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Wage Differentials and State-Private Sector Employment Choice in the Federal Republic of Yugoslavia

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Abstract

Lokshin and Jovanovic use the newly available Yugoslavian Labor Force Survey data to investigate wage differentials and employment decisions in the state and private sectors in Yugoslavia. For the analysis the authors use three empirical models that rely on different statistical assumptions. They extend the standard switching regression model to allow non-normality in the joint distribution of the error terms. After correcting for the sector selection bias and controlling for workers' characteristics the authors find a private sector wage

advantage. The wage premium is largest for workers with low education levels and declining for workers with higher educational levels. Given the regulatory and tax policies that pushed the private sector into the informal sphere of the economy during the period covered by our data, the authors argue that the state-private wage gap is likely to grow in the future. This will make it increasingly difficult for the state sector to attract and retain highly skilled employees.

This paper—a product of the Poverty Team, Development Research Group—is part of a larger effort in the group to understand labor issues in public sector reform. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Patricia Sader, room MC3-556, telephone 202-473-3902, fax 202-522-1153, email address psader@worldbank.org. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The authors may be contacted at mlokshin@worldbank.org or jovanovicb@capecon.com. January 2003. (33 pages)

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WAGE DIFFERENTIALS AND STATE-PRIVATE SECTOR EMPLOYMENT
CHOICE IN THE FEDERAL REPUBLIC OF YUGOSLAVIA

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1. Introduction

It is generally accepted that of all the former centrally planned economies, the Socialist Federal Republic of Yugoslavia (SFRY) was best positioned to make a rapid transition to a market economy. In June of 1990 the federal government had introduced a law governing the transformation of social ownership, and the country seemed to be strongly committed to the reform process. However, a series of economic and political shocks accompanied by inconsistent and unrealistic economic policy caused the newly formed Federal Republic of Yugoslavia (FRY) to lag significantly behind other countries of Central and Eastern Europe in the process of reform. The economic recession of the last decade witnessed soaring inflation, a decline in the industrial output, and rising levels of unemployment in Yugoslavia. National GDP fell to the level recorded in the 1960s. By December 2000 812,400 people had registered as unemployed. The unemployment rate, including redundant workers from the state/social sector, reached almost 46% (Pinkulj, 2001).

To a large extent, the economic structure a country inherits from the past and the degree to which it adjust to the reform process determine its ability to integrate itself into the world economy and respond positively to new economic conditions. Because Yugoslavia made little progress toward reforms in 1990s, retaining an economy dominated by the state/social sector, it remains unable to take advantage of new economic opportunities.

The new government of Serbia, elected after the events of October 2000¹, is developing a framework that would allow 70 percent of enterprise equity to be offered to strategic investors. This restructuring and privatization of the social and state sector is certain to cause a large number of job separations. The private sector, consisting of small and medium size enterprises, operates mostly in the sphere of the informal economy. Encouraging its growth in the formal economy will be one of the more pressing issues for the government, especially since the state sector employs a large share of the working population. As privatization proceeds, therefore, the issue of the state/private sector wage

¹ The political events on October 5, 2000 that led to removing Milosevic from power and election of a new democratic government.

differentials will become increasingly important. The series of strikes (Serbian Post and Telecom, as well as Kolubara and Kostolac mines, are the most recent examples) caused by the restrictions on state sector wages raises a concern about the pressure to continue substantial state employment that may mean a large state wage bill in the government budget. The hardening of soft budget constraints will make it increasingly difficult for state and social enterprises to pay higher wages that are not backed by growth in productivity and efficiency. The result, a widening wage gap, is likely to encourage a number of state sector employees to look for employment in the private sector.

In this paper we attempt to quantify the wage difference between the two sectors after the reforms. In particular, we examine if employees in the private sector fare better than those staying on in the state sector. Are there any differences in returns to accumulated human capital between the state and the private sector? Are the skills acquired under the old system still relevant in the market-governed economy? Who are the individuals who would be affected the most by large-scale privatization? These are some of the questions addressed explicitly and implicitly in this paper.

To answer these questions we analyze the labor market data collected by the Yugoslavian Labor Force Survey (YLFS). We develop a simple sector-choice model to assess how individuals are selected into employment in the state and the private sector, and to identify the determinants of wages in the two sectors. We apply several econometric techniques and compare the results to test the robustness of the estimated earning gaps. Depending on the distributional assumptions, we estimate the wage gap by a simple regression, by the Full Information Maximum Likelihood (FIML) method of switching regression that takes into account the possible endogeneity of a sectoral choice, and by the Semi-Parametric FIML method that relaxes the assumption of joint normality imposed in the switching regression approach.

The results presented in this paper are interesting for several reasons. The paper is based on newly available data from YLFS, which allows the most up-to-date analysis of the wage situation. We also apply a new econometric technique that has not been used before for estimation of such types of models. Most important, to our knowledge, no formal analysis of the state-private wage differential and employment decisionmaking exists for Yugoslavia using this or any other dataset. The wage differential between the

state and private sector in developed countries, and more recently developing countries, has been analyzed extensively.² However, such studies are scarce for the transition economies of Central and Eastern Europe. Three recent studies address the sectoral wage differentials in Poland (Adamchik and Bedi, 2000), Bulgaria (Falaris, 2000), and Russia (Jovanovic and Lokshin, 2001).

Our results indicate that younger individuals are more likely to work in the private sector. Men's education level does not affect their probability of being employed in the private sector, but women with completed higher or professional education are more likely to work in private enterprises. After correcting for the sector selection bias and controlling for workers' characteristics, we find a private sector wage advantage. The wage premium is the largest for workers with low levels of education and declining for those with higher education levels.

2. Privatization in Yugoslavia

In contrast to most centrally planned economies, Yugoslavia introduced a concept of "social" ownership in 1952, and subsequently created a "self-management" model that relied somewhat on market signals. Since then, private smallholders have dominated agriculture, with more than 80% of cultivated land in private ownership. The government also allowed private ownership in the crafts and catering sectors, although such "private" firms were more like family businesses, with strict limits on the number of workers they could employ. Along with economic growth, the liberalization of the economy in the 1960s brought about increasing levels of inequality and unemployment, both of which were politically undesirable for the Yugoslav government. The reforms of the mid-1970s sought to regain control over the distribution of income by directly controlling the personal earning funds of business enterprises. The system of social contracts and self-management agreements regarding income distribution prevented successful Yugoslavian firms from paying higher wages, while weaker firms benefited from the significant redistribution of income (Vodopivec 1993).

² For a detailed overview of recent studies of wage differentials and sectoral choice decisions see, for example, Jovanovic and Lokshin (2001).

In June of 1990, a law governing the transformation of social ownership was introduced, followed by legislative measures designed to safeguard the inflow of foreign capital. The initial results were encouraging: by the end of the year, some 23% of “socially owned” capital entered the privatization process.³ This process enabled a new class of enterprises, known as mixed ownership firms, to emerge. Despite initial success, the Federal Privatization Law met with strong opposition and criticism, particularly in Serbia, where the federal government was accused of selling social equities at undervalued prices.

