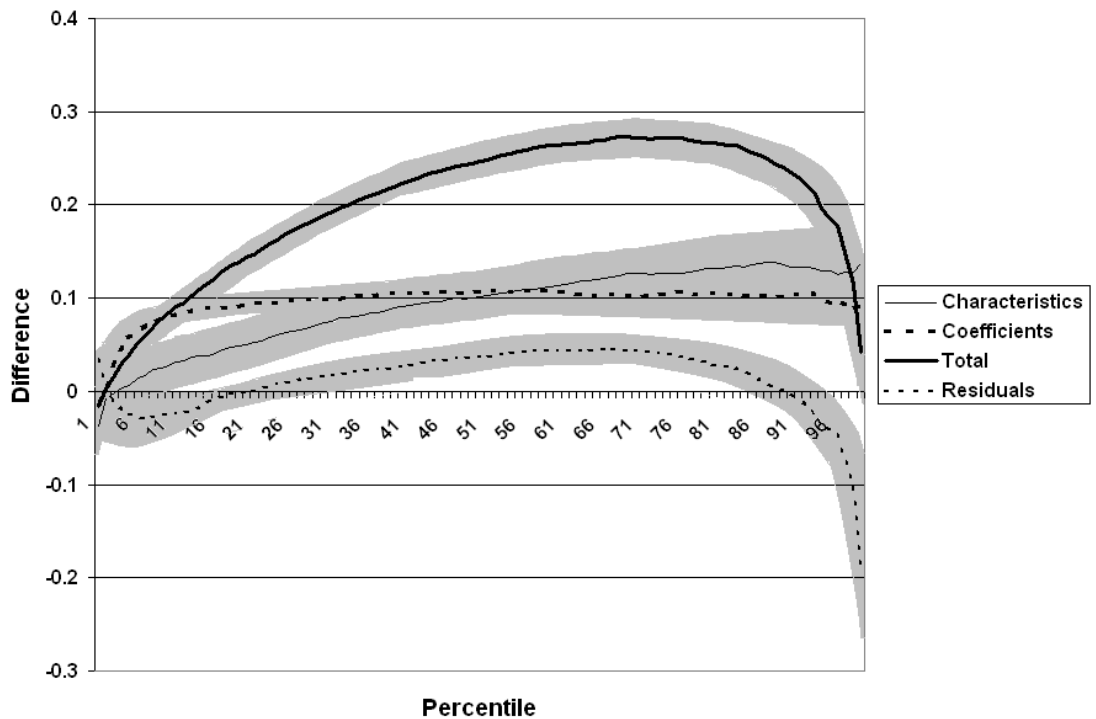
The public-private wage premium decomposition for 2004 and 2009 is shown in Figs. 5 and 6.

**Fig. 5. Public-private wage premium decomposition, 2004<sup>4</sup>**



**Fig. 6. Public-private wage premium decomposition, 2009**

<sup>4</sup> The shaded area represents the 95 percent confidence interval, obtained by 200 bootstrapping replications.



The total wage premium is positive and increasing in wage, but starts decreasing after about 75<sup>th</sup> quantile. This shows that the public sector not only overpaid compared to the private one, but in doing so it had a more unequal wage distribution. There are two drivers affecting the wage premium across quintiles: changes in covariates and in residuals. The third factor – changes in coefficients (or returns to characteristics) between the public and private sector—has a positive and more or less constant contribution of 10 percent in the three years under consideration. This emphasizes a conclusion we drew before: the public sector rewards the same characteristics (education, experience, gender) better than the private one.

The first driver is the difference in covariates (or personal characteristics), which increases across all wage quintiles. This is entirely expected, and reflects the consistent

component of the wage-setting policy. The other driver is the difference in residuals—namely, the difference between how far the residuals are spread around zero for the median regression (50<sup>th</sup> quintile regression). The difference in residuals is significant and positive in the middle of the wage distribution, and negative in the upper tail. The negative difference (‘ceiling’) at the top of the wage distribution means that there is more dispersion at the top of the wage distribution in the private sector than in the public one, which is expected: at the top of the distribution, the private sector pays better. As it is evident from Figs. 5 and 6, the ceiling was more pronounced in 2004.

