

Public – Private Sector Wage Differentials in Switzerland

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1. INTRODUCTION

Public sector pay has always attracted attention for obvious political reasons. Discussion on this topic typically grows bigger at times where public sector deficits take worrying dimensions. For labour economists, the subject is also of interest, because of the different nature of institutions that regulate wage determination in the private and public sectors. The main difference arises from the fact that private employers are profit maximizing agents, while public employers seek different goals when making labour demand decisions. Not only do they provide public goods and services that the market will not necessarily make available, but wages are also set with distributional considerations. Fairness, absence of discrimination and job security are also important characteristics of public sector jobs that will drive a wedge between private and public sector compensations.

Many studies have been devoted to the analysis of public-private sector pay differentials, with the aim of measuring the explained and unexplained portions of the mean wage gap. As will be detailed later, an important issue in this respect is the selection problem of workers in their respective sectors, which can impart a serious bias in OLS estimates. Unlike gender wage differential, the income differential between public and private sector may itself have an impact on the allocation of workers between the two sectors. Individuals will choose the sector which provides the greater benefit, which depends on the characteristics of the individual whether they are observable or not as on the prices given to the characteristics by each sector. This is the well documented selection issue that has been treated in the public-private sector wage differential literature by VAN OPHEM (1993) and HARTOG and OOSTERBEEK (1993) or more recently by DUSTMANN and VAN SOEST (1998).

More recently, some studies have paid attention to the decomposition of the wage differential not only at the mean, but also at all points of the distribution (see recent studies from POTERBA and RUEBEN, 1994, BLACKABY, MURPHY, and O'LEARY, 1996 and MUELLER, 1998). This approach is clearly attractive in the context of public-private sector wage differentials, as one expects these differentials to vary along the distribution. Simple techniques exist that enable one to decompose the wage gap at various points of the distribution into personal characteristics, prices and unobservables. In this study, we

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shall follow this route to examine differences between both sectors and their determinants in Switzerland.

The structure of the paper is as follows. In section 2, we describe the approach used to measure wage differentials. We first present alternative methods to decompose the differentials along the wage distribution, and then discuss how to address the selection problem in this context. Section 3 briefly describes the data set used for estimation. The next section is dedicated to the results. Finally, section 5 concludes and summarizes.

2. METHODOLOGY

2.1. *The breakdown of the wage differential*

In order to estimate public-private sector wage differentials, various methods have been put forth. A crude measure of the public sector premium is given by including a dummy variable in an earnings regression, containing both public and private sector workers. The coefficient attached to this dummy variable captures the effect of public sector affiliation, others things equal. Such a measure is however clearly unsatisfactory for many reasons. First, it rests on the assumption that the coefficients of all other variables are the same for both groups of workers. In other words, their characteristics are priced in the same way in both sectors, which is at odds with the arguments developed in the previous section. Second, wage differentials may vary substantially along the earnings distribution. This problem may even become more acute when male and female workers are considered. Finally, the very existence of a wage premium between the two sectors can be a source of measurement problem, when mobility between sectors is influenced by this earnings difference.

For all these reasons, care should be taken in estimating the wage gap and its determinants. POTERBA and RUEBEN (1994) have estimated public-private sector wage differentials by means of quantile regression. This technique enables one to measure the wage premium and the role of its determinants at different levels of the wage distribution. It is based on early work by KOENKER and BASSETT (1978).¹ The basic idea is to find linear regression coefficients at different quantiles by solving the following minimization problem:

$$\min_{\beta_q} \left[\sum_{\varepsilon_i \geq 0} q |\ln W_i - X_i \beta_q| + \sum_{\varepsilon_i < 0} (1 - q) |\ln W_i - X_i \beta_q| \right], \quad (1)$$

where q is the quantile level, $\ln W_i$ is the log of the wage rate of individual i , X_i a vector of observable characteristics including a binary variable for public sector affiliation, and β_q its corresponding coefficient vector to be estimated. The latter can be found by using

1. A recent survey of the method is provided in BUCHINSKY (1998).

linear programming techniques. Hence, with this method, one can estimate the wage premium at different quantiles of the distribution. As mentioned previously, this estimated premium suffers from a major drawback, in that individual characteristics can be expected to be priced differently between the two sectors. To overcome this problem, one can follow the standard OAXACA (1973) a approach applied to quantile regression estimates. Such a decomposition allows one to determine the ‘rent’ component or unexplained premium of the total wage differential, the rest being made up of different human capital endowments between sectors (or other observable characteristics). The decomposition formula can be written as follows:

$$\overline{\ln W}_q^{\text{pu}} - \overline{\ln W}_q^{\text{pr}} = \sum \beta_q^{\text{pr}} (\bar{X}^{\text{pu}} - \bar{X}^{\text{pr}}) + \sum (\beta_q^{\text{pu}} - \beta_q^{\text{pr}}) \bar{X}^{\text{pu}}, \quad (2)$$

where the left hand side of equation (2) is the log wage differential evaluated at the quantile q , $\beta_q^{\text{pu}}, \beta_q^{\text{pr}}$ are the public and private sector estimated coefficients at quantile q , and $\bar{X}^{\text{pu}}, \bar{X}^{\text{pr}}$ are vectors of average characteristics in each sector. The first term on the right hand side measures the portion of the total wage differential which is due to different average characteristics between sectors, while the second term is the unexplained or ‘rent’ component measured at average public sector characteristics. An alternative decomposition consists in measuring the ‘rent’ at average private sector characteristics. We however prefer the former decomposition, as it implies that the reference prices are those of the private sector.² Indeed, removing the ‘rent’ component would ascribe public sector employees wages consistent with market valuation of their human capital and other characteristics.