The second privatization phase started with the republics adopting privatization laws. The second phase unfolded as political disruption increased. The government that had introduced privatization turned out to be the last government of the SFRY, which, after the secession of Slovenia, Croatia, and Macedonia in the early 1990s, and the war in Bosnia, was reduced to the Yugoslav republics of Serbia and Montenegro.

In Serbia the Republican Law of “transformation of social property into other forms of ownership” was introduced in mid 1991.⁴ While keeping the employees’ shareholding scheme as the principal form of privatization, the law worsened the conditions of share selling.⁵ In addition, the law demanded that the assets valuation procedure (which was subject to approval by the Serbian Privatization Agency) precede privatization. This legal innovation resulted in a sharp decline in the number of firms undergoing privatization, let alone completing it.

Not only was privatization slowed, but also in some sense it was reversed. In the first quarter of 1992, for example, state control of capital was reintroduced. Cerovic (1999) reports that this move converted about 40% of social capital into state-controlled capital. The laws adopted by the Serbian Government in 1994 and 1997 further weakened the privatization process. To the contrary, the 1994 law almost completely “re-socialized” privatized equity (Cerovic, 1999).

³ The basic privatization model was employee share-ownership that allowed the firm employees to acquire the firm’s shares at huge discounts (30-70%) based upon the firm’s book value and with a 10-year payment term.

⁴ Although we focus on the privatization in Serbia, it is important to note that Montenegro does not share Serbia’s experience. For a detailed account of privatization in Montenegro see Cerovic (1999).

⁵ Employee discounts decreased to 20-60%, and the payment term was shortened to five years.

All these contradictory efforts at transition have left the FRY in late 2000 with two main economic sectors: a dominant state- and socially-owned enterprise sector and a private sector. While the state sector is thoroughly accustomed to soft budget constraints, making it inefficient, prone to substantial losses, and excessively indebted, the private sector (mainly composed of small- and medium-sized enterprises) has been dynamic and profitable (World Bank, 2001). Because the private sector has been severely constrained by overregulation, much of its economic activity has taken place in the informal economy. Furthermore, uneven playing field tilted towards the larger, socially owned companies has caused the private sector to suffer from a severe lack of investment and working capital. Nonetheless, the more numerous – but on average substantially smaller and far less capitalized – private firms produce more than half of all profits generated in Yugoslavia.

Given the striking differences between the two economic sectors, it should not be surprising that the wage structure in the state and private sectors differ considerably. In the period studied, the wages in the state sector were highly structured, with a fixed base wage and wage scales based on educational attainment, working conditions, and level of responsibility. While industry-based collective agreements determined the base wages, the scales were negotiated at the firm level and determined by the so-called collective agreements. State sector wages were not homogeneous across industries, or across the firms. While enterprises that enjoyed a monopolist position paid higher wages, those affected by economic isolation assumed a social role, and paid only minimum wages plus benefits (thus creating hidden unemployment). Wages in the state's service sector (including health and education) were based on the average wage in the "productive" sector. Although the wage ceiling existed in some form, it was hard to enforce due to chaotic economic conditions. Progressive taxation proved a more effective mechanism for wage equalization across the state sector. However, business enterprises used numerous loopholes to avoid the progressive tax, instead making alternative forms of payment to the government, such as consulting fees.

Pushed into the informal sphere of the economy, the private sector effectively avoided the wage regulating provisions. Anecdotal evidence suggests that employees were offered no benefits or, in rare cases, were given a choice between a higher wage

without benefits and a lower wage with benefits (social security and health benefits, in particular) (see for example Jovicic et al., 2000). Employees' pay depended almost exclusively on their productivity, but due to the hectic economic environment private sector employment offered little job security.

3. Data and definitions

The data for this study come from the newly available Yugoslav Labor Force Survey (YLFS). The YLFS is a nationally representative sample survey that has been carried out annually since 1994. The YLFS is based on a two-stage stratified sampling method (Federal Statistical Office 1998). The primary sample units are census districts with at least 20 households.⁶ The secondary sample units are households, chosen with the same probabilities. In the first stage, 880 census districts are sampled, and in the second five households are randomly selected in each census district. Individuals older than 14 years are targeted by the survey. Households are stratified across settlement type (i.e., urban, mixed, and rural) and across the Yugoslav territory (i.e., Central Serbia, Vojvodina, Kosovo, and Montenegro, with Kosovo and Montenegro being oversampled).

This paper uses surveys from 1995 to 2000. The 1995 survey was conducted in September, the 1996 survey in May, and the 1997 through 2000 surveys in October. Each round of the cross-sectional survey samples about 4,400 households. Information has been collected on approximately 12,000 members of these households.

The questionnaire used in the survey consists of two sections: The first section focuses on individual characteristics that include age, nationality, gender, marital status, and educational attainment. The second section collects information on the labor market status of individuals, nature of employment, hours worked and monthly earnings in the main job, labor force experience, occupation and skill levels, and the industrial activity and ownership of the place of work.

In using these data, we distinguish between two main sectors: social/state and private. In the social/state sector we include two additional forms of ownership – mixed

⁶ The fact that households from the census districts with less than 20 households have not been selected in the sample should not affect the results of our analysis, since these households are likely to live in remote areas and to be engaged predominantly in agricultural activities.

and cooperative. Cooperative ownership is an archaic type of ownership, with a very low share of the employees in the workforce. In 2000, for example, only 0.45% of the labor force was employed in cooperatives (see Table 1). The mixed sector comprises the firms that have started, but not completed, the privatization process. These firms typically hold a large share of state capital and are mostly socially owned. The “private” part of mixed ownership firms are held by other socially owned or mixed enterprises. For that reason, we believe that mixed ownership firms and social/state firms behave similarly and determine wages in similar ways. Changes in the percentage of employees in enterprises with different type of ownership are captured in Table 1. The share of workers employed in the private sector doubled in 2000 compared to 1995, while the percentage of those employed in mixed and cooperative firms showed a modest increase (less than 1.5 percentage points).

Our wage definition is based on main job earnings only, which includes the regular wage and all additional wage payments (transportation subsidies, payments in kind, and such). Main job wages exclude taxes, pensions, and welfare payments, and relate to earnings in the reference month. We compute the hourly wage as a ratio of the monthly wage and the total number of hours worked in the previous month. Because the survey reference period for hours worked was a week prior to the interview, we multiply the reported hours worked by 4.2 (the average number of weeks in a month), and assume that the number of hours worked was uniform in the month prior to the interview. In cases when the respondents do not report hours because of vacation or sick leave, we impute the average number of hours worked by gender and ownership sector. On average, across the years covered by the survey, we imputed work hours for 7% of respondents.⁷

4. Descriptive analysis

The levels of labor force participation (LFP) in Yugoslavia have been relatively stable during 1995-2000 (Figure 1). For both males and females the rates of LFP were

⁷ Although we do not impute hours for other forms of leave, it is worth noting that state sector employees were more likely to be on forced paid leave than the private sector employees in all years.

comparable or higher than in other transition economies. On average about 71% of males and about 55% of females 15 to 64 years old participated in the labor force in the late 1990s. The rates of LFP peak at the age of about 44 for men, when more than 80% of them work, and about 40 for women, when close to 60% of them work. About 10% of the labor force was unemployed in Yugoslavia during 1995-2000 (Figure 2). The unemployment rate among women is higher than among men, although this difference is not statistically significant.

