

## WAGE DIFFERENTIALS BETWEEN THE STATE AND PRIVATE SECTORS IN MOSCOW

BY BRANKO JOVANOVIĆ\*

*CapAnalysis, Washington, D.C.*

AND

MICHAEL M. LOKSHIN

*The World Bank, Washington, D.C.*

In this study the 1997 Russian Labor Force Survey is used to investigate wage differentials between the state and the private sector in the city of Moscow. Our analysis demonstrates that substantial differences exist between private and state sector wages. We estimate the gap between private and state sector wages to be 14.3 percent for men and 18.3 percent for women. We also find gender differences in wages. Men in the private sector earn on average 23.7 percent more than women. The gender wage gap in the state sector is even higher at 32.5 percent. In the state sector, wages for both men and women increase as years of tenure increase. But in the private sector this is only true for men; women earn no return to tenure. The probability of employment in the private sector decreases with age and tenure.

### 1. INTRODUCTION

In 1991, 83.8 percent of men and 90.1 percent of women were employed in the state sector in Russia. Three years later, less than half the men and 62.2 percent of the women in Russia remained in the state sector (Brainerd, 1998). The number of employees in the state-owned enterprises continued to decline in the years that followed. Despite these trends a substantial share of the Russian labor force remained in the state sector in the late 1990s.

State employment on a large scale is of particular concern to Russia policy-makers, because it may mean a large wage bill in the government budget. The sizable state sector in Russia influences wage setting and other employment practices in the rest of the labor market (Tansel, 1999). But a growing wage gap between the private and state sectors may be weakening state influence over the labor market and affecting the economic status of various groups in the Russian population in different ways. On the one hand, economic reforms are allowing individuals to take advantage of the new opportunities that privatization is bringing about. On the other hand, generations of Russians trained and educated during the central planning era may be finding that their skills are irrelevant and their

*Note:* We would like to thank Finis Welch, Donald Deere and Manuelita Ureta, the participants of the Private Enterprise Research Center Applied Economics Seminar, and anonymous referees for their valuable comments and suggestions, and Ruslan Yemtsov for making the Russian Labor Force Data available to us. The findings and interpretation in this paper are those of the authors and should not be attributed to the World Bank Group or CapAnalysis.

\*Correspondence to: Branko Jovanovic, CapAnalysis, 1299 Pennsylvania Avenue NW, Washington, D.C. 20004, USA (jovanovicb@capanalysis.com).

employment opportunities slim in the private sector. At the same time the growing wage gap may make it increasingly difficult for the state to retain and attract new employees, particularly those with skills that are valued in the private sector. Since the selection of certain occupations implies employment in the state sector, able students may stay away from particular careers, contributing to a gap in employee quality between the state and private sectors. Low state sector wages may encourage employees to make less of an effort at work and moonlight, reinforcing the wisdom common in socialist times: in one's main job, one can always work less to compensate for low pay.

Most of the recent literature on state-private wage differentials examines developed, Western European economies (e.g. Dustmann and van Soest (1998) in Germany; Richard E. Mueller (1998) in Canada; and van Ophen (1993) and Hartog and Oosterbeek (1993) in the Netherlands). Evidence from developing and transitional economies is limited. The evolution of the private-state wage gap during economic transition has been addressed in Rutkowski (1996), Vecernik (1995), Flanagan (1995), and Benacek (1995). Recent analyses of this issue include Lokshin and Jovanovic (2003), which uses a Serbia and Montenegro Labor Force Survey, Adamchik and Bedi (2000), which uses Polish data, and Falaris (1999), which examines the public-private wage differential in Bulgaria.

Despite the subject's vital importance in the Russian context, research on the private-state wage differential and the reasons people choose to seek employment in one sector rather than another is rather limited. To our knowledge, the sole estimate of the wage differential between the two sectors in Russia is a paper by Brainerd (1998). She finds that the wage gap between the two sectors, unconditional on individual characteristics of the respondents, was significant and has increased between 1991 and 1994.

In this paper we use data from the 1997 Russian Labor Force Survey (RLFS) for the city of Moscow to assess how individuals are selected into state and private-sector employment, and to identify the determinants of wages in these two sectors. Do employees in the private sector fare better than those who stayed in the state sector? Are there any differences in returns to accumulated human capital between the state and private sectors? Are skills acquired under the old economic system still relevant in the market-governed economy? To answer these questions we use the standard switching model and estimate an equation for the decision to choose employment in a particular sector jointly with sector-specific wage equations.

Our results show that in 1997 the state-private sector wage gap in Moscow was 14.3 percent for men and 18.3 percent for women. We find the wage structure to be different for the two sectors. Age-earning profiles for all education and tenure groups show higher average wages in the private sector. Within the private sector, employees logging fewer years with a particular employer have a wage advantage over those with more years. Returns to education are higher in the private sector for both men and women.

This paper is organized into six sections. The next section describes the data and variables we use. Section 3 provides a descriptive analysis of the labor force. Section 4 outlines our theoretical framework and empirical specification. We present our empirical results in Section 5. In Section 6 we offer conclusions.

## 2. DATA AND DEFINITIONS

This paper uses the November 1997 round of the Russian Labor Force Survey (RLFS), conducted by Russia Statistical Agency. The RLFS is based on a nationally representative sample of men and women between 15 and 72 years of age. The survey consists of two parts. The main part is administered in all regions of Russia and contains questions on demographic characteristics of households and household members, their educational attainment, and their employment status. The supplemental module of the survey is administered in five regions of Russia—Moscow City, Moscow *Oblast*, *Chelyabinsk Oblast*, *Chuvash Republic*, and *Krasnoyarsk Krai*—covering 11,177 individuals, 5,483 from Moscow. This supplemental survey collects detailed information on wages, benefits, hours worked, characteristics of the firm (size, ownership type) where respondents are currently employed, and whether they are paid on time and in full. Respondents are also asked to report their employment history for the past seven years (industry of employment, type of firm ownership, etc.).

For the purpose of our study we restrict our sample to 4,590 self-reported full-time employees who reported positive monthly wages and hours worked. The self-employed and individuals employed in the Army and Police Force are excluded from our sample.