BLACKABY et al. (1996) have recently suggested yet another method based on JUHN et al. (1993) famous article. The JUHN et al. approach was initially proposed to measure the evolution of wage inequality in time, based on a decomposition including not only human capital characteristics and their rewards, but also unobservable attributes. We here follow BLACKABY et al. in that we abstract from comparing changes in time of wage distributions and their determinants, but keep the idea of comparing hypothetical wage distributions. More precisely, assume that the (log) wage equation of a public and private sector employees are respectively given by:

$$\ln W_i^{\text{pu}} = X_i^{\text{pu}} \beta^{\text{pu}} + \varepsilon_i^{\text{pu}}, \quad (3)$$

$$\ln W_i^{\text{pr}} = X_i^{\text{pr}} \beta^{\text{pr}} + \varepsilon_i^{\text{pr}}, \quad (4)$$

where $\varepsilon_i^{\text{pu}}, \varepsilon_i^{\text{pr}}$ are unobservable factors influencing wages of individuals in each sector. Following JUHN et al., this term can also be seen as a position in the residual distribution. Indeed, if $\theta_i = F(u_i|X_i)$ is the percentile of the residual of worker i with observable characteristics X_i , one can also write: $u_i = F^{-1}(\theta_i|X_i)$. This means that a worker can be

2. Clearly, public employers are part of the labour market, but they have some margin in the determination of wages and working conditions.

ascribed a residual from another residual distribution by picking the one corresponding to the percentile θ_i .

Hence, holding unobservables constant between sectors tantamounts to using the individual's residual ranking of his sector (the θ_i) in the average cumulative distribution of residuals computed over the full sample: $\bar{F}^{-1}(\theta_i|X_i)$.

This makes it possible to simulate (log) wage distributions based on differences either in the observable characteristics, or their prices or the unobservables. Firstly, we can build hypothetical (log) wages for public and private sector, holding prices and unobservables constant:

$$\ln W_i^{\text{pu}1} = X_i^{\text{pu}} \bar{\beta} + \bar{F}^{-1}(\theta_i|X_i^{\text{pu}}), \quad (5)$$

$$\ln W_i^{\text{pr}1} = X_i^{\text{pr}} \bar{\beta} + \bar{F}^{-1}(\theta_i|X_i^{\text{pr}}), \quad (6)$$

where $\bar{\beta}$ is the vector of average coefficients obtained by regressing over the whole sample. The difference between the two distributions will therefore only be due to observable characteristics.

Secondly, we can construct hypothetical (log) wages, holding only unobservables constant:

$$\ln W_i^{\text{pu}2} = X_i^{\text{pu}} \beta^{\text{pu}} + \bar{F}^{-1}(\theta_i|X_i^{\text{pu}}), \quad (7)$$

$$\ln W_i^{\text{pr}2} = X_i^{\text{pr}} \beta^{\text{pr}} + \bar{F}^{-1}(\theta_i|X_i^{\text{pr}}). \quad (8)$$

Here, the two distributions differ because of both varying prices and characteristics.

We can now decompose the total (log) wage difference between the two distributions at various quantiles into changes due to observable characteristics, changes in prices and changes in unobservables. Taking differences between the two sectors yields:

$$\Delta W_q = \ln W_q^{\text{pu}} - \ln W_q^{\text{pr}}, \quad (9)$$

$$\Delta W_q^1 = \ln W_q^{\text{pu}1} - \ln W_q^{\text{pr}1}, \quad (10)$$

$$\Delta W_q^2 = \ln W_q^{\text{pu}2} - \ln W_q^{\text{pr}2}, \quad (11)$$

which we can now use in the following identity:

$$\Delta W_q = \underbrace{\Delta W_q^1}_{\text{obs. char.}} + \underbrace{(\Delta W_q^2 - \Delta W_q^1)}_{\text{prices}} + \underbrace{(\Delta W_q - \Delta W_q^2)}_{\text{unobservables}}. \quad (12)$$

The method above, which is used by BLACKABY et al. for the analysis of public-private sector wage differentials, carries the advantage of solving the index number problem by taking average prices and average residual distributions. However, and as already mentioned earlier, one could also argue that the reference prices should be those of the private sector. The path followed by BLACKABY et al. does not allow to calculate the in-

come of public sector workers, if the the rewards of both their observable and unobservable characteristics were those of the private sector. As regards the prices of observable characteristics, the problem is easily solved by taking the decomposition measured at average public sector characteristics as in (2). For unobservables, the residual a public sector worker i with characteristics X_i^{pu} would obtain in the private sector is given by $F_{\text{pr}}^{-1}(\theta_i | X_i^{\text{pu}})$. As shown in BOURGUIGNON and MARTINEZ (1996), and as long as the error term follows a normal distribution,³ an equivalent procedure consists in multiplying the residuals of public sector workers by the ratio of standard errors: $\varepsilon_i \cdot \sigma_{\text{pr}}/\sigma_{\text{pu}}$.

Consequently, the (log) wage equation of a public sector employee i , facing private sector prices and unobservables can be written as:

$$\ln W'_i = X_i^{\text{pu}} \beta_{\text{pr}} + \varepsilon_i \frac{\sigma_{\text{pr}}}{\sigma_{\text{pu}}}. \quad (13)$$

2.2. Selection issues

A well-known problem that occurs when estimating separate regressions for public and private sector stems from the self-selection of individuals into their chosen sector. Workers in both sectors are not randomly allocated, since their presence in each sector follows from a choice based, among other things, on their expected income. Therefore, their wages reflect to a certain extent their decision to work in a given sector.