The proportion of individuals employed in the private sector in Yugoslavia has been increasing steadily (Figure 3) since 1995. In 1995 6.3% of men and 9.6% of women were working in private enterprises and by 2000 the proportion had reached 12.5% for men and more than 17% for women. The difference between the number of male and female employees in the private sector has been fluctuating between 1995 and 2000, and remains significant throughout the period.

For the purpose of analyzing the state/private wage gap and differences in returns to education, we restrict our sample to full-time employed individuals who reported positive monthly wages and hours worked in the latest, October 2000, round of YLFS. Table 2 summarizes the characteristics of the respondents by gender and sector of employment. Workers employed in the private sector earn, on average, higher wages than the state sector employees, but this could be the selection effect, based on (observed or unobserved) heterogeneity in abilities. Private sector employees are on average younger, work more hours (both regular and overtime), and are less likely to be married. The share of highly educated workers is roughly 5% higher in the state sector for men and 9% for women. Men and women employed in the private sector have on average half the number of years of work experience compared with men and women in the state sector. Whereas the largest fraction of the men employed in the state sector worked in manufacturing and mining, most of the men employed in the private sector found work in trade, followed by crafts, construction, and tourism and catering. Most women in the state sector worked in services, followed by manufacturing and mining, while women in the private sector worked in trade (over 50% in all years) and tourism and catering (roughly 10%).

The wage structure of private and state sector employees is quite different. About 86% of total wages received by state sector workers come from regular payments, and

approximately 15.5% come from subsidies on transportation and meals. In the private sector, only about 4% of total wages come from such subsidies, and 96% come from regular wages. Payments in kind, credits from employers, and other kind of payments constitute less than 1% of total wages in Yugoslavia.

The wage distribution in the private and state sectors is described in Table 3. Based on the ratio of the 90th to the 10th deciles, we find that the state sector wages for men seem to be more dispersed, whereas private sector wages show more variation for women. For men, all major percentiles, apart from the 90th and the 10th, record higher wages in the private sector (the difference for the 90th percentile is insignificant). For women, the 10th and 90th percentile wages are lower in the state sector, while the middle of the wage distribution is similar for both state and private sectors. Wages in both sectors are more unequal for men than for women. Figure 4 further describes the wage distribution by plotting the probability density kernel estimates of the log hourly and log monthly wages in the state and the private sectors for males and females. The mean wages in the private and state sectors are almost the same for women, whereas men in the private sector enjoy a significant wage advantage over those in the public sector.

The nonparametric estimation of wage-age profiles is plotted in Figure 5 for men and women in the state and private sectors. Figure 5 reveals steeper age-wage profiles for men in the private sector. Only men under 25 years of age earn more in the state sector, and the gap between the two sectors reaches its maximum for workers just below 45 years of age. Past that age, the wage differentials decrease. The wage disadvantage for younger men employed in the private sector may be explained by their willingness to take a job with a lower initial wage, but an eventually higher earning potential. Jovicic et al., (2000) suggest that the private sector wage premium decreases with age because senior employees more often opt for lower wages with benefits (retirement and health benefits, in particular) than for higher wages and no benefits, a combination that may be more attractive for younger employees. The two sectors show no significant differences in the wage-age profiles for women.

Our results reveal a modest wage premium in the private sector for men, and an insignificant wage premium in the private sector for women (Table 4). For men in the state sector, a positive return exists to both general (as measured by education attainment)

and specific (as measured by experience) human capital. The results for women in the state sector are less conclusive: although a premium on general skill seems to exist, the premiums on specific skills are not obvious. The positive returns to education attainment and experience in the state sector should not be surprising: as pointed out earlier, the state sector wages combine base wage with increments for additional education and experience. There exists a significant private sector premium for men who have completed high school or professional school. Women enjoy a private sector wage premium only for higher educational attainment (professional school or university). While no significant differences exist between private and state wages for different experience groups, men with between 10 and 20 years of work experience have a wage advantage in the private sector.

Men employed in the agriculture, fishing, forestry, and water industry enjoy a significant state sector wage premium (bottom part of Table 4). Men employed in construction and tourism and catering, as well as women employed in manufacturing have higher wages in the private sector. Both men and women employed in trade and in services enjoy a private sector wage premium. The service sector comprises very different sub-sectors. In particular, it contains government, education and health, which hardly have any private sector counterparts. Thus, what we see as a private sector advantage is likely to be understated.

5. Methodology

Having discussed the current situation in the Yugoslavian labor market, the next step is to formulate a formal model of an individual's employment decision.

The existence of two sectors in the economy determines the employment opportunities in Yugoslavia. To choose between the sectors, an individual compares the expected net benefits in each sector. Once an individual decides on the sector in which to seek employment, she enters the pool of applicants from which employers select. The probability of being selected in a particular sector depends on the individual's characteristics. Although a number of factors may describe 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, 1988) that expected benefits are equal to the difference in wage rates between the private and state sectors.

An individual chooses to join the private sector if the expected benefits in the private sector exceed the expected benefits in the state sector. Formally, an individual i selects employment in the private sector if:

$$(1) \quad \ln W_{1i} - \ln W_{2i} > X_i \beta + v_i$$

where W_{1i} and W_{2i} are the wages (hourly or monthly) in the private and state sectors, X_i is a set of individual characteristics that determine the individual's probability of securing the job in the private sector, and v_i is an error term.

The choice of sector leads to two wage equations:

$$(2) \quad \ln W_{si} = Z_i \phi_s + \mu_{si}, s=1,2$$

where Z_i is a vector of characteristics that determine the wage level, μ_{1i} and μ_{2i} are the error terms, and index s equals 1 for the private sector and 2 for the state sector.

Depending on the assumptions about the correlation of the error terms μ_{1i} , μ_{2i} and v_i , we estimate the system of equations (1-2) in three different ways: a simple regression, the FIML method of switching regression, and the semi-parametric FIML method.

Under an assumption of independence of the error terms in (1-2), the wage and sector selection equations could be estimated by OLS and a binary response model. However, such an assumption can be problematic. Some jobs in the state sector were reserved as rewards for political loyalty and many were allocated based on personal connections. At the same time, individuals who left the state sector for the private sector likely had more entrepreneurial spirit and better earning opportunities in the private sector. Characteristics such as entrepreneurial spirit and the quality of one's political or personal connections are not measurable. Thus, the OLS method would produce, in general, biased results if individual wages are affected by unobserved characteristics that

correlate with the sector of employment.⁸ The commonly used approach to deal with this selection bias is the endogenous switching regression model (e.g., Lee 1978).