Respondents are classified as working in the private sector if they work in a new private enterprise, a privatized enterprise with the majority of ownership in private hands, or an enterprise with another form of ownership (mostly foreign-owned and joint-venture enterprises and public associations). State-sector employees are those employed in state-owned enterprises and institutions, municipal services, and privatized enterprises with the majority of ownership still under state control.

We define an hourly wage<sup>1</sup> as a ratio of the reported after-tax monthly wage (in thousands of 1997 rubles) and number of hours worked.

We limit our analysis to the Moscow city sample. There are several compelling reasons for doing this. The key condition for our analysis is that workers have jobs available to them in the state and private sectors. In Moscow, where large numbers of enterprises exist in both sectors, individuals can choose their sector of employment based on their preferences and abilities. In other regions of Russia, however, the job market is not so diverse. Workers may have to choose from a small number of enterprises under one type of ownership. The second reason for limiting our analysis to Moscow is the problem of wage arrears. Wage arrears (wages paid late and/or in part) could substantially complicate the analysis of the private-state wage gap. Wage arrears are less common in Moscow than in the other regions. In 1997 only 12.6 percent of employees in Moscow did not receive their wages on time and in full, compared to two-thirds of the employees in other regions (Lehmann *et al.*, 1999). Finally, even though Moscow is not representative of the all-Russia labor

<sup>1</sup>The average monthly wage in Moscow in 1995 was higher than the national average: 1,707,800 rubles for Moscow versus 531,600 rubles for Russia as a whole. The unemployment rate was lower in Moscow: 5.2 percent versus 8.7 percent in the rest of Russia (Goskomstat, 1996).

TABLE 1  
MEANS (AND STANDARD DEVIATIONS) OF THE SELECTED VARIABLES

	Male		Female	
	State	Private	State	Private
Hourly wage (thousand Rubels)	6.806 (3.321)	8.026 (4.066)	4.990 (2.630)	6.234 (3.666)
Hours (weekly)	39.856 (3.110)	40.442 (3.521)	39.077 (3.674)	39.840 (3.172)
Age	43.772 (11.389)	38.607 (11.321)	42.039 (10.694)	39.062 (10.980)
Number of children	0.320 (0.601)	0.314 (0.621)	0.279 (0.549)	0.323 (0.617)
Married	0.778	0.702	0.645	0.606
Eligible for retirement	0.077	0.030	0.120	0.083
Education				
Primary	0.040	0.068	0.040	0.054
Vocational	0.471	0.562	0.480	0.576
Secondary	0.013	0.014	0.007	0.022
Incomplete university	0.017	0.025	0.028	0.025
University and graduate degree	0.458	0.331	0.445	0.323
Years of education	13.115 (2.157)	12.478 (2.331)	13.191 (2.091)	12.679 (2.181)
Years with current employer				
0–2 years	0.056	0.140	0.059	0.150
2–5 years	0.114	0.330	0.141	0.299
5–10 years	0.290	0.305	0.286	0.304
10+ years	0.540	0.225	0.513	0.248
Sample size	1,208	1,154	1,353	875

marker,<sup>2</sup> its labor market is worthy of careful analysis on its own terms. We argue that the process of economic transition is more advanced in Moscow than in the rest of the country, and that the results of our analysis may provide clues to the kinds of changes that will occur in labor markets elsewhere in Russia.

### 3. DESCRIPTIVE ANALYSIS

Table 1 summarizes characteristics of the respondents by the sector of employment. Thirty-nine percent of women and almost half of the men in our sample are employed in the private sector. The data reveals that 2,586 (55.6 percent) individuals in our sample were always employed in the state sector, 1,028 (22.1 percent) made a transition from state to private sector, 15 (0.3 percent) made a reverse move, and 1,024 (20 percent) were always employed in the private

<sup>2</sup>Some may argue that the concept of hourly wage may not be appropriate for the Moscow labor market, in which wages are usually paid on a monthly basis. According to this argument, monthly wages would yield a more accurate assessment of the wage structure. For our analysis we need to control for the possibility that the private-sector employee's wage premium is simply a result of her/him working longer hours (Brainerd, 1998). We recognize that by computing hourly wages we allow for a measurement error to enter our analysis not only through reported wages, but also through reported hours. We attempt to minimize the possible negative effects of such a measurement error by restricting our sample to self-reported full-time employees with positive reported wages and hours worked.

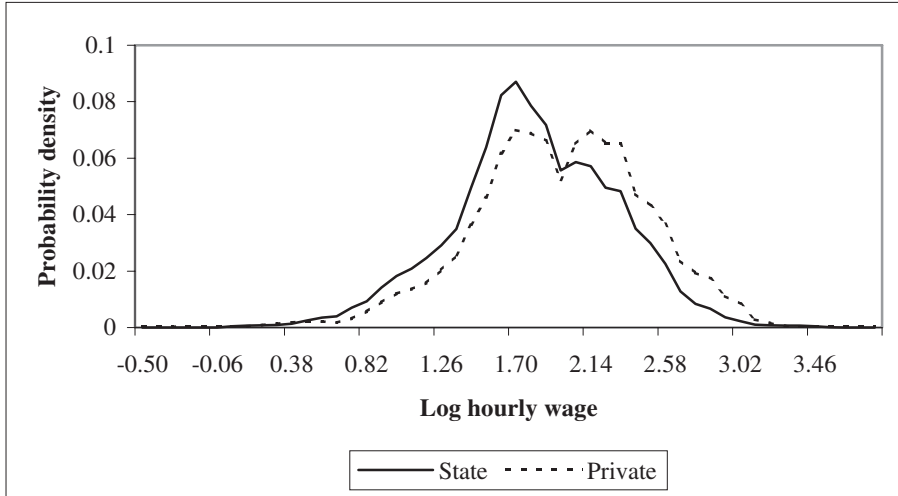
sector.<sup>3</sup> The private sector employees are younger, work more hours, and are less likely to be married. On average, the state sector employees have more years of education. The share of workers with university or postgraduate degrees is 12 percent higher in the state than in the private sector. Workers with less than higher education are over-represented in the private sector, suggesting that a university degree is not a deciding factor when getting a job in the private sector. More than half of the respondents employed in the state sector have 10 or more years of tenure with their current employer. The private sector is dominated by individuals with 2–5 years of tenure. Recent graduates are almost twice as likely to work in the private than in the state sector. About 15 percent of the private sector employees have worked with their current employer for less than two years. These individuals constitute a group that entered the private sector voluntarily, after the period of mass-privatization of 1992–95. This group is possibly larger since some of the employees with 2–5 years of tenure with the current employer may also have joined the private sector voluntarily. The remaining workers in the private sector simply remained in the enterprises that underwent the process of privatization.