Simple earnings regressions will typically be biased in the presence of self-selection, as the expectation of the error term, conditional on the sector affiliation, is no more equal to zero. This problem is very similar to the one raised by HECKMANN (1976) for women's wage equations, when participation in the labour market is assumed to depend on their reservation wage. As we shall see in the data section, this participation problem of women cannot be avoided, since the data set only includes salaried workers.

The methodology to correct this endogeneity problem is in fact very similar. The switching regression model developed by LEE (1978, 1979) has been widely used in the context of public-private sector wage differentials.⁴ The basic idea consists in supplementing the wage equations (3)-(4) with the following sector structural choice equation:

$$I_i^* = \delta_0 + \delta_1 (\ln W_i^{\text{pu}} - \ln W_i^{\text{pr}}) + \delta_2 V_i - u_i, \quad (14)$$

where I_i^* is an index of net gain for worker i of being affiliated to the public sector, V_i is a vector of exogenous variables affecting the choice of sector and u_i is a random term. This equation can only be estimated as a qualitative dependent variable model, since I_i^*

3. This is also valid when the number of observations becomes increasingly large, which is the case in our study.

4. See for instance BELMAN and HEYWOOD (1989), HARTOG and OOSTERBEEK (1993), VAN OPHEM (1993), CHOUDHURY (1994).

cannot be measured. Only the individual's sector affiliation is observed ($I_i = 1$ for the public sector).

By assumption, $\varepsilon_i^{\text{pu}}, \varepsilon_i^{\text{pr}}$ from equations (3) – (4) and u_i follow a trivariate normal distribution with covariance matrix:

$$\text{Cov}(\varepsilon_i^{\text{pu}}, \varepsilon_i^{\text{pr}}, u_i) = \Sigma = \begin{bmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{1u} \\ \sigma_{21} & \sigma_2^2 & \sigma_{2u} \\ \sigma_{u1} & \sigma_{u2} & 1 \end{bmatrix}, \quad (15)$$

and the selectivity-corrected wage equations are obtained by introducing “inverse Mill's ratios” (a selectivity term) into the wage equations:

$$\begin{aligned} \ln W_i^{\text{pu}} &= X_i^{\text{pu}} \beta^{\text{pu}} - \sigma_{1u} \frac{\phi(Z_i \gamma)}{\Phi(Z_i \gamma)} + \xi_i^{\text{pu}}, \\ \ln W_i^{\text{pr}} &= X_i^{\text{pr}} \beta^{\text{pr}} + \sigma_{2u} \frac{\phi(Z_i \gamma)}{1 - \Phi(Z_i \gamma)} + \xi_i^{\text{pr}}, \end{aligned} \quad (16)$$

where $\xi_i^{\text{pu}}, \xi_i^{\text{pr}}$ are error terms with conditional expectations equal to zero, Z_i is the reduced-form vector of variables of the selection equation, and γ its corresponding coefficients' vector. The model can either be estimated via maximum likelihood or a two-step method, where the selection equation is first estimated in a probit model, and the inverse Mill's ratios are then inserted into the wage equations. The structural selection equation can then be estimated by introducing the estimated expected wage differential between sectors (computed with the selectivity corrected coefficients) into the probit equation.

The decomposition of wage inequalities between sectors becomes a little bit more complicated, since a selection term is now part of the simulated wage equations. Various methods can be used to take account of these terms and their coefficients, that are fully described in OAXACA and NEUMAN (1998). Here, we have chosen the solution where the selection term is simply taken as another characteristic of the individual, although we let its coefficient vary between sectors.

The simulated public sector wage equation facing private sector observable characteristics prices now becomes:

$$\ln W_i^{\text{pu I}} = X_i^{\text{pu}} \beta^{\text{pr}} - \sigma_{1u} \frac{\phi}{\Phi} + \xi_i^{\text{pu}}. \quad (18)$$

Adding a private sector selection coefficient, we have:

$$\ln W_i^{\text{pu II}} = X_i^{\text{pu}} \beta^{\text{pr}} - \sigma_{2u} \frac{\phi}{\Phi} + \xi_i^{\text{pu}}, \quad (19)$$

and with a private sector unobservables distribution, the simulated wage becomes:

$$\ln W_i^{\text{pu III}} = X_i^{\text{pu}} \beta^{\text{pr}} - \sigma_{2u} \frac{\phi}{\Phi} + \frac{\sigma_{\epsilon}^{\text{pr}}}{\sigma_{\epsilon}^{\text{pu}}} \xi_i^{\text{pu}}. \quad (20)$$

The decomposition can then proceed as before with the new selection terms added:

$$\Delta W_q = \ln W_q^{\text{pu}} - \ln W_q^{\text{pr}}, \quad (21)$$

$$\Delta W_q^{\text{I}} = \ln W_q^{\text{pu}} - \ln W_q^{\text{pu I}}, \quad (22)$$

$$\Delta W_q^{\text{II}} = \ln W_q^{\text{pu I}} - \ln W_q^{\text{pu II}}, \quad (23)$$

$$\Delta W_q^{\text{III}} = \ln W_q^{\text{pu II}} - \ln W_q^{\text{pu III}}, \quad (24)$$

$$\Delta W_q^{\text{IV}} = \ln W_q^{\text{pu III}} - \ln W_q^{\text{pr}}, \quad (25)$$

which we can now use in the following identity:

$$\Delta W_q = \underbrace{\Delta W_q^{\text{I}}}_{\text{prices}} + \underbrace{\Delta W_q^{\text{II}}}_{\text{selection coeff.}} + \underbrace{\Delta W_q^{\text{III}}}_{\text{unobs.}} + \underbrace{\Delta W_q^{\text{IV}}}_{\text{char.}}, \quad (26)$$

where the characteristics also include the inverse Mill's ratio.