Combining equations (1) and (2), we can express the sector selection criteria in terms of a reduced form binary choice model:

$$(3) \quad G=1 \text{ if } L_i\delta + \mu_i > 0, \text{ and} \\ G=0 \text{ otherwise.}$$

Thus, an individual i is employed in the private sector if the gain from employment is greater than zero, and in the state sector otherwise. Vector L absorbs both vectors of exogenous variables X and Z , and μ_i ($\mu_i = \mu_{i1} - \mu_{i2}$) is a composite error term. Under an assumption of joint normality of the distributions of the error terms, the system of three equations (2-3) can be estimated jointly by using the method of maximum likelihood. This procedure gives unbiased estimates for coefficients $Z_{1,2}$, L , and for the standard deviations $\sigma_{1,2}$ of disturbances μ_1 and μ_2 . The correlation coefficients, ρ_1 and ρ_2 , between the composite error term μ and error terms μ_1 and μ_2 , can also be estimated.

However, the assumption about the joint normality of the error terms is rather restrictive. If the true joint distribution of the error terms is not normal, then the parameters estimated under the normality assumption would be biased and inconsistent. To relax this assumption we use the method of Semi-Parametric Full Information Maximum Likelihood (SPFIML) (e.g., Laird 1978, Heckman and Singer 1984, and Mroz 1999). This method allows us to estimate the system of simultaneous equations without specifying an exact functional form of the joint distribution of the error terms by approximating these distributions non-parametrically.

The system of equations (2-3) is identified even if the variables in X and Z overlap completely because of the non-linearity of the functional form. However, estimators that rely on functional form for identification are usually unstable. To achieve more reliable estimates, stronger identification restrictions are necessary, i.e., we need to include in our specification some variables that influence the selection into the sector, but do not influence the individual wage. For that purpose, we use two variables available in

⁸ Low rates of female LFP in Yugoslavia (Figure 1) may suggest that the bias in the wage estimation associated with the decision to participate in the labor market may also be large. However, the

the survey: marital status and number of jobholders in the household. These two variables may account for the importance of a secure job and its associated benefits in the sector choice decision.⁹ We assume that these variables do not also influence wages conditional on the sector choice.

6. Results

We estimate wage equations using both hourly and monthly wages as dependent variables. While understanding the problems associated with use of monthly wages for the analysis of wage differentials, the concept of hourly wages is virtually unknown in Yugoslavia, where most people are paid monthly. This is why we present the results of these two alternative specifications.

We present three sets of estimation results that correspond to three econometric specifications described in the previous section and compare results for the monthly and hourly wage estimations. According to the likelihood ratio test, the independent error term assumption is rejected in favor of the joint normal dependence of the error term's assumption (FIML). In turn the latter specification is rejected in favor of the specification that relaxes the assumption of joint normality of the error terms (SPFIML).

6.1 *Sector choice*

The results of the estimation of the sector choice equation for males and females are presented in Table 5. The set of explanatory variables for this estimation includes: age and age squared, a dummy variable that indicates that the person is single, the number of jobholders in the household, educational dummies with university degree or higher used as a reference category, a dummy variable showing that the person has a low skill category, and regional dummies that capture geographic differences in the sector choices

focus of the paper is on the differentials between the sectors of employment for those who chose to participate in the labor market, and we do not make adjustments for such types of bias.

⁹ We also tried to use as identifying variables the number of unemployed and the number of pensioners in a household, and the proportion of non-wage income in total individual income. Unlike marital status and the number of jobholders in the household, these variables were insignificantly different from zero in the selection equation.

with Belgrade used as a reference category. Summary statistics for the variables used in our analysis are shown in Table 2.

For both males and females, across almost the whole range of data, age has a negative and significant effect on the probability of being employed in the private sector. Educational attainment does not significantly affect the likelihood of private sector employment for males. Women with completed primary and high school, however, are more likely to work in the private sector than women with university or post-graduate degrees. Similar to the results for Poland (Adamchic and Bedi, 2000) the insignificant effect of education on the probability of private sector employment might suggest that the quantity of education may be less important in determining private sector participation than quality.

The skill level of males and females does not affect their decision about the sector of employment. Single individuals are significantly more likely to be employed in the private sector. The number of jobholders in the household has a positive and statistically significant effect on the sector choice of females but it does not affect the employment choice of males. The statistical significance of the coefficients on the number of jobholders in the household and their marital status points to the successful choice of identifiers for the estimation of the switching regression system.

6.2 *Wage equation*

Table 6 presents the OLS and FIML estimates of the sector-specific hourly (Table 6(1)) and monthly (Table 6(2)) wage equations for males and females. The wage equations take a common Mincerian form (Mincer and Polachek 1974). The set of explanatory variables in these regressions is similar to the variables used in the estimation of the sector choice equation, except for two identification variables. In addition to the latter variables, we include a set of industry dummies with a manufacturing industry selected as a reference category.¹⁰ Two variables that reflect the individual's total work experience are used instead of age variables.

¹⁰ The industry dummies could be endogenous in the wage equations (e.g., Knight and Sabot, 1981). However, exclusion of such variables from the wage equation in turn could lead to bias estimates if the industry of employment affects earnings. To test the effect of these dummies on our results we estimated an

When discussing the wage estimates, we focus on the FIML estimates.¹¹ We find almost no significant effects of education, years of experience, or skill level on the male wage profile in the private sector. Regional differences and industry of employment explain most of the variation in male earnings. Male workers employed in private sector agriculture, transport and communication, and trade earn significantly less than workers employed in other industries. Compared with Belgrade, employees of private enterprises in Serbia and Vojvodina earn less, but in Montenegro, they earn more.

In the state sector, however, individual characteristics affect male earnings significantly. Male workers with university or post-graduate degrees earn almost 44% more than male workers with only primary education. The difference between the earnings of male workers with university or post-graduate degrees and the earnings of male workers with high school diplomas and professional school degrees are smaller, but still significant.

Surprisingly, for the majority of male employees in the private sector, the level of experience has a negative and significant effect on their earnings. The wage rate declines as experience declines for both men and women with 22 years of experience or less. Individuals employed in manufacturing earn more than the state sector workers in any other industry. Geographical differences in the wages of employees in the state sector are similar to those in the wages of private sector workers.

The wage profile of female workers is quite different from that of male workers for both the private and state sectors. In the private sector, working females with greater work experience (up to 22 years) enjoy a significant wage premium. The level of education appears to have a strong and significant effect on female earnings. Women with university or post-graduate degrees earn significantly more than women with lower levels of education in the private sector. In contrast with the private sector wages of males, women confront substantial wage differences according to their industry of employment. Women working in manufacturing enjoy an earning advantage compared to women employed in other private sector industries.

alternative specification without the industry dummies and our main results were robust to the inclusion of these dummies.

The wage determinants of female workers in the state sector are similar to those of male employees. For younger women (women with less than 17 years of work experience) the wage rate declines as the years of experience decrease. Returns to women's education at all levels are significantly different from zero. As compared to women with a university or higher degree, the earnings of women with lower levels of education are lower in the state sector. However, the returns to education for female workers are distinctly higher in the private than in the state sector. For example, in the private sector, women with a university degree would earn on average about 80% more than women with a primary education; women in the state sector, however, would earn only 40% more. Looking at the wage differences by industry, women employed in state sector transportation and communication earn more than those in other state-sector industries, followed by women in manufacturing.