On average, men employed in the private sector earn 15 percent higher wages than men in the state sector. But the wage premium is higher for women—female private-sector employees earn 20 percent higher wages than their state-sector counterparts. The kernel estimates of probability density function for the log hourly wage in the state and the private sector are presented in Figure 1. Based on the log variance, the private-sector wage distribution is more dispersed than the state-sector wage distribution for both genders. This finding agrees with a 90th to 10th decile ratio for women (Table 2). For men, the state-sector 90th to 10th decile ratio is higher than that for the private sector. The private-sector premium decreases for higher deciles, dropping from 12 percent in the 10th decile to less than 2 percent in the 90th decile. The right tail of the wage distribution is thicker for men employed in the state and for women in the private sector. The wider left tail for men in the private sector may reflect the concentration of workers with lower education employed in “productive” industries privatized between 1992 and 1994.

A comparison of private-state mean wages across educational and tenure categories reveals that there is a significant wage premium in the private sector (Table 3). The private-sector wage premium varies with years of tenure. For example, private-sector employees with ten or more years of tenure earn only about 5 percent higher wages than their state-sector counterparts. At the same time, private-sector employees with only 1–2 years of tenure earn almost 30 percent higher wages than their state-sector counterparts. Men and women

<sup>3</sup>An alternative way to assess the wage differential between the private and the state sector would be to use information on individuals’ work history, and compare the wages between the individuals who have and those who have not made a transition between state and private sector. This analysis, however, would yield a significant reduction in the number of individuals we can include in our analysis—a consequence we were not comfortable with. One additional setback would remain: this analysis would also suffer from the same limitation that our original analysis suffers from—we cannot identify individuals who “actively” switched the sector of employment and those who “passively” ended up in private sector as a result of their company becoming privatized.

(a)



(b)

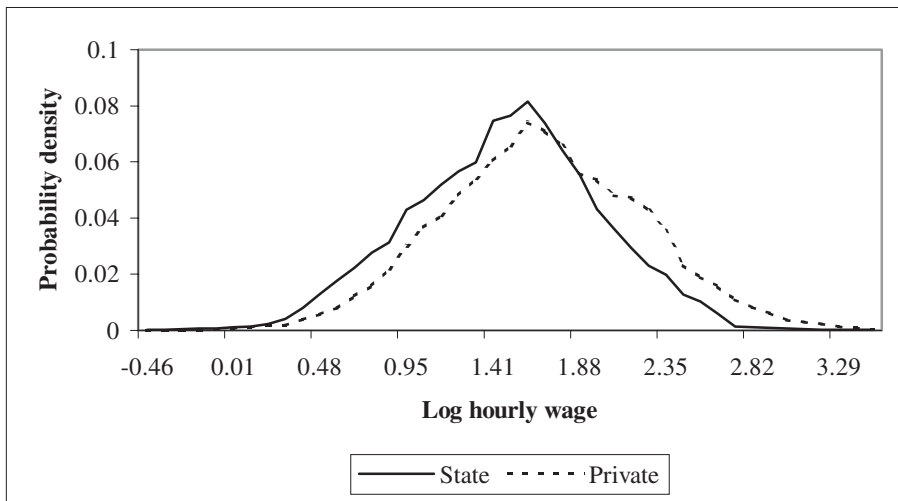


Figure 1. Probability Density Kernel Estimates of the Log Hourly Wage for (a) Men and (b) Women

with university or postgraduate degrees record above-average returns only in the private sector, with wage premiums of 20 percent for men and 25 percent for women.<sup>4</sup> Differences in the average wages between the two sectors are smaller for employees with fewer years of education and tenure. To summarize, despite the fact that state-sector employees have higher levels of education and more

<sup>4</sup>This sizable gap is based on unconditional wage means and is presented (and should be treated) as a part of descriptive analysis, not wage gap estimation.

TABLE 2  
SUMMARY MEASURES OF THE LOG WAGE DISTRIBUTION (STANDARD ERRORS)

Gender	Sector	Variance	Percentiles of the Log Wage Distribution				Decile Ratio			
			10th	25th	50th	75th	90th	90/10	90/50	50/10
Men	State	0.223 (0.010)	1.202 (0.059)	1.559 (0.005)	1.782 (0.000)	2.188 (0.008)	2.475 (0.027)	1.273 (0.066)	0.693 (0.027)	0.580 (0.059)
	Private	0.257 (0.013)	1.351 (0.063)	1.677 (0.020)	1.964 (0.009)	2.293 (0.050)	2.524 (0.058)	1.173 (0.076)	0.560 (0.060)	0.613 (0.061)
Women	State	0.254 (0.011)	0.866 (0.026)	1.089 (0.032)	1.531 (0.029)	1.782 (0.001)	2.188 (0.035)	1.322 (0.045)	0.657 (0.037)	0.665 (0.037)
	Private	0.294 (0.015)	1.027 (0.051)	1.273 (0.042)	1.677 (0.028)	2.070 (0.054)	2.370 (0.064)	1.343 (0.074)	0.693 (0.062)	0.650 (0.051)

TABLE 3  
HOURLY WAGE BY EDUCATION AND TENURE IN THE PRIVATE AND THE STATE SECTOR IN 1,000s Rb

	Male			Female		
	State	Private	Gap %	State	Private	Gap %
<i>Education level</i>						
All levels	6.806	8.026	15.201	4.990	6.234	19.955
Incomplete primary and less	3.962	5.035	21.311	3.197	3.521	9.202
Primary	5.892	6.322	6.802	3.410	4.208	18.964
Vocational	6.325	7.296	13.309	4.076	5.078	19.732
Secondary	5.742	8.964	35.944	4.066	6.345	35.918
Technical vocational	6.630	7.900	16.076	4.782	6.069	21.206
Incomplete higher	7.342	8.632	14.944	4.653	6.173	24.623
Higher and graduate	7.217	9.011	19.909	5.644	7.533	25.076
<i>Tenure</i>						
All	6.806	8.026	15.201	4.990	6.234	19.955
Less than a year	5.925	7.960	25.565	4.339	6.156	29.516
1–2 years	5.286	7.360	28.179	4.088	4.963	17.63
2–5 years	6.486	8.474	23.46	4.455	6.488	31.335
5–10 years	7.132	8.186	12.876	5.075	6.635	23.512
10 and more years	6.799	7.188	5.412	5.190	5.502	5.671

Note: Tenure is measured as the number of years with current employer.

years of tenure, on average, employees in the private sector enjoy a significant wage premium.<sup>5</sup>

#### 4. THEORETICAL APPROACH AND EMPIRICAL SPECIFICATION

Our theoretical framework follows a standard model of sector of employment choice (van der Gaag and Vijverberg, 1988).