3. DATA

The data we use come from the 1996 Swiss Wage Structure Survey (SWSS). The survey is made every two years since 1994 and is collected directly from employers via a questionnaire. The advantage of this survey, compared to phone surveys like the SLFS (Swiss Labor Force Survey), lies in the higher reliability of the data, especially with regards to earnings. On the other hand, the data set only covers wage and salary workers. For this reason, no sample selection correction can be made for non-participants. Further, the number of variable is quite limited, with only very little socio-demographic information. Children and family background is not available, nor is any specific information on the household like other sources of income. As regards public sector workers, it is worth mentioning that, unfortunately, the 1996 classification only includes federal administrations and agencies.⁵

Workers without a permanent status, as well as workers in the agricultural sector have been discarded. After deleting all missing observations, our final data set includes 209'255 men (of which 42'685 are in the public sector) and 137'213 women (of which 20'448 in the public sector).

5. Data on cantonal administrations have been collected but have not been made available for public use because of a reported lack of reliability of these data. The 1998 SWSS will include all public sector workers.

All variables have been constructed in a straightforward fashion. The dependent variable in our regression is the logarithm of the monthly wage rate (i. e. normalized to 40 hours per week). Education levels have been transformed in years of education, according to average values observed in Switzerland. Experience is simply given by age minus years of education minus 6. We include a cantonal unemployment rate as well as a dummy variable for french and italian speaking cantons. Other variables that we use are sets of dummies for the hierarchical position in the firm, a dummy for part time work, a set of dummies for the job skill requirement level and a dummy variable for job-skill adequacy.

4. RESULTS

A first picture of the public-private sector wage differential is provided in Figure 1 and 2 for men and women respectively, where we have plotted graphs from estimated kernel densities. As can be seen from these figures, the distributions are quite distinct between sectors. For men, the public sector wage distribution exhibits a clear mode around SF 6000, with a very steep tail on the left side of the distribution. The private sector distribution also has a mode around SF 6000, but it is characterised by a higher dispersion. For women, the two distributions have clearly different modes. Note also that the dispersion of wages in the private sector is not as strong as for men. For this reason, we have chosen to run separate regressions for men and women.

Figure 1: Public and private sector wage distributions for men (kernel density estimates), SWSS 1996

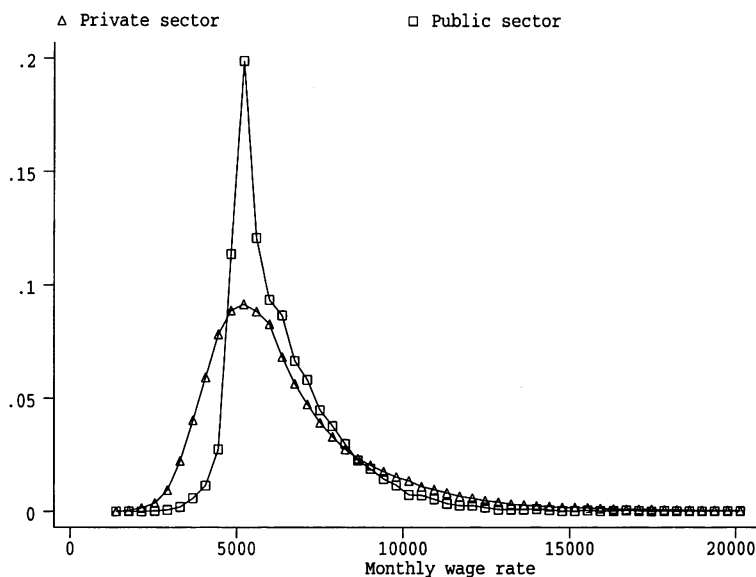
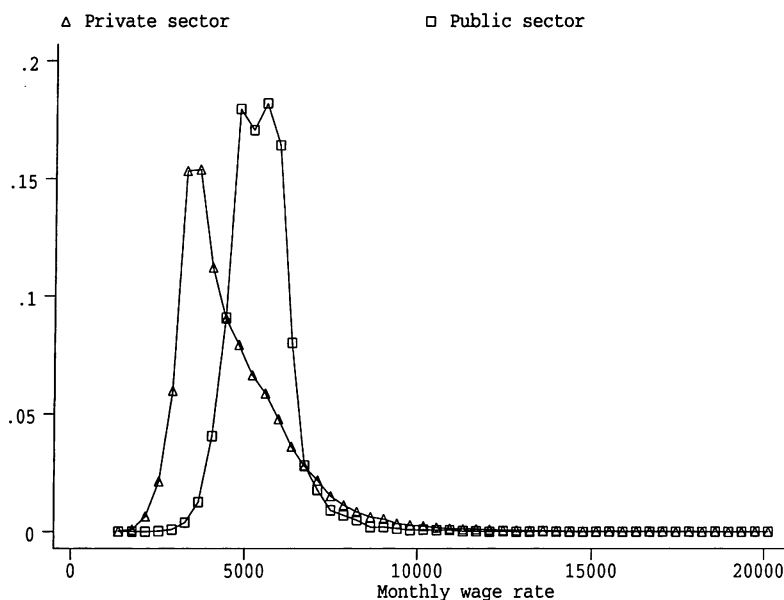


Figure 2: Public and private sector wage distributions for women (kernel density estimates), SWSS 1996

A first crude measure of public-private sector differences is given by a simple dummy variable for public sector affiliation in earnings quantile regressions. These premiums with their standard errors are displayed in Table 1 at various quantiles for both men and women. The premium shows a clear decreasing pattern for both genders, and becomes even significantly negative for men from the 75th percentile. Note also that the public sector premiums are much higher for women than for men.