These findings are also confirmed by the inequality measures shown in Table 6 below. The difference between the 90/10 ratio increased in the favour of the public sector: from +0.45 in 2004 (3.46 – 3.01) to +0.53 in 2009 (3.28 – 2.76). This shows a reduction in inequality in the private sector which was not matched by a similar move in the public one. This conclusion is also supported by a sharp reduction in the Gini coefficient in the private sector (2.4 percentage points over 5 years), which was again not matched in the public sector. The Gini coefficient in the public sector dropped by only 1.4 percentage points. Because the change in residuals (the dotted line) show the upper tail of the private sector wage distribution became shorter in 2009, the 90/50 percentile ratio displays the same pattern as the 90/10 ratio: the inequality in the private sector decreased more (1.98 to 1.8) compared to the public one (1.95 to 1.8). This dynamics shows that the firings that took place in the private sector in 2009 occurred mostly in the top half of the wage distribution and led to a decrease in inequality, while the public sector was slow to adjust in the wake of the crisis.

**Table 6. Inequality measures**

Statistic	2004		2009	
	Private	Public	Private	Public
p90/p10	3.016	3.466	2.757	3.283
p90/p50	1.985	1.949	1.807	1.799
p10/p50	0.658	0.562	0.655	0.548
Relative Mean Deviation	20.07%	19.91%	18.14%	18.74%
Gini	27.69%	27.56%	25.30%	26.18%

## **VI. Concluding remarks**

Our paper shows the existence of a large, positive, and significant wage premium (about 10 percent) in the Romanian public sector between 2004 and 2009, which is at odds with the negative premium uncovered in a number of transition economies in Central and Eastern Europe. The public sector doesn't strive to be more egalitarian and equitable, as the wage premium grows in relative terms across the wage distribution. Breaking down the premium by occupational sector, we find out that the highest premium (25-30 percent) is in that sector where the state has the highest market share of employment, namely in public administration and defense. This finding suggests that workers in these sectors are receiving a rent, unrelated to their personal skills and abilities. A qualifier must be added, however: employees in the defense sector and in some parts of public administration face a number of limitations in terms of secondary sources of income, including the interdiction to start a business.

To account for the possibility of self-selection in the public and private sectors, we instrument the public sector dummy variable with the number of other public sector employees in the family, marital status, and the number of minor children in the family. Two conclusions arise from this: the number of other public sector employees in the family is a significant driver of public sector employment, most likely by facilitating

access to the job, and the self-selection effect is weak or non-existent, as the public sector wage premium remains significant and in the same range (7-10 percent).

We further decompose the wage premium into the effect of coefficients, covariates, and residuals. This decomposition shows that in the bottom half of the wage distribution the biggest part of the premium is explained by differences in coefficients (the public sector rewards the same personal characteristics differently). In the top part it is the difference in covariates that represents the biggest part of the premium – this shows that higher wages are due in this case to personal characteristics, like education or experience, which is entirely justifiable. The difference in residuals shows a ceiling on public wages: it is positive in the middle of the wage distribution, and negative in the upper tail. The negative difference at the top of the wage distribution means that the private sector pays better and its wage distribution exhibits a longer right tail.

In spite of these ceilings and floors, the increase in public sector wages in the period under study (when the public wage bill grew from 4.8 percent of GDP in 2004 to 9 percent in 2009), created a more unequal wage distribution in the public sector compared to the private sector: the Gini coefficient went from being similar to being about one percentage point higher in 5 years. The Romanian government's 2010 decision to cut public sector wages by 10 percent, although it did help bringing the budget deficit under control, did not address the fact that there is more inequality within the public sector compared to the private one. A cut across the board in all public wages by the same percentage did not help to remedy this inequality.

This paper therefore shows two objectives the policymakers should follow: (a) reduce the public-private wage inequality by cutting/freezing those public wages that

offer a better reward for the same characteristics (education, experience) compared to the private sector, and (b) reduce the inequality within the public sector itself. This latter goal is to be achieved by the law of public sector compensation, to be implemented over the next few years. However, a unified compensation framework should go hand in hand with a unified performance evaluation. A clear framework for performance evaluation should be laid down, especially for those public services that have no private counterpart, like public administration, or the military.

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## Appendix 1.