The existence of two sectors in the economy determines the employment opportunities for Russian workers. According to our model, the individual's

<sup>5</sup>The wage advantage in the private sector may be a form of compensation for not providing employees with social benefits. The RLFS has information on benefit incidence, but not on their value. State enterprises indeed are more likely to provide benefits than those in the private sector, which may decrease the size of the wage premium in the private sector.

sectoral employment choice is based on a comparison of expected net benefits between the private and state sectors. State-sector employment could offer relatively secure employment and some non-cash benefits, but low wages. Higher wages in the private sector could be associated with greater employment uncertainty, lack of benefits, and an unregulated work environment.

Once an individual makes a decision on the sector in which to seek employment, she enters a pool of applicants from which employers select. The probability of being selected in a particular sector depends on the individual's characteristics as well as on the characteristics of the employer. Although a number of factors may influence the costs and benefits of employment in a particular sector, such as job security, flexible work hours, working environment, etc., we assume, following van der Gaag and Vijverberg, that expected benefits are equal to the difference in wage rates between the private and the state sector. This theoretical framework leads to the empirical specification based on the system of three equations: a binary equation for the sector-of-employment selection decision, and two equations that determine wages in the private and state sectors.

The probability of employment in the private or state sector could be affected by unobserved characteristics that correlate with the individual wage rates. For example, people with high entrepreneurial skills might find it easier to obtain a job in the private sector, and these skills could also help them to earn higher wages. Thus, the error terms in the equations in the system could be correlated and this might result in a bias in the estimation of the wage equations. The standard practice for dealing with such biases is to estimate the system of equations jointly using the Full Information Maximum Likelihood (FIML) method (e.g. Lee, 1973).

For identification of the sectoral choice equation we use three variables: industry of employment prior to 1992, marital status, and number of children in the household. The first variable accounts for the industry-specific skills that may not be important in the new private sector. It could also capture inertia in choosing the sector of employment and account for the lower cost of entering the private sector for individuals who were not in the labor force prior to introduction of economic reforms. We expect that those employed in the health, education, and science and research sectors are less likely to find employment in the private sector, since those industries have remained largely in the state sector. On the other hand, individuals employed in industries that were subjected to mass privatization are likely to be employed in the private sector. The marital status and number of children variables account for the importance of a secure job and its associated benefits when choosing a sector. We expect that the probability of private-sector employment for households with a large number of children is lower on average.<sup>6</sup>

The wage equations that we estimate take a common Mincerian form (Mincer and Polachek, 1974). The set of explanatory variables in the wage equation includes age and age squared; five educational dummies—primary education or less, vocational education, completed general high school, incomplete higher edu-

<sup>6</sup>An alternative argument would be that a person with a larger family and higher costs might seek employment in the private sector. Our assumption about the negative sign of this variable rests on our belief that a person with a large family would be more risk averse, and therefore less likely to accept a potentially more lucrative but uncertain position in the private sector if the safe but lower-paying job is available in the state sector.



cation, and university diploma or postgraduate degree. In addition, we attempt to capture the relevance of recent education by interacting the education dummies with age of the respondents. Finally, a firm-specific work experience is captured by four tenure dummies.

## 5. RESULTS

In this section we present two sets of estimates.<sup>7</sup> One set is based on the estimations of the system of equations under an assumption of independence of the error terms. In this case, the estimation of the wage equations and binary sector-of-employment decision equation are just simple ordinary least square (OLS) and binary probit type estimations. The second set of results is obtained by assuming the joint dependence of the error terms in the equations and estimating this system by the FIML method. According to the likelihood ratio test, the assumption of independent error terms is rejected in favor of jointly dependent error terms.

### 5.1. *Sector Choice Equation*

Table 4 reports the results of FIML estimations for the selection equation for men and women. There is a significant negative effect of age on the probability of private-sector employment for both men and women. The marginal effects of age on the probability of employment in the private sector are larger for men than for women. At the mean, the probability of private-sector employment decreases with each additional year by 6.3 percent for men and by 1.8 percent for women.

Longer job tenure also influences negatively the likelihood of private-sector employment. Compared to respondents with ten or more years with their current employers, all other tenure groups are more likely to work in the private sector.

Apart from individuals who obtained vocational training, employees with low educational attainment are less likely to be in the private sector. Since individuals with a high level of education dominate the state-owned health and education sectors, the positive effect of higher education in the private sector is somewhat surprising. Neither education nor education-age interaction terms are significant.

The industry of employment in 1991 significantly influences the chances of private-sector employment in 1997. Compared to the service sector, past employment in all industries, except health and education, has a positive effect on the probability of employment in the private sector. This supports the argument that some workers gained employment in the private sector when the enterprises in which they worked were privatized. Surprisingly, the individuals who were not in the labor force in 1991 (mostly men and women younger than 30 years of age, the majority of whom were students) are less likely to work in the private sector.

### 5.2. *The Wage Equation*

Sector-specific OLS and FIML estimates of wage equations for men and women are shown in Table 5.<sup>8</sup> When discussing the wage estimates, we focus on

<sup>7</sup>A likelihood ratio test indicates that the estimates for men and women differ significantly, and we report separate estimates for each gender.

<sup>8</sup>The Wald test ( $\chi^2=102.34,14$ ) rejects equality of regression coefficients between private and state sectors for men and ( $\chi^2=125.31,14$ ) for women.