Table 1: Quantile regressions and public sector premiums

Quantile	Men		Women	
	Coefficient	Standard error	Coefficient	Standard error
10	0.1055	(0.0018)	0.2964	(0.0026)
25	0.0641	(0.0015)	0.2287	(0.0020)
50	0.0275	(0.0014)	0.1505	(0.0022)
75	-0.0038	(0.0016)	0.0896	(0.0022)
90	-0.0373	(0.0022)	0.0423	(0.0033)
Mean	0.0231	(0.0013)	0.1369	(0.0019)

Control variables are identical to those of Table 5.

Standard errors in parentheses.

As stated in the methodological section, such estimated premiums are unsatisfactory as all other parameters are assumed equal across sectors. Table 2 shows the results of wage differential decompositions estimated with quantile regressions. First, it is worth noting that the (geometric) mean wage differential is almost inexistent for men, while it reaches more than 20 % for women. The breakdown of this mean differential into a characteristics component and a price contribution provides a rather blurry picture for men, since the total differential is too small to enable us to draw any conclusion. However, a closer look at the various quantiles makes it clear that the wage differential decreases as one climbs along the distribution, a result which is consistent with the public sector premiums described in Table 1. For men, both the contribution of coefficient differences and characteristics differences follow the same path. The former becomes negative at the 25th percentile, while the latter does so only from the 75th percentile.

Table 2: Decomposition of wage differentials (quantile regressions)

Quantile	Men			Women		
	Total	Char.	Coefficients	Total	Char.	Coefficients
10	0.1111	0.0027	0.1084	0.3644	0.0670	0.2974
25	0.0544	-0.0033	0.0576	0.2903	0.0793	0.2110
50	0.0046	-0.0083	0.0129	0.2019	0.0824	0.1194
75	-0.0377	-0.0167	-0.0210	0.1186	0.0741	0.0445
90	-0.0941	-0.0332	-0.0609	0.0560	0.0653	-0.0093
Mean	0.0067	-0.0084	0.0151	0.2047	0.0796	0.1252

Control variables are identical to those of Table 5.

For women, the wage differential tends to decrease too as one moves up in the distribution, but it never becomes negative. An interesting aspect of the decomposition at various quantiles is that characteristics contribute uniformly a positive portion of the wage gap in the range of 6.5 % to 8 % for the public sector. On the other hand, price differences, which account for more than four fifths of the wage differential at the 10th percentile, drop dramatically and even become slightly negative at the 90th percentile.

Note that the simple public sector premiums of Table 1 are quite valid approximations of the premiums unexplained by characteristics, especially for women and the lower ends of the distribution.

The basic message of Table 2 is that male public employees have higher characteristics endowments and more favourable rewards at the bottom of the distribution, whereas the opposite is true for high wage earners. For women, only rewards fall along the distribution. The existence of a 'rent' component at the low end of the wage distribution is consistent with a degree of 'social consciousness' from public sector employers who tend to decrease inequalities by paying implicit 'minimum wages'.

We now turn to the results of the various decompositions based on the Juhn et al. approach. Table 3 gives estimates of the wage decomposition at average prices and unobservables. As stated, this methodology enables us to add the contribution of unobservable characteristics to the total wage gap, which is given in the last column of the table. The characteristics component (ΔW_q^1) and coefficient contribution ($\Delta W_q^2 - \Delta W_q^1$) show a similar pattern to the one observed for both genders with the quantile regression technique. The contribution of unobservables is also decreasing along the wage distribution. We observe that for both men and women, unobservables contribute positively to the wage differential at the bottom of the distribution and negatively at the top.

Table 3: JMP Wage decomposition measured at average prices and unobservables

Quantile	ΔW_q	ΔW_q^1	$\Delta W_q^2 - \Delta W_q^1$	$\Delta W_q - \Delta W_q^2$
Men				
10	0.1936	0.0616	0.0544	0.0776
25	0.0766	0.0101	0.0246	0.0418
50	-0.0037	-0.0038	0.0045	-0.0044
75	-0.0572	-0.0072	-0.0075	-0.0426
90	-0.1491	-0.0855	-0.0045	-0.0591
Women				
10	0.3596	0.1048	0.1359	0.1189
25	0.3323	0.1372	0.1309	0.0642
50	0.2526	0.1323	0.1106	0.0097
75	0.0928	0.0573	0.1083	-0.0728
90	-0.0388	0.0038	0.0865	-0.1291

What are the reasons for this reversal of the impact of unobservables? It is difficult to find a clear-cut answer, for the very reason that we cannot identify what stands behind unobservables. However, two possible explanations come to mind. One is selection. Workers with high unobserved ability may self-select into the private sector at the top of the distribution, since they may find a ‘wage ceiling’ in the public sector. On the other hand, at the bottom of the distribution, these same workers have no incentive to go to the private sector, because of an implicit ‘minimum wage’ in the private sector.