Variable	2004						2009					
	Total		Private		Public		Total		Private		Public	
	19900		12628		7272		18516		13481		5035	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Log Wage	6.031	0.487	5.957	0.471	6.165	0.488	6.844	0.455	6.795	0.439	6.981	0.469
Secondary Edu	0.081	0.272	0.085	0.279	0.072	0.259	0.072	0.259	0.077	0.266	0.060	0.237
High-school Edu (reference group)	0.658	0.474	0.727	0.446	0.532	0.335	0.650	0.477	0.706	0.456	0.494	0.500
Univ Edu	0.261	0.439	0.188	0.390	0.395	0.489	0.278	0.448	0.217	0.413	0.447	0.497
Work Exper <= 5y	0.098	0.297	0.115	0.319	0.068	0.251	0.096	0.294	0.106	0.308	0.067	0.250
Work Exper 5-10y	0.132	0.338	0.145	0.352	0.107	0.310	0.116	0.320	0.119	0.323	0.109	0.312
Work Exper 11-15y	0.165	0.371	0.171	0.376	0.154	0.361	0.154	0.361	0.160	0.366	0.138	0.345
Work Exper 16-20y	0.166	0.372	0.172	0.377	0.155	0.362	0.155	0.362	0.153	0.360	0.162	0.369
Work Exper 21-25y (reference group)	0.133	0.340	0.129	0.335	0.141	0.348	0.162	0.369	0.163	0.369	0.161	0.368
Work Exper 26-30y	0.136	0.343	0.126	0.332	0.156	0.363	0.116	0.320	0.111	0.314	0.130	0.336
Work Exper 31-35y	0.112	0.316	0.096	0.295	0.141	0.348	0.110	0.313	0.104	0.306	0.127	0.332
Work Exper > 35y	0.058	0.233	0.047	0.211	0.078	0.268	0.090	0.287	0.085	0.278	0.106	0.308
Sex (0=male,1=female)	0.453	0.498	0.438	0.496	0.482	0.500	0.445	0.497	0.420	0.494	0.517	0.500
Term Contract	0.037	0.190	0.036	0.187	0.039	0.194	0.025	0.156	0.023	0.151	0.030	0.170
Bucharest	0.146	0.353	0.147	0.354	0.144	0.352	0.163	0.369	0.172	0.378	0.136	0.343
Fam Members in Public Sect	0.626	0.774	0.179	0.422	1.444	0.579	0.483	0.725	0.139	0.380	1.448	0.576
Marital status	0.228	0.419	0.252	0.434	0.183	0.387	0.226	0.418	0.234	0.424	0.203	0.403
No of children	0.870	0.923	0.883	0.926	0.846	0.916	0.739	0.875	0.735	0.875	0.750	0.873
Agriculture	0.027	0.163	0.028	0.166	0.025	0.157	0.024	0.154	0.026	0.159	0.020	0.142
Mining	0.021	0.143	0.008	0.090	0.045	0.206	0.016	0.124	0.010	0.099	0.032	0.175
Manufacturing	0.308	0.462	0.429	0.495	0.087	0.281	0.256	0.436	0.331	0.471	0.045	0.207
Utilities	0.033	0.179	0.015	0.120	0.067	0.250	0.025	0.157	0.019	0.136	0.043	0.203

Construction	0.074	0.262	0.103	0.303	0.023	0.149	0.096	0.295	0.125	0.331	0.017	0.128
Retail	0.154	0.361	0.225	0.417	0.024	0.154	0.194	0.395	0.256	0.436	0.019	0.136
Transportation, communications	0.077	0.266	0.069	0.254	0.091	0.288	0.086	0.281	0.089	0.284	0.080	0.272
Financial Services	0.018	0.134	0.017	0.131	0.020	0.139	0.022	0.148	0.024	0.154	0.017	0.130
Real Estate Intermediation	0.014	0.117	0.018	0.133	0.007	0.082	0.018	0.132	0.022	0.145	0.007	0.084
Public Administration, Defense	0.088	0.283	0.013	0.115	0.224	0.417	0.082	0.275	0.011	0.103	0.284	0.451
Education	0.070	0.256	0.005	0.071	0.189	0.392	0.061	0.239	0.007	0.081	0.213	0.409
Health and social assistance	0.066	0.248	0.018	0.134	0.153	0.360	0.061	0.239	0.021	0.145	0.172	0.378
Other social services	0.047	0.212	0.050	0.217	0.043	0.203	0.056	0.229	0.058	0.233	0.049	0.217