TABLE 4  
FIML ESTIMATES OF THE SWITCHING EQUATION—LOG HOURLY WAGE

	Men		Women	
	Coeff.	Std. Err.	Coeff.	Std. Err.
Constant	1.211**	0.519	0.043	0.530
Age	-0.063**	0.023	-0.018	0.025
Age square*100	0.052*	0.027	0.005	0.031
Married	-0.136**	0.066	-0.002	0.061
Unmarried	Reference			
Number of children	-0.117**	0.043	0.001	0.048
Eligible for retirement	-0.318**	0.160	0.029	0.160
<i>Education</i>				
Primary and less	-0.040	0.420	0.096	0.486
Vocational	0.349	0.275	0.115	0.314
Secondary	-0.050	0.255	0.132	0.272
Incomplete higher	-0.298	0.620	-0.912	0.577
University or postgraduate degree	Reference			
<i>Tenure</i>				
2 years and less	0.401**	0.145	0.486***	0.145
2-5 years	0.577***	0.112	0.640***	0.119
5-10 years	0.810***	0.074	0.507***	0.076
10 or more years	Reference			
<i>Age-education interaction</i>				
Incomplete higher*age	0.010	0.016	0.025	0.017
Secondary*age	0.001	0.006	0.001	0.006
Vocational*age	-0.004	0.006	0.000	0.008
Primary and less*age	0.008	0.009	0.005	0.010
<i>Industry of employment in 1991</i>				
Agriculture and fishing	1.028	0.749	0.229***	0.382
Manufacturing	0.355***	0.077	0.294	0.088
Construction	0.570***	0.099	0.187	0.138
Mining and energy	0.334**	0.145	0.297	0.228
Transport and communications	0.362***	0.085	0.141	0.128
Trade	1.151***	0.133	1.198***	0.107
Finance	0.789***	0.203	0.774***	0.168
Health and education	-0.697***	0.140	-0.795***	0.010
Not in the labor force	-0.229*	0.100	-0.130	0.106
Services	Reference			
Number of observations	2,391		2,262	

Notes: \*\*\*Significant at 1% level; \*\*at 5% level; \*at 10% level.

the FIML estimates. The control group consists of individuals with high levels of education and ten and more years of tenure.

Men employed in the state sector reach the peak of their earnings by the age of 48, while those employed in the private sector reach their earning peak at age 44. Similarly, women earn their highest wages in the state sector at age 43, compared to age 40 in the private sector. Men in the state sector enjoy a higher age premium compared to those employed in the private sector, while women do not enjoy an age premium.

The effects of tenure on earnings for men are positive and significant, but smaller in the private sector than in the state sector.<sup>9</sup> Lack of tenure is penalized

<sup>9</sup>Although the coefficients on tenure are negative, the effect of tenure is positive. This is due to the fact that the omitted category is the most tenured group: employees with over 10 years of tenure.

TABLE 5  
OLS AND FIML ESTIMATES OF THE WAGE EQUATION

	OLS				FIML			
	Private		State		Private		State	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
<i>Men</i>								
Constant	1.489***	0.214	1.058***	0.210	1.840***	0.236	0.845***	0.215
Age	0.031***	0.010	0.039***	0.009	0.024**	0.010	0.040***	0.009
Age square*100	-0.038***	0.011	-0.045***	0.009	-0.027**	0.011	-0.042***	0.010
Incomplete higher	-0.394	0.308	0.132	0.366	-0.318	0.278	0.186	0.368
Secondary	0.114	0.141	0.213*	0.127	0.097	0.152	0.214*	0.128
Vocational	0.143	0.143	0.080	0.146	0.036	0.154	0.004	0.161
Primary and less	0.121	0.195	-0.1700	0.246	0.091	0.217	-0.160	0.268
2 years and less	0.003	0.072	-0.204**	0.088	-0.045	0.082	-0.281**	0.096
2-5 years	-0.082	0.054	-0.237***	0.069	-0.152**	0.059	-0.339***	0.069
5-10 years	0.018	0.034	-0.061	0.045	-0.078**	0.036	-0.195***	0.050
Incomplete higher*age	0.009	0.008	-0.003	0.009	0.006	0.007	-0.005	0.008
Secondary*age	-0.006	0.003	-0.006**	0.003	-0.005	0.004	-0.007**	0.003
Vocational*age	-0.009***	0.004	-0.004	0.003	-0.008**	0.004	-0.004	0.004
Primary and less*age	-0.011**	0.005	0.000	0.005	-0.012**	0.005	-0.002	0.006
Number of obs	1,164		1,227		2,391		2,391	
R-squared	0.077		0.059		-		-	
Sigma	0.491		0.461		0.528***	0.016	0.499***	0.019
Rho	-		-		-0.524***	0.083	-0.552***	0.084
<i>Women</i>								
Constant	1.249***	0.246	1.132***	0.20	1.407***	0.285	0.954***	0.203
Age	0.034**	0.011	0.027**	0.009	0.031**	0.013	0.030***	0.009
Age square*100	-0.044***	0.013	-0.034***	0.010	-0.039	0.015	-0.035***	0.010
Incomplete higher	0.156	0.363	-0.261	0.245	0.262	0.353	-0.109	0.264
Secondary	-0.104	0.167	-0.055	0.129	-0.110	0.161	-0.040	0.123
Vocational	-0.136	0.185	-0.050	0.155	-0.153	0.193	-0.058	0.162
Primary and less	-0.324	0.291	-0.421	0.260	-0.321	0.298	-0.462*	0.281
2 years and less	0.051	0.083	-0.163**	0.082	0.032	0.090	-0.243***	0.067
2-5 years	-0.199**	0.063	-0.172**	0.068	-0.230**	0.071	-0.267***	0.066
5-10 years	0.038	0.042	-0.126**	0.041	0.012	0.044	-0.210***	0.043
Incomplete higher*age	-0.008	0.010	0.005	0.007	-0.011	0.010	0.002	0.009
Secondary*age	-0.001	0.004	-0.003	0.003	-0.002	0.004	-0.003	0.003
Vocational*age	-0.006	0.005	-0.005	0.004	-0.006	0.005	-0.006	0.004
Primary and less*age	-0.005	0.006	-0.001	0.005	-0.006	0.006	-0.001	0.006
Number of obs	888		1,374		2,262		2,262	
R-squared	0.127		0.102		-		-	
Sigma	0.514		0.483		0.518***	0.014	0.505***	0.014
Rho	-		-		-0.249**	0.097	-0.469***	0.079

Notes: The reference category consists of employees with completed higher education, 10 and more years of tenure. Wages are in thousand of rubles.