For both men and women there are differences between OLS and FIML estimates of the private and state earning equations. For men, the FIML estimation leads to smaller and insignificant coefficients on the experience variable in the private sector. Education coefficients are also lower in the case of FIML (although these coefficients are insignificant in both OLS and FIML estimations of the private sector wage equation). Thus, without correcting for the selection bias, the return for men in the private sector would be understated, but overstated in the state sector. Similar biases exist in the estimations for women.

The correlation coefficients between the error terms in the men's sector selection equation and wage equation are positive and significant for the state sector and negative and insignificant for the private sector. For women the correlation coefficient is negative for the private sector and positive for the state sector (Table 6(1)).¹² Therefore, the estimated selection effect is negative in the state sector. That means that women employed in the state sector have unobservable characteristics that lower their wages in comparison with a random individual from the sample. The selection effect is, however,

¹¹ A log-likelihood test rejects the independent error term estimation in favor of a joint switching regression estimation. A Wald test ($\Pi^2=102.34,15$) rejects equality of regression coefficients between private and state sectors for men and women ($\Pi^2=125.31,15$).

¹² The correlation appears in the conditional expectation of the wages:

positive for women employed in the private sector. Thus, the unobservable characteristics of female employees in the private sector allow them to earn higher wages than the average worker. This pattern of positive selection suggests that female employees with better skills select themselves into the sector with a higher variance in wages.

Comparing estimations based on hourly wages to those based on monthly wages shows that our findings are robust to such a change in the dependent variable. For men in the private sector, region and industry of employment mostly determine the variation in earnings. The levels of education and experience have a strong effect on male wages in the state sector. Earnings of women in the private sector are more dependent on individual characteristics in comparison with female earnings in the state sector.

6.3 *Semi-Parametric Full Information Maximum Likelihood (SPFIML)*

As we noted in the methodology section, the FIML method used in estimating the switching regression model imposes an assumption of joint normality on the distribution of the error terms in the system of equations (1-2). In this section we show the results of the alternative approach to estimation of the inter-sector earning function. This method is based on the SPFIML method and it estimates the joint distribution of the error terms non-parametrically.

To estimate the system of equations (1-2) non-parametrically, the following structure of the error terms can be specified:

$$\begin{aligned}\mu_{1i} &= \varepsilon_{1i} + \rho_1^1 V_1 + \rho_2^1 V_2 \\ \mu_{2i} &= \varepsilon_{2i} + \rho_1^2 V_1 + \rho_2^2 V_2 \\ \mu_{3i} &= \varepsilon_{3i} + \rho_1^3 V_1 + \rho_2^3 V_2\end{aligned}$$

where ε_{1i} and ε_{2i} are the independent error terms, ε_{3i} is an independent extreme value error, and V_1 and V_2 are common across factors in the equations. These common factors are unobservable variables that influence the choices made by individuals and are uncorrelated with the explanatory variables. The ρ coefficients are factor loadings that represent the effect of a given factor in each equation. The system of equations (1-2) can

$$E(\ln(w_{1i} | I_i > 0) = Z_i \phi_1 - \sigma_1 \rho_1 f(W_i \delta) / F(W_i \delta)$$

$$E(\ln(w_{2i} | I_i < 0) = Z_i \phi_2 + \sigma_2 \rho_2 f(W_i \delta) / (1 - F(W_i \delta)), \text{ where } f(W_i \delta) > 0 \text{ and } 0 < F(W_i \delta) < 1$$

then be estimated by the SPFIML method developed by Laird (1978), Heckman and Singer (1984), and Mroz (1999). This method assumes that V's are distributed by a step function. We introduce a two-factor structure for a system of three equations to account in the most unrestricted form for the possible sources of heterogeneity in the disturbances (Anderson and Rubin 1956).

Table 7 shows the results of the SPFIML estimation of the system of equations (1-2).¹³ In general, the SPFIML coefficients are similar in statistical significance and signs to the coefficients of the FIML estimation (Table 6[1] and 6[2]). As in the case of parametric estimations, the semi-parametric coefficients on education variables for males in the private sector are insignificantly different from zero. For male employees of the state sector, however, the SPFIML estimation shows a higher wage premium for education. For example, the difference in the hourly wages of male workers with high school and professional education is 20% for the FIML estimation and 23% for the SPFIML estimation. A similar picture emerges with the coefficients on educational dummies estimated on the sample of females working in the state sector. There is a 19% difference between the wages of female employees with high school and professional education in the state sector according to the parametric estimations and a 23% difference according to the semi-parametric estimations. For the private sector the situation is the opposite. SPFIML estimation produces coefficients that show lower returns to education relative to FIML estimation. Effects of the regions and industry of employment are analogous in these two estimations.

The comparison of estimations based on hourly and monthly wages indicates the robustness of our conclusion to the choice of the dependent variable.

6.4 *Wage differentials*

Based on the estimates of the selection equation and the sector specific wage equations, we can now analyze the gap between private and state sector earnings. For males, our

¹³ We estimate the SPFIML model with 3 points of support for each of two factors. Further increase in the number of points of support fail to produce a significant improvement in the value of the likelihood function. The likelihood ratio test rejects the specification with the normally jointly distributed error terms (FIML) in favor of unrestricted specification (SPFIML) for both male and female samples.

model predicts an average hourly log-wage of 2.91 (18.38 dinars) in the private sector and an hourly log-wage of 2.82 (16.78 dinars) in the state sector. This wage differential represents a 9.4% earning advantage for an average male employed in the private sector. For female employees, the difference in earnings between the private and state sectors is smaller. An average female worker in the private sector earns 15.33 dinars per hour (2.73 in logs), while her counterpart in the state sector earns 15.03 dinars (2.71 in logs). This represents about a 4% private-state wage differential. Comparing male and female earnings between sectors reveals that in the private sector men earn on average 20% higher wages than women. In the state sector the male/female wage differential is about 11%.

Aggregate wages based upon simulations using the semi-parametric estimation are presented in Table 8. These wages are defined as average predicted values of the state or private log wage rates conditional on being employed in the private or state sector. Males with university degrees employed in private enterprises earn higher wages than other males in the private sector. For every educational category, work experience seems to have a positive effect on private sector male wages. For example, a male with a high school diploma and less than five years of experience earns almost 23% less than a male with the same education level and more than 15 years of work experience. Returns to work experience are lower for males working in the state sector. State sector male workers who have completed high school and acquired more than 15 years of work experience would expect to earn only 5% more than workers with similar education and less than five years of experience. The private sector wage advantage tends to decrease for groups with higher levels of education. The private-state wage gap is about 11% for males with completed primary and high school, but it declines for male workers with professional school degrees, and disappears for those with university degrees or higher.

For women with university degrees or higher, the private/state wage differential is about 20%. Wages for women with only primary education or less are almost identical in the private and state sectors. Years of work experience seem to have a positive effect on women's wages in the private sector, but the effect of experience on earnings in the state sector is ambiguous.