The second explanation is related to the first. Unobserved ability is most probably better rewarded in the private sector, since public sector employers tend to follow stricter wage schedules based on tenure, formal education and other ‘observables’. On the other hand, workers in the private sector will receive a wage that more truly reflect their characteristics, whether they are observable or not. Again, one can put forth the argu-

ment that price differences for unobserved skills are probably greater at the upper end of the distribution.⁶

A refinement of the above decomposition consists in measuring wages public sector employees would earn, were they to face private sector prices and unobservables distributions. This is the BOURGUIGNON and MARTINEZ method described in section 2.1. In Table 4, we show the results of this decomposition. The fourth column, labelled "private sector", is merely the sum of the second and third column. It gives the difference between a public employee's actual wage and the wage he/she would earn in the private sector. As the table makes clear, the differences with Table 4 are not huge especially for men. Still, it is worth noting that for women, price contribution differences are greater between quantiles. Hence, women at the top of the distribution would not see such a big reduction in the reward of their observable characteristics, whereas their counterparts lying at the bottom of the distribution would lose a more sizeable premium on their characteristics. On the other hand, the respective gains and losses due to unobserved characteristics are smaller for both groups. Wage differences of public sector employees accounted for by private sector prices and unobservables are not very much different from those obtained with respect to average prices and unobservables in Table 3. Note

Table 4: JMP decomposition measured at public sector characteristics

Quantile	Δw_q	prices	unobservables	private sector	characteristics
<i>Men</i>					
10	0.1936	0.0867	0.0546	0.1413	0.0523
25	0.0766	0.0138	0.0635	0.0773	-0.0007
50	-0.0037	-0.0141	0.0088	-0.0053	-0.0023
75	-0.0572	-0.0116	-0.0594	-0.0711	0.0138
90	-0.1491	-0.0094	-0.0755	-0.0849	-0.0642
<i>Women</i>					
10	0.3596	0.1834	0.0867	0.2701	0.0895
25	0.3323	0.1585	0.0561	0.2145	0.1178
50	0.2526	0.1363	-0.0002	0.1361	0.1165
75	0.0928	0.0987	-0.0439	0.0548	0.0382
90	-0.0388	0.0483	-0.0740	-0.0257	-0.0128

6. At one extreme, the "superstars" argument (ROSEN, 1981) can also be invoked, although we do not regard it as a crucial explanation for the observed impact of residuals. In this model, employers are more interested in the relative ability of workers than in their absolute productive characteristics. Hence, they will compete for the best, so as to drive wages at very high levels for the most skilled.

Table 5: Earnings Regressions for Men, SWSS 1996

Variable	Uncorrected OLS		Two-stage estimates	
	Public sector	Private sector	Public sector	Private sector
Intercept	7.6362 (0.0077)	7.2778 (0.0048)	7.8566 (0.0239)	7.2692 (0.0055)
Education	0.0605 (0.0006)	0.0723 (0.0003)	0.0270 (0.0019)	0.0721 (0.0003)
Experience	0.0167 (0.0003)	0.0284 (0.0002)	0.0144 (0.0009)	0.0286 (0.0002)
Exp. squared $\times 10^{-3}$	-0.0255 (0.0007)	-0.0447 (0.0005)	-0.0306 (0.0018)	-0.0453 (0.0004)
Tenure	0.0051 (0.0003)	0.0040 (0.0002)	0.0119 (0.0008)	0.0046 (0.0002)
Tenure squared $\times 10^{-3}$	-0.0125 (0.0007)	-0.0034 (0.0006)	-0.0154 (0.0018)	-0.0054 (0.0005)
Married	0.0182 (0.0015)	0.0467 (0.0014)	0.0216 (0.0042)	0.0459 (0.0013)
Swiss national	0.0586 (0.0029)	0.0505 (0.0015)	0.0893 (0.0078)	0.0610 (0.0014)
Higher	0.5215 (0.0094)	0.4826 (0.0030)	0.4176 (0.0159)	0.4798 (0.0029)
hierarch. level				
Middle	0.4572 (0.0043)	0.3093 (0.0023)	0.3909 (0.0111)	0.3100 (0.0022)
hierarch. level				
Lower	0.2245 (0.0019)	0.2099 (0.0018)	0.2383 (0.0052)	0.2200 (0.0016)
hierarch. level				
Supervision and	0.0319 (0.0017)	0.1210 (0.0018)	0.0136 (0.0048)	0.1222 (0.0017)
control level				
Part time	-0.0932 (0.0030)	-0.0614 (0.0025)	-0.0759 (0.0081)	-0.0684 (0.0023)
Inverse Mill's	–	–	-0.1501 (0.0049)	-0.0243 (0.0020)
ratio				
Adjusted R^2	0.689	0.602	0.753	0.595
SER	0.1287	0.2301	0.1149	0.2320
Observations	42'685	166'570	42'685	166'570

Asymptotically consistent standard errors in parentheses.

Table 6: Earnings Regressions for Women, SWSS 1996

Variable	Uncorrected OLS		Two-stage estimates	
	Public sector	Private sector	Public sector	Private sector
Intercept	7.6360 (0.0162)	7.2211 (0.0075)	7.9868 (0.0162)	7.2072 (0.0061)
Education	0.0603 (0.0014)	0.0726 (0.0005)	0.0221 (0.0014)	0.0735 (0.0005)
Experience	0.0133 (0.0003)	0.0226 (0.0003)	0.0105 (0.0003)	0.0229 (0.0003)
Exp. squared $\times 10^{-3}$	-0.0282 (0.0007)	-0.0411 (0.0005)	-0.0246 (0.0003)	-0.0423 (0.0005)
Tenure	0.0202 (0.0004)	0.0081 (0.0003)	0.0246 (0.0003)	0.0098 (0.0003)
Tenure squared $\times 10^{-3}$	-0.0380 (0.0011)	-0.0048 (0.0010)	-0.0467 (0.0010)	-0.0074 (0.0010)
Married	0.0057 (0.0018)	-0.0390 (0.0016)	0.0033 (0.0017)	-0.0412 (0.0016)
Swiss national	0.0123 (0.0029)	0.0364 (0.0019)	0.0263 (0.0027)	0.0411 (0.0019)
Higher	0.5046 (0.0383)	0.3093 (0.0082)	0.4029 (0.0357)	0.2968 (0.0083)
hierarch. level				
Middle	0.3376 (0.0159)	0.2653 (0.0049)	0.2446 (0.0149)	0.2583 (0.0050)
hierarch. level				
Lower	-0.0012 (0.0023)	0.1720 (0.0032)	0.0693 (0.0025)	0.1841 (0.0033)
hierarch. level				
Supervision and	0.0541 (0.0038)	0.1328 (0.0027)	0.0273 (0.0035)	0.1347 (0.0027)
control level				
Part time	-0.0384 (0.0020)	0.0101 (0.0016)	-0.0303 (0.0018)	0.0123 (0.0016)
Inverse Mill's	-	-	-0.0821 (0.0014)	-0.0655 (0.0033)
ratio				
Adjusted R^2	0.484	0.361	0.553	0.376
SER	0.1123	0.2461	0.1042	0.2447
Observations	20'448	116'765	20'448	116'765