\*\*\*Significant at 1% level; \*\*at 5% level; \*at 10% level.

less in the private sector. Employees with less than two years on the job in the private sector earn only 4.5 percent less than those with the highest level of tenure. In the state sector the wage difference between these two groups is almost 30 percent. Women in the private sector with less than two years of tenure and with 5-10 years of tenure earn, respectively, 3.2 percent and 1.2 percent less than women with the highest level of tenure. At the same time, in the state sector, women who have been employed for less than two years earn almost 25 percent lower wages than women with the most years on the job. Negative signs on the education-age interaction terms indicate that the returns on education decrease with time. However, returns to education, as well as the education-age interactions, are insignificant in both sectors and for both genders. For the employees in the private sector, the higher wages are likely to be a result of individual's unobserved

characteristics rather than to a large degree irrelevant skills obtained during the communist regime. As for the state sector where wage structure was designed to reward people with higher education, the insignificant returns to education are more puzzling. One should bare in mind, however, that in 1997 wages in the state sector were extremely depressed, and wage arrears were common.

A comparison of the OLS and FIML results indicates that for both genders there are differences in the private- and state-sector estimates. For men, the estimation under an assumption of the joint distribution of the error terms (FIML) leads to smaller age coefficients in the private sector. Education coefficients are also lower in the case of FIML estimation, and tenure coefficients are higher (although these coefficients are insignificant in both OLS and FIML estimations). Thus, without the correction for the selection bias the return in the private sector for men is understated and the return in the state sector overstated. Similar biases exist in the women's estimations.

For the private sector, the correlation coefficient between the error terms in the men's sector-selection equation and wage equation is negative ( $-0.524$ ) and significant. It is also negative ( $-0.552$ ) and significant for the state sector. These correlation coefficients for women have the same sign although the coefficients are smaller ( $-0.249$  for the private sector and  $-0.469$  for the state sector). Therefore, for both men and women the estimated selection effect is positive in the private sector and negative in the state sector. This means that unobservable characteristics of individuals in the private sector allow them to earn higher wages than the average private-sector worker. Individuals employed in the state sector have unobservable characteristics that lower their wages relative to the average worker. This pattern of positive selection suggests that the individuals with the better skills select themselves into the sector with a higher variance in wages.

Based on the estimates of the selection equation and the sector-specific wage equations, we predict the log hourly wage of 1.959 (equivalent to 7,092 rubles, since wages are reported in 1,000 rubles) for men in the private sector, and 1.805 (6,079 rubles) for men in the state sector. This implies that, at the mean, a male worker in the private sector earns 14.3 percent more than his counterpart in the state sector. For women, the private sector wage premium is 18.3 percent, with a log hourly wage of 1.682 (5,736 rubles) in the private and 1.480 (4,392 rubles) in the state sector. The larger wage gap between the state and private sectors for women may indicate that the sector-specific non-wage benefits could be a more important determinant of women's choice of a sector.

To further assess the wage differentials between the two sectors across the different education and tenure groups, we predict the conditional and unconditional wage in the state and private sectors. An unconditional wage, or offered wage, is an expected wage for an employee who is about to join a particular sector (demographic and human capital characteristics evaluated in their sector-specific "prices"). The conditional wage is a wage that an individual earns while working in that particular sector. The results of this exercise are presented in Table 6.

The offered wages in the private sector exceed those offered in the state sector for all education and tenure groups. While the wage in the state sector increases with tenure for both men and women, women employed in the private sector with less than two years of tenure earn a premium compared to women in the state

TABLE 6  
PREDICTED LOG WAGES IN STATE AND PRIVATE SECTOR (FIML ESTIMATES)

Education	Tenure (years)	Private Sector		State Sector	
		Unconditional (Offer)	Conditional (Observed)	Unconditional (Offer)	Conditional (Observed)
<i>Men</i>					
Primary and less	2 and less	1.917	1.767	1.127	1.532
	2 to 5	1.856	1.748	0.999	1.411
	5 to 10	1.873	1.782	1.237	1.605
	10 and more	1.855	1.665	1.477	1.703
Vocational	2 and less	2.024	1.884	1.203	1.502
	2 to 5	1.917	1.799	1.177	1.511
	5 to 10	2.000	1.897	1.351	1.725
	10 and more	2.040	1.853	1.579	1.769
Secondary	2 and less	2.165	1.973	1.349	1.571
	2 to 5	2.056	1.901	1.291	1.562
	5 to 10	2.135	2.009	1.452	1.739
	10 and more	2.194	1.966	1.656	1.819
Incomplete higher	2 and less	1.956	1.758	1.261	–
	2 to 5	2.050	1.932	1.270	–
	5 to 10	2.114	2.059	1.467	1.802
	10 and more	2.263	2.010	1.682	1.888
Complete higher	2 and less	2.273	2.065	1.423	1.671
	2 to 5	2.147	1.966	1.332	1.554
	5 to 10	2.245	2.099	1.519	1.792
	10 and more	2.329	2.079	1.740	1.875
<i>Women</i>					
Primary and less	2 and less	1.385	1.315	0.760	1.035
	2 to 5	1.063	0.926	0.715	0.938
	5 to 10	1.389	1.306	0.802	1.003
	10 and more	1.337	1.254	1.004	1.124
Vocational	2 and less	1.632	1.578	0.990	1.177
	2 to 5	1.386	1.298	0.981	1.202
	5 to 10	1.629	1.546	1.040	1.261
	10 and more	1.588	1.496	1.231	1.351
Secondary	2 and less	1.848	1.755	1.116	1.331
	2 to 5	1.570	1.493	1.080	1.330
	5 to 10	1.822	1.742	1.147	1.351
	10 and more	1.810	1.700	1.351	1.470
Incomplete higher	2 and less	1.878	1.746	1.161	–
	2 to 5	1.672	1.555	1.111	1.200
	5 to 10	1.914	1.834	1.188	1.326
	10 and more	1.822	1.713	1.486	1.578
Complete higher	2 and less	2.019	1.927	1.281	1.409
	2 to 5	1.738	1.650	1.238	1.428
	5 to 10	2.002	1.905	1.320	1.497
	10 and more	1.994	1.867	1.542	1.631