7. Conclusion

In this paper we have analyzed the wage differences in the private and state sectors in Yugoslavia and examined the factors that determine the probability that Yugoslavians will be employed in one sector rather than another. Our main findings follow.

Younger individuals are more likely to be working in the private sector because they receive higher wages in that sector. For men education does not have a significant effect on the probability of being employed in the private sector. Women with completed primary and high school education are more likely to work in the private sector than women with higher levels of education.

Once in the private sector, male workers on average earn 9.4% higher wages than those in the state sector, other things equal. The private sector premium for women is about 4%. Part of this gap may be offset by the benefits state sector employees receive, such as insurance in the form of a greater job security. If non-wage benefits in the state sector are high, some workers may prefer working in that sector even if wages are higher in the private sector.

Wage structure differs across sectors for both genders. Wage profiles show higher average wages in the private sector at almost all levels of education and experience. However, the wage differentials decrease for individuals with the highest educational achievements.

Estimation of the alternative specification of our model using different econometric techniques demonstrates that our findings are robust with regard to assumptions about the distribution of the error terms and the choice of dependent variables and identification restrictions.

What are the consequences of the wage gap between the private and state sectors? The gap can make it difficult for the state sector to retain and recruit particularly able workers, and it may promote moonlighting and even encourage corruption among state sector workers. Furthermore, the gap may lead young men and women to avoid occupations concentrated in the state sector, such as medical doctors, teachers, and researchers. These outcomes could further compromise efficiency in the state sector.

Some analysts (for example, Adamchik and Bedi, 2000) have suggested that retraining employees to acquire skills demanded by the market may close the wage gap between the state and private sectors. Retraining would decrease the supply of labor in the state sector and increase the supply in the private sector, bringing the price of labor in the two sectors closer together. Although this approach would help the state firm shed excess labor, it is likely that only the most able and ambitious employees would choose to be retrained and to move to the private sector. This outcome would lead to further inefficiencies in the state sector, and a widening of the wage gap.

It is not clear why the closing of the wage gap alone should be an important policy goal. If higher wages in the private sector reflect the higher efficiency of private sector employees, the wage gap may well be justified. An alternative policy goal could be to assure equal access to the private sector. To achieve this, state sector employees can be retrained so that they acquire skills demanded in both sectors. As Rama (2000) points out, it is increasingly accepted that governments should focus their efforts on the core state activities that are crucial to development, such as delivering sound economic policies and providing basic health and education, rather than waste scarce resources on activities the private sector can do better, such as producing goods and services. Increasing wage differentials between the state and the private sector may provide the necessary push towards a smaller and more efficient state sector. The wage gap may also create a more efficient private sector, which ought to be one of the most pressing goals for the new Serbian government.

The Serbian government has begun to develop a new framework that will allow 70% of enterprise equity to be offered to strategic investors (The World Bank, 2001). Under this framework, new legal acts will facilitate privatization, create a new privatization agency, and prepare the sale of 34 “early win” firms to strategic investors with the assistance of international investment bankers. A main goal of this effort is to establish clearly defined and dominant owners, and to provide an institutional framework that will protect ownership rights and encourage both domestic and foreign investment. Such policy changes may trigger resource reallocation throughout the economy, which could influence wages and affect the number of people employed in the state and private sectors.

We believe that the state/private wage differential we estimate is in fact a lower bound of the wage differential between the two sectors, and that the wage premium in the private sector will increase in the wake of current reforms. In part this increase will result from the abandonment of the repressive regulation and over-taxation that pushed the private sector into the informal economy. Private sector wages (and benefits) are likely to be set with less constraint, based on employees' productivity and the overall performance of the firm. One may argue that the restructuring and privatization of the state and socially owned enterprises will inevitably cause a significant number of job separations, leading to open unemployment that will put downward pressure on private sector wages. The experience of other developing economies in transition, however, suggests that individuals who lose their state sector jobs often do not have qualifications that would make them competitive in the private sector. The recent experience of one of the largest manufacturing companies, Zastava Automobiles, the producer of the YUGO cars, indeed suggests that employees are aware that they need new skills in the changing economy. The restructuring of Zastava caused almost 50 percent of its employees to lose their jobs. Faced with a choice between retraining, getting a separation premium, and registering with the bureau for the unemployed, almost 75% of Zastava employees chose retraining.

References

- Adamchik, V. A. Bedi, V., (2000) "Wage differentials between the public and the private sectors: Evidence from an economy in transition." *Labour Economics* Vol. 7: 203-224.
- Anderson, T., Rubin, H., (1956) "Statistical inference in factor analysis." *Proceedings of the Third Berkeley Symposium on Mathematical Statistics and Probability*, Berkeley: University of California Press.
- Cerovic, B., (1999) "Costs of the Delay: Comparing Yugoslavia with Other Transition Economies." Mimeo, Economic Department of the University of Belgrade, Belgrade, Yugoslavia.
- Falaris, E., (2000) "Private and Public Sector Wages in Bulgaria". Mimeo, Department of Economics, University of Delaware, Newark, DE.
- Heckman, J., and E. Singer (1984) "A method of minimizing the impact of distributional assumptions in econometric models for duration data." *Econometrica* 52:271-320.
- Jovanovic, B., Lokshin, M., (2001) "Wage Differentials Between the State and the Private Sector In Moscow." mimeo, The World Bank.
- Jovicic, M., Nojkovic, A., Paranos, A., (2000) "Labor Force Survey Data on Wages and Earnings in the Private and Social Sectors in FR Yugoslavia." Mimeo, Economic Department of the University of Belgrade and Federal Statistical Office.
- Knight, J., and Sabot, R., (1981) "The returns to education: increasing with experience or decreasing with expansion?" *Oxford Bulletin of Economics and Statistics* 43:51-71
- Laird, N., (1978) "Non-parametric maximum likelihood estimation of a mixing distribution." *Journal of the American Statistical Association* 73(1978): 805-811.
- Lee, L., (1978). "Unionism and Wage Rates: A Simultaneous Equations Model with Qualitative and Limited Dependent Variables." *International Economic Review*, 19: 415-433
- Mincer, J., Polachek, S., (1974) "Family Investment in Human Capital: earnings of women." *Journal of Political Economy* (Supplement), Vol. 82: S76-S108
- Mroz, T. (1999) "Discrete factor approximations in simultaneous equation models: Estimating the impact of a dummy endogenous variable on a continuous outcome." *Journal of Econometrics*. Vol. 92(2): 233-74
- Pinkulj, A., (2001) "Economic Trends in 2000 and at the Beginning of 2001." *Yugoslav Survey*, Vol. XLII(1) : 77-108
- Rama, M. (2000) "State Sector Downsizing: An Introduction" *The World Bank Economic Review*, Vol. 13(1): 1-22
- Rees, H., Shah, A., (1995) "Public-private sector wage differential in the UK." The Manchester School of Economics and Social Studies
- Van der Gaag, J., Vijverberg, W., (1988). "A Switching Regression Model for Wage Determinants in the Public and Private Sectors of a Developing Country.", *Review of Economics and Statistics*, 70(2): 244-252
- Vodopivec, Milan (1993) "Determination of Earnings in Yugoslav Firms: Can It Be Squared with Labor Management?" *Economic Development and Cultural Change*, 41(3): 623-32
- The World Bank (2001) "Federal Republic of Yugoslavia - Breaking With the Past: The Path to Stability and Growth". Prepared by Ardo Hansson, Marina Wes and Juan Carlos Ginarte. The World Bank, Washington, DC