Asymptotically consistent standard errors in parentheses.

however that the reference group is not the same. Hence, the results based on Table 4 seem more appropriate to discuss the “rent” component of public sector wages. In this respect, the “rent” based on our results only exists for wages below the median.

We can now turn to the selectivity-corrected estimates which are presented in Table 5 for men and Table 6 for women. The correction procedure we have used is the traditional two stage method as described in MADDALA (1983). We have preferred this method to full information maximum likelihood, as sample size would make computation more involved. Further, and as argued in PUHANI (2000), two stage methods are recommended in presence of multicollinearity between the regressors and the inverse Mill’s ratio. This was the case in our estimations, as we found a condition number well above 30.

As can be seen, the fit of the earnings regression is generally good, especially for men and the public sector. Most coefficients have the expected sign and are highly significant. Turning to the inverse Mill’s ratios coefficients, we see that they are all negative. Following MADDALA (1983), this can be interpreted as follows. Public sector employees perform better in both sectors than a randomly chosen individual, but they are relatively more efficient in the public sector. Private sector workers are less efficient in both sectors than a randomly chosen individual but they have a comparative advantage in the private sector. Most other studies on the subject (HARTOG and OOSTERBEEK, 1993; VAN OPHEM, 1993; CHOUDHURY, 1994) also find negative coefficients for the public sector selection term, but fail to find significant coefficients in the private sector regression. Note that the difference $\sigma_{2u} - \sigma_{1u}$ is positive both for women and men, so that the estimates are consistent with the assumption of self-selection into the sector providing greater net benefits.

Table 7: Structural Probit Estimates of the Switching Regression Model

Variable	Men	Women
Intercept	-18.4741 (0.2150)	0.1193 (0.1355)
Education	1.6081 (0.0180)	-0.0353 (0.0101)
Experience	0.0848 (0.0019)	-0.0310 (0.0008)
Tenure	0.1134 (0.0020)	0.0691 (0.0009)
Unempl. rate	-0.0380 (0.0172)	0.0306 (0.0096)
Latin canton	0.5939 (0.0553)	-0.0486 (0.0297)
Married	1.9429 (0.0349)	-0.0804 (0.0135)
Part time	-0.7075 (0.0584)	-0.0856 (0.0139)
Coll. agreement	-7.5626 (0.2152)	-1.9250 (0.0287)
Job-skill match	-3.3508 (0.0492)	-2.1182 (0.0286)
Skill requirement level = 1	-6.7354 (0.0839)	-1.5165 (0.0653)
Skill requirement level = 2	-4.9999 (0.0617)	-1.5978 (0.0222)
Skill requirement level = 3	-2.0916 (0.0486)	0.3149 (0.0310)
Swiss national	1.4297 (0.0574)	0.4770 (0.0186)
Wage differential	39.0172 (0.3996)	1.3072 (0.1071)
χ^2	196'079.3	68'357.48
Observations	209'255	137'213

Standard errors in parentheses.

Skill requirement levels are: 1 = 'Top qualification, difficult tasks'; 2 = 'Highly qualified and autonomous worker' 3 = 'Specialized skills' and the left out category is 'Repetitive tasks, no qualifications'.

Some coefficients undergo significant changes when the selection term is included. This is especially true for the public sector. For instance, the return to education falls for both genders from approximately 6 % to slightly more than 2 %. This may be explained by a higher proportion of educated workers in the public sector than in the private sector. Other coefficients that are affected by the selectivity correction for the public sector earnings regressions are the nationality and the hierarchical level dummy variables. The latter effect may capture the effect of unobserved ability to climb up the ladders in the public sector hierarchy.

If we take a look at the structural probit estimates of our switching regression model on Table 7, we see that the potential wage differential is correctly signed and highly significant. For women, education and experience have opposite signs to men. A possible explanation could be that low-skilled women may be attracted by the public sector, due to the existence of an “implicit” minimum wage. In any case, the model shows that individuals are not indifferent to their wage prospects across sectors. Lowering wages in the public sector could affect the skill-composition of its workforce.

We can now turn to Table 8, where we report the decomposition based on the estimates of the switching regression model. A first point to note is that, for men, personal characteristics account for a more important portion of the wage differential compared to Table 4, and this is true at all selected points of the distribution. For women, this is only observed up to the 75th percentile. On the other hand, the price effect decreases notably for both men and women, and becomes negative at the 25th percentile for men, while it remains positive for women.