*Note:* Wages in thousands of rubles.

sector with a higher level of tenure. Focusing on new entrants (those with less than two years of tenure), the differences between the private- and state-sector wage offers are striking: for men, these differences range from 70 percent for workers with a low level of education to 85 percent for highly educated workers. The private-sector wage premium is smaller and extends from 63 percent for less educated to 74 percent for highly educated women. The gender wage differentials are

higher in the private sector, where men with primary education or less are offered a 53 percent higher wage than women with comparable education. In the state sector men have a 36 percent wage advantage. The gender wage gaps decrease with education. Highly educated men earn only 25 percent more than women in the private sector and 14 percent more in the state sector.

The return to tenure in the private sector is insignificant for women and for men with less than complete higher education. We find a modest tenure premium for men with higher education employed in the private sector. In the state sector, however, wages for both men and women increase as years of tenure increase. The conditional wage differentials for the new entrants, although high, are not as striking as the unconditional differentials. For men the conditional education wage premium ranges between 23 percent for individuals with primary education or less and 40 percent for highly educated workers. For women, the education wage premium is higher than for men. It ranges from 28 percent for individuals with primary education or less to 51 percent for highly educated workers. In the private sector, men with primary education or less are offered 45 percent higher wages than women, compared to a 50 percent advantage in the state sector. Within a sector, the gender differentials decrease with education. Highly educated men earn 13.8 percent more in the private and 26 percent more in the state sector, compared with women with the same level of education. Overall, men in the private sector earn 23.7 percent more at the mean than women in the same sector. The gender wage gap in the state sector is 32.5 percent.<sup>10</sup>

Our findings are comparable with the results of an earlier analysis of the wage differential in Russia. According to Brainerd (1998) men earned 16.4 percent less in the state than in the private sector in 1994. In 1997 the state-private wage gap decreased slightly to 15.4 percent. Wages of women employed in the state sector were 7.5 percent lower than wages of women employed in the private sector in 1994, and 20.2 percent lower in 1997. Nesterova and Sabrianova (1998) found a private sector wage premium of 20.8 percent and a male-female wage differential of 18 percent in Russia in 1994.<sup>11</sup>

Studies of wage differentials and sector employment decisions in other transition economies demonstrate similar trends. Adamchik and Bedi (2000), for instance, report a 22 percent earning advantage for men with university education and five years of tenure in the private sector, compared to their counterparts in the state sector in Poland. Our results indicate that Russian workers with similar characteristics enjoy a wage premium of 44 percent in the private sector. For

<sup>10</sup>Glinskaya and Mroz (2000) find that in 1995 women's average wages were 78 percent as high as men's hourly wages, without controlling for the state/private sector. Nesterova and Sabrianova (1998) estimate the gender gap to be 18.7 percent in 1996, after controlling for occupation, industry, regional and ownership effects. Both results are for all Russia.

<sup>11</sup>Brainerd uses a series of monthly cross-section surveys conducted by the All-Russian Center for Public Opinion Research (VTsIOM) in 1991, 1993 and 1994 as a primary source of the data for her study. The areas covered by the survey represent roughly one-third of Russia's 88 regions. Reported wages are monthly wages, and are unadjusted for hours worked. Nesterova and Sabrianova use Rounds 1 (1992) and 5-7 (1994-96) of the Russian Longitudinal Monitoring Survey (RLMS). The RLMS is the first nationally representative random sample for Russia, and has been carried out in two phases, with each phase based on a separate nationally representative sample of the Russian population. Since the RLMS contains no information on the ownership structure, for years 1994-96 the authors use information provided by respondents on their employers that was not part of the original data set.

women with the same education level and tenure, the private sector wage advantage is 21 percent in Poland and 22.2 percent in Moscow.

The important findings that come from our analysis are the low returns to education in both the state and private sectors and low returns to tenure in the private sector. Our results are consistent with other studies on returns to human capital in Russia. Newell and Reilly (1996) report only 3–4.5 percent return on human capital in the early period of Russian transition. Clark (2000) indicates that tenure and experience are not rewarded in the non-state or private sectors. The study by Cheidvasser and Benitez-silva (2000) finds that the returns to education in Russia in the 1992–99 period were low compared to other countries. In addition, these authors find “extremely low returns to tenure, which can become negative in certain specification.” They suggest that such low rates of return are demand driven and could be explained by an over-supply of well-educated workers in which blue-collar employees are in high demand.<sup>12</sup> We can also argue that the majority of workers who obtained training and education during the central planning era may find their skills less valued in the current economic conditions, and the rewards for these skills could be low. Alternatively, the distinction in education could be blurred by the labor market transition process, with a massive reallocation of workers possibly based on unobserved worker characteristics. Studies in other transition economies support these ideas. For example, Adamchik and Bedi (2000) find that in Poland wages in the private and state sectors increase with education, but not necessarily with tenure, which accords with our findings. Flanagan (1995) reports that recent market experience is more valuable than experience acquired under central planning.

Four methodological challenges may affect the findings in this paper: First, our study could be seen more as a cross-section of the Russian labor market under reconstruction, not as an analysis of an equilibrium situation. Many tendencies that we uncovered in this paper could be only temporary and disappear or change in the future. Second, our analysis is restricted to Moscow and our results might not be representative for the national labor market. Third, a significant proportion of Russian workers in the state and private sectors were subject to wage arrears in recent years and this may require us to adjust the model developed in this paper to include information about wage arrears. However, the analysis of such a model could be extremely intricate. Finally, as is well-known (e.g. Goldberger, 1983; van der Gaag and Vijverberg, 1988; Adamchik and Bedi, 2000), the FIML estimation results may be sensitive to the distributional assumptions made, as well as to the specification and identification of the switching equation.