Table 1: Share of Employees across different ownership categories, 1995-2000

	1995	1996	1997	1998	1999	2000
State and Social	88.9	88.89	86.08	84.14	82.39	80.41
Private	7.7	7.09	8.85	11.18	12.79	14.46
Mixed	3.12	3.56	4.55	4.31	4.33	4.68
Cooperative	0.29	0.46	0.51	0.37	0.48	0.45

Table 2: Summary statistics of variables used in the analysis, October 2000

	Males						Females			
	State			Private			State		Private	
	Mean	St. Dev		Mean	St. Dev		Mean	St. Dev	Mean	St. Dev
Hourly wage – Main job (Dependent)	21.99	18.73		22.98	17.54		18.74	14.63	18.92	14.56
Hourly wage – Main and secondary job	23.26	32.26		23.14	17.67		18.82	14.74	18.92	14.56
Monthly wage – Main job (Dependent)	3678.45	3209.03		4351.76	3565.77		3090.04	2490.55	3321.86	2475.45
Monthly wage – Main and secondary job	3848.16	3345.87		4418.30	3584.74		3128.68	2519.78	3339.21	2467.72
Proportion of individual with two jobs	0.074			0.034			0.052		0.011	
Hours worked on the main job	39.665	9.619		46.334	14.869		38.973	8.248	43.285	7.784
Hours worked in main and 2 nd job	42.134	10.926		47.163	15.364		39.772	8.703	43.684	8.053
Number of job holders in the household	1.994	0.868		2.238	1.064		2.046	0.807	2.273	1.011
Age	44.838	10.068		35.323	11.416		43.644	8.735	36.000	10.879
Working experience	21.043	9.830		11.388	10.620		18.709	8.684	9.834	9.738
Marital status										
Single	0.168			0.477			0.119		0.354	
Education attainment										
Primary completed	0.194			0.112			0.162		0.118	
High school completed	0.593			0.777			0.575		0.756	
Professional school	0.094			0.038			0.111		0.055	
Skill level										
Blue collar – low	0.099			0.077			0.096		0.063	
Industry of employment										
Manufacturing and mining	0.432			0.146			0.289		0.092	
Agriculture, Fishing, Forestry and Water	0.080			0.019			0.035		0.015	
Construction	0.056			0.119			0.020		0.018	
Transport and communications	0.113			0.058			0.046		0.022	
Trade	0.060			0.342			0.109		0.576	
Tourism and catering	0.021			0.108			0.047		0.107	
Crafts	0.014			0.150			0.014		0.089	
Services	0.224			0.058			0.440		0.081	
Region										
Serbia	0.447			0.427			0.410		0.373	
Montenegro	0.133			0.146			0.122		0.144	
Vojvodina	0.234			0.169			0.217		0.214	
Sample size	1756			243			1233		254	

Table 3: Summary measures of wage distribution, October 2000.

	Male				Female			
	State		Private		State		Private	
	Mean	Sr. Dev	Mean	Sr. Dev	Mean	Sr. Dev	Mean	Sr. Dev
Major percentiles								
10 th	7.937	0.304	7.800	0.946	7.465	0.281	8.260	0.546
25 th	11.310	0.334	12.521	0.864	10.714	0.172	10.833	0.602
Median	16.548	0.318	17.857	0.740	14.881	0.180	14.881	0.523
75 th	24.405	0.570	26.964	1.546	20.952	0.436	20.833	0.988
90 th	41.667	2.014	39.286	4.135	31.429	1.485	35.714	3.608
Decile ratios								
90/10	5.250	0.269	5.037	0.736	4.210	0.262	4.324	0.562
50/10	2.085	0.073	2.289	0.273	1.993	0.075	1.801	0.147
50/25	1.463	0.033	1.426	0.081	1.389	0.023	1.374	0.078
75/50	1.475	0.031	1.510	0.078	1.408	0.025	1.400	0.061
90/50	2.518	0.109	2.200	0.223	2.112	0.098	2.400	0.232

Table 4: Hourly Log Wage by Education and Experience level, and Industry of Employment, October 2000.

	Male				Female			
	Private		State		Private		State	
	Mean	Sr. Dev	Mean	Sr. Dev	Mean	Sr. Dev	Mean	Sr. Dev
All levels	2.925*	0.693	2.841*	0.693	2.740	0.613	2.726	0.628
Education attainment								
Primary completed or less	2.717	0.784	2.717	0.641	2.643	0.462	2.465	0.520
High school completed	2.875*	0.638	2.765*	0.684	2.690	0.602	2.643	0.603
Professional school	3.586*	1.029	3.013*	0.653	2.855	0.545	2.859	0.547
University	3.334	0.390	3.341	0.586	3.531*	0.621	3.191*	0.595
Experience								
Less than a year	2.756	0.660	2.781	0.627	2.691	0.700	2.836	1.008
1-5 years	2.783	0.669	2.759	0.742	2.845*	0.601	2.682*	0.722
5-10 years	2.927	0.643	2.843	0.730	2.740	0.668	2.712	0.620
10-15 years	3.076*	0.483	2.709*	0.698	2.749	0.410	2.653	0.611
15-20 years	3.259*	0.617	2.807*	0.692	2.739	0.571	2.713	0.631
20 and more	3.025*	0.801	2.891*	0.682	2.722	0.508	2.757	0.573
Industry								
Manufacturing and Mining	2.888	0.546	2.813	0.720	2.822*	0.335	2.593*	0.544
Agriculture, etc	2.111*	1.050	2.590*	0.535	2.725	0.391	2.472	0.697
Construction	3.088*	0.718	2.803*	0.696	2.731	0.420	2.749	0.344
Transport and comm	3.088	1.181	2.914	0.750	2.676	0.467	2.989	0.788
Trade	2.852*	0.626	2.568*	0.560	2.667*	0.648	2.454*	0.565
Tourism and catering	2.967*	0.757	2.680*	0.795	2.764	0.483	2.733	0.919
Crafts	2.879	0.473	2.885	0.881	2.581	0.680	2.380	0.646
Services	3.290*	0.713	3.037*	0.607	3.303*	0.518	2.877*	0.589

Note: * indicates that the difference between the state and the private log wage is statistically different from zero at 90% confidence level.