Table 8: Wage decomposition with self selection

Quantile	ΔW_q	ΔW_q^1	ΔW_q^{11}	ΔW_q^{111}	ΔW_q^{IV}
Men					
10	0.1936	0.0033	0.0700	-0.0067	0.1270
25	0.0766	-0.0672	0.0620	-0.0182	0.1000
50	-0.0037	-0.1038	0.0865	-0.0039	0.0175
75	-0.0572	-0.1191	0.1289	0.0177	-0.0837
90	-0.1491	-0.1693	0.1430	0.0276	-0.1504
Women					
10	0.3596	0.1533	0.0115	-0.0269	0.2217
25	0.3323	0.1166	0.0108	-0.0121	0.2170
50	0.2526	0.0969	0.0116	0.0079	0.1338
75	0.0928	0.0640	0.0118	0.0044	0.0100
90	-0.0388	0.0121	0.0112	0.0065	-0.0692

The selection term contributes positively to the wage gap at all levels of the distribution, as was expected from the sign of σ_{1u} and σ_{2u} . Hence, the public-private sector wage difference does not only come from different characteristics, prices or unobservables distributions, but also from a specific allocation of workers into both sectors. A last difference worth noticing with Table 4 is that the impact of unobservables decreases. Such an effect is also expected, since the selection term now captures part of the unobservables in Table 4.

5. CONCLUDING COMMENTS

In this paper, we have compared the wage distributions of public and private sector workers. Our results indicate that a wage gap exists for public employees, although only at the low end of the distribution for men, while it decreases along the distribution for women. This wage difference can be ascribed to the various components of wage determinants, namely personal and job characteristics, their prices and unobserved attributes. These are seen to have varying influence on the wage gap between men and women, as well as at different points of the distribution. At the bottom of the distribution, public sector workers earn a positive premium on their characteristics while this premium decreases (and even becomes negative for men) at the top of the distribution. Unobserved skills are found to exert some positive impact at the lower ends of the distribution and the reverse is observed for high wage earners. Finally, we show that selection does matter when we estimate a switching regression model, with very significant coefficients on the inverse Mill's ratios. Their signs indicate that workers of both genders choose the sector where they have a comparative advantage. Further, their values imply that public sector employees also have absolute advantages in both sectors compared to randomly chosen individuals. Including the selection term in the decomposition shows that public-private sector wage differences also stem from a specific allocation of workers into both sectors.

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SUMMARY

This paper measures the differences in earnings distributions between public sector and private sector employees, based on data from the wage structure survey of 1996. We first use quantile regressions to account for possible different wage premiums at various point of the distributions along the lines of POTERBA and RUEBEN (1994). As expected, we find that public sector employees at the low tail of the distribution earn a premium of up to 30 % for women and 10 % for men. On the contrary, the premium even becomes negative for men at the upper tail of the distribution. Following the methodology of JUHN, MURPHY, and PIERCE (1993), we next breakdown these inequalities into observable characteristics, price differences as well as unobservables. It is shown that unobservables tend to magnify the effect of prices along the distribution. Finally, we also estimate a switching regression model to account for possible selection bias. Our results indicate that public sector workers would perform better than average workers in both sectors.

RESUME

Notre étude vise à mesurer les différences entre les distributions des salaires des employés du secteur public et privé à l'aide de l'enquête suisse sur les salaires de 1996. Dans un premier temps, à l'instar de POTERBA et RUEBEN (1994), nous utilisons la méthode de régression de quantile afin de calculer d'éventuelles primes salariales à différents niveaux de la distribution. Nous observons que les employés du secteur public se trouvant dans le bas de la distribution des revenus engrangent une prime de 30 % pour les femmes et de 10 % pour les hommes. Par contre, cette prime devient négative pour les hommes se trouvant dans le haut de la distribution. Dans un second temps, à l'aide de la méthode de JUHN, MURPHY et PIERCE (1993), nous décomposons cette inégalité de salaires en trois éléments, soit les caractéristiques inobservables, les caractéristiques observables et les prix attachés à ces dernières. Nous montrons que les caractéristiques inobservables tendent à amplifier les effets des prix le long de la distribution de revenu. Finalement, nous estimons un modèle à changement de régime pour tenir compte d'un éventuel biais de sélection. Nos résultats indiquent que les employés du secteur public seraient plus performants que l'employé moyen aussi bien dans le secteur public que dans le secteur privé.

ZUSAMMENFASSUNG

Das Ziel unserer Studie ist, die Feststellung der Differenzen in den Lohnverteilungen der Angestellten des öffentlichen und privaten Sektors auf Basis der Daten der Lohnstrukturhebung von 1996 zu messen. In erster Linie folgen wir POTERBA und RUEBEN (1994), wenn wir mit der Methode der „Quantile regression“ Lohnprämien für verschiedene Niveaus der Lohnverteilung berechnen. Wir stellen fest, daß die Angestellten des

öffentlichen Sektors, die sich im unteren Teil der Verteilung befinden, eine Prämie von 30 % für die Frauen und von 10 % für die Männer erhalten. Aber Männer, die sich im oberen Teil der Verteilung befinden, erhalten eine negative Prämie. In zweiter Linie, gemäss der Methode von JUHN, MURPHY und PIERCE (1993), zergliedern wir diese Lohnunterschiede in drei Elemente, das heisst, die unbeobachtbaren Fähigkeiten, die beobachtbaren Fähigkeiten und die Preise, die mit den beobachtbaren Fähigkeiten verbunden sind. Wir zeigen, daß die unbeobachtbaren Fähigkeiten die Auswirkungen der Preise entlang der Einkommensverteilung erweitern. Schließlich schätzen wir ein „Switching Regression Model“, um eine mögliche Auswahlverzerrung in Erwägung zu ziehen. Unsere Ergebnisse zeigen, daß die Angestellten des öffentlichen Sektors leistungsstärker wären als der durchschnittliche Angestellte sowohl im öffentlichen Sektor als auch im Privatsektor.