## 6. SUMMARY AND CONCLUSIONS

The objective of this paper is to examine differences in wages and wage structures between the private and state sectors in Russia. We find systematic differences between workers in the state and private sectors. Younger men with little or

<sup>12</sup>The studies by Cheidvasser and Benitez-silva (2000), Clark (2000), and Newell and Reilly (1996) are based on data from RLMS, 1992–99. Cheidvasser and Benitez-silva (2000) argue that Newell and Reilly results are likely to be biased downward because of the way the education variables are constructed.

no tenure, and those who were employed in industries that were subjected to mass privatization in 1991, are more likely to be employed in the private sector. Compared with services, past employment in all industries, except health and education, has a significant and positive effect on the probability of employment in the private sector.

Once in the private sector, workers on average earn 16 percent higher wages than workers in the state sector, other things being equal. The private sector wage premium for women is higher than for men. Part of this gap may be offset by the benefits received by state-sector employees. If the non-wage benefits in the state sector are high, some workers may prefer the state sector even if the wages are higher in the private sector. Our data show that, compared to the private sector, a higher portion of state-sector employees enjoy benefits such as retirement benefits, sick leave, medical and childcare benefits, and meal, housing and transportation subsidies.

Wage structure differs across the sectors for both genders. Age-earning profiles for all education and tenure groups show higher average wages in the private sector at any age, and private-sector employees with fewer years with a current employer having a wage advantage over individuals with more tenure in the same sector. Somewhat surprisingly, education matters more in the private sector for both men and women, contradicting the initial hypothesis that acquired skill matters more in the private sector.

In Russia, the existence of a sizable wage gap can make it difficult for the state sector to retain and recruit workers with high ability, and may promote moonlighting for workers in the state sector. Moreover, young men and women may choose not to enter occupations that are concentrated in the state sector, such as medical doctors, teachers and researchers. All these factors can eventually further compromise efficiency in the state sector.

## REFERENCES

- Adamchik, V. A. and A. S. Bedi, "Wage Differentials between the Public and the Private Sectors: Evidence from an Economy in Transition," *Labour Economics*, 7, 203–24, 2000.
- Benacek, V., "Small Businesses and Private Entrepreneurship during Transition: The Case of the Czech Republic," *Eastern European Economics*, 33(2), 38–75, 1995.
- Brainerd, E., "Winners and Losers in Russia's Economic Transition," *American Economic Review*, 88(5), 1094–1116, 1998.
- Cheidvasser, S. and H. Benitez-silva, "The Educated Russian's Curse: Return to Education in the Russian Federation," Working paper #00-05, Department of Economics, SUNY-Stony Brooks, 2000.
- Clark, A., "The Returns and Implications of Human Capital Investment in a Transition Economy: An Empirical Analysis for Russia, 1994–98," Discussion paper #2000/02, School of Management, Heriot-Watt University, 2000.
- Dustmann, C. and A. van Soest, "Public and private sector wages of male workers in Germany," *European Economic Review*, 42, 1417–41, 1998.
- Falaris, Evangelos M., "Private and Public Sector Wages in Bulgaria," Mimeo, Department of Economics, University of Delaware, Newark, DE, 1999.
- Flanagan, R., "Wage Structures in the Transition of the Czech Economy," Working Paper #95/36, International Monetary Fund, Washington, D.C., 1995.
- Gimpelson, V. and D. Lippoldt., "Private Sector Employment in Russia: Scale, Composition and Performance," *Economics of Transition*, 7(2), 505–33, 1999.
- Glinskaya, E. and T. Mroz, "The Gender Gap in Wages in Russia from 1992 to 1995," *Journal of Population Economics*, 13, 353–86, 2000.



- Goldberger, A., "Abnormal Selection Bias," in S. Karlin and T. Amemiya (eds), *Studies in Econometrics, Time series and Multivariate Statistics*, Academic Press, New York, 1983.
- Goskomstat. *Russia Statistical Yearbook*, Moscow, 1996.
- Hartog, J. and H. Oosterbeek, "Public and Private Sector Wages in the Netherlands," *European Economic Review*, 37, 97–114, 1993.
- Lee, L., "Unionism and Wage Rates: A Simultaneous Equation Model with Qualitative and Limited Depended Variables," *International Economic Review*, 19, 415–33, 1973.
- Lehmann, H., J. Wadsworth, and A. Acquisti, "Grime and Punishment: Job Insecurity and Wage Arrears in the Russian Federation," *Journal of Comparative Economics*, 27, 595–617, 1999.
- Lokshin, M. and B. Jovanovic, "Wage Differentials and State-Private Sector Employment Choice in Yugoslavia," *Economics of Transition*, 11(3), 463–91, 2003.
- Mincer, J. and S. Polachek, "Family Investment in Human Capital: Earnings of Women," *Journal of Political Economy* (Supplement), 82, S76–108, 1974.
- Mueller, R. E., "Public-Private Sector Wage Differentials in Canada: Evidence from Quantile Regressions," *Economics Letters*, 60(2), 229–35, 1998.
- Nestorova, D. and K. Sabrianova, "Investment in Human Capital Under Economic Transformation in Russia," Economic Education and Research Consortium working paper series. No. 99/04, December 1998.
- Newell, A. and B. Reilly, "The Gender Wage Gap in Russia: Some Empirical Evidence," *Labour Economics*, 3, 337–56, 1996.
- Rama, M., "Public Sector Downsizing: An Introduction," *The World Bank Economic Review*, 13(1), 1–22, 2000.
- Rutkowski, J., "High Skills Pay Off: The Changing Wage Structure during Economic Transition in Poland," *Economics of Transition*, 4(1), 89–111, 1996.
- Tansel, J., "Public-Private Employment Choice, Wage Differentials and Gender in Turkey," Center Discussion Papers, Yale University, Economic Growth Center, 1999.
- van der Gaag, J. and W. Vijverberg, "Switching Regression Model for Wage Determination in the Public and Private Sectors of a Developing Country," *The Review of Economics and Statistics*, 70(2), 224–52, 1988.
- van Ophen, H., "A Modified Switching Regression Model for Earnings Differentials Between the Public and Private Sectors in the Netherlands," *The Review of Economics and Statistics*, 75(2), 215–24, 1993.
- Vecernik, J., "Changing Earnings Distribution in the Czech Republic: Survey Evidence from 1988–1994," *Economics of Transition*, 3(3), 355–71, 1995.