Table 5: FIML of the sector choice equation

	Males		Females	
	Coeff.	Std.Err.	Coeff.	Std.Err.
Constant	2.453	0.584	1.837	0.589
Age	-0.148	0.026	-0.122	0.026
Age ² /100	0.142	0.030	0.110	0.031
Single	0.141	0.100	0.116	0.091
Number of job holders	0.048	0.041	0.076	0.040
Primary completed	0.037	0.207	0.465	0.208
High school completed	0.277	0.158	0.486	0.152
Professional school	0.095	0.224	0.136	0.205
Low-skilled workers	0.154	0.191	-0.075	0.219
Serbia w/o Belgrade	-0.380	0.111	-0.337	0.117
Montenegro	-0.516	0.130	-0.359	0.148
Vojvodina	-0.610	0.128	-0.297	0.130

Table 6(1): OLS and FIML estimation of the *hourly* wage equation for the private and the state sectors.

	Males								Females							
	Private				State				Private				State			
	FIML		OLS		FIML		OLS		FIML		OLS		FIML		OLS	
	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err
Constant	3.072	0.335	3.201	0.156	3.553	0.078	3.251	0.065	4.156	0.168	3.591	0.142	3.343	0.076	3.090	0.064
Experience	0.018	0.018	0.027	0.011	-0.016	0.005	0.004	0.005	0.034	0.012	0.014	0.011	-0.016	0.006	0.001	0.006
Experience ² /100	-0.052	0.044	-0.068	0.033	0.036	0.014	0.003	0.013	-0.081	0.046	-0.055	0.038	0.045	0.017	0.014	0.016
Education																
Primary completed or less	-0.157	0.329	-0.178	0.221	-0.417	0.075	-0.475	0.060	-0.814	0.200	-0.551	0.173	-0.396	0.077	-0.497	0.066
High school completed	-0.221	0.309	-0.266	0.157	-0.366	0.060	-0.449	0.044	-0.761	0.137	-0.506	0.139	-0.288	0.051	-0.403	0.043
Professional school	-0.046	0.335	-0.068	0.227	-0.212	0.077	-0.243	0.060	-0.362	0.207	-0.266	0.180	-0.201	0.069	-0.232	0.056
Low-skilled workers	-0.092	0.170	-0.111	0.187	-0.115	0.076	-0.111	0.064	-0.046	0.201	-0.224	0.171	-0.183	0.086	-0.159	0.072
Industry																
Agriculture et all.	-0.922	0.218	-0.939	0.248	-0.177	0.064	-0.157	0.051	-0.405	0.189	-0.532	0.248	-0.141	0.074	-0.143	0.078
Construction	0.137	0.122	0.146	0.124	-0.073	0.058	-0.086	0.059	0.001	0.266	0.018	0.224	0.064	0.132	0.089	0.101
Transport and com.	-0.241	0.144	-0.215	0.156	-0.034	0.039	-0.054	0.044	-0.428	0.474	-0.428	0.206	0.119	0.057	0.083	0.069
Trade	-0.158	0.093	-0.158	0.094	-0.266	0.057	-0.307	0.057	-0.321	0.089	-0.343	0.085	-0.282	0.052	-0.290	0.047
Tourism and catering	-0.208	0.141	-0.213	0.125	-0.224	0.076	-0.255	0.095	-0.210	0.103	-0.327	0.114	-0.104	0.052	-0.130	0.068
Crafts	-0.021	0.132	-0.027	0.114	-0.047	0.090	-0.148	0.114	-0.290	0.114	-0.349	0.121	-0.282	0.084	-0.346	0.119
Region																
Serbia w/o Belgrade	-0.464	0.138	-0.419	0.087	-0.341	0.057	-0.292	0.039	-0.246	0.102	-0.406	0.079	-0.307	0.056	-0.269	0.037
Montenegro	0.672	0.159	0.736	0.113	0.715	0.061	0.742	0.049	0.878	0.124	0.637	0.100	0.694	0.065	0.690	0.051
Vojvodina	-0.309	0.155	-0.242	0.107	-0.219	0.059	-0.149	0.043	-0.235	0.108	-0.367	0.087	-0.204	0.062	-0.186	0.042
N			243				1756				254				1233	
Adjusted R ²	---	---	0.407		---	---	0.338		---	---	0.436		---	---	0.385	
ρ	0.287	0.317	---		0.837	0.222	---		-0.842	0.038	---		0.851	0.022	---	

Table 6(2): OLS and FIML estimation of the *monthly* wage equation for the private and the state sectors.

	Males								Females							
	Private				State				Private				State			
	FIML		OLS		FIML		OLS		FIML		OLS		FIML		OLS	
	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err
Constant	8.201	0.302	8.321	0.165	8.750	0.082	8.429	0.066	9.223	0.169	8.743	0.138	8.487	0.076	8.223	0.064
Experience	0.010	0.018	0.019	0.011	-0.020	0.006	0.001	0.005	0.031	0.013	0.013	0.011	-0.018	0.006	0.001	0.006
Experience ² /100	-0.035	0.046	-0.049	0.035	0.042	0.015	0.006	0.013	-0.076	0.047	-0.052	0.037	0.047	0.017	0.013	0.016
Education																
Primary completed or less	-0.028	0.272	-0.043	0.232	-0.438	0.078	-0.506	0.062	-0.879	0.197	-0.664	0.165	-0.411	0.076	-0.511	0.066
High school completed	-0.068	0.240	-0.106	0.166	-0.380	0.063	-0.468	0.045	-0.795	0.132	-0.580	0.131	-0.299	0.050	-0.412	0.043
Professional school	0.113	0.283	0.099	0.241	-0.231	0.079	-0.266	0.061	-0.474	0.192	-0.397	0.173	-0.213	0.068	-0.241	0.056
Low-skilled workers	-0.141	0.186	-0.159	0.195	-0.130	0.075	-0.119	0.064	-0.028	0.197	-0.167	0.168	-0.175	0.086	-0.148	0.072
Industry																
Agriculture et all.	-0.724	0.270	-0.738	0.264	-0.170	0.066	-0.147	0.052	-0.406	0.208	-0.481	0.243	-0.143	0.079	-0.136	0.078
Construction	0.150	0.124	0.158	0.131	-0.039	0.055	-0.055	0.059	-0.007	0.275	0.015	0.220	0.087	0.126	0.112	0.101
Transport and com.	-0.411	0.172	-0.393	0.161	-0.004	0.040	-0.024	0.045	-0.404	0.527	-0.414	0.203	0.165	0.055	0.126	0.068
Trade	-0.257	0.100	-0.258	0.100	-0.249	0.056	-0.303	0.058	-0.230	0.087	-0.252	0.083	-0.260	0.053	-0.265	0.047
Tourism and catering	-0.254	0.146	-0.259	0.133	-0.225	0.077	-0.265	0.095	-0.145	0.110	-0.236	0.111	-0.095	0.054	-0.112	0.068
Crafts	-0.141	0.144	-0.146	0.121	0.045	0.097	-0.101	0.114	-0.231	0.115	-0.284	0.119	-0.248	0.083	-0.312	0.119
Region																
Serbia w/o Belgrade	-0.345	0.154	-0.299	0.092	-0.359	0.057	-0.308	0.040	-0.218	0.106	-0.352	0.078	-0.306	0.057	-0.267	0.037
Montenegro	0.731	0.181	0.798	0.120	0.710	0.062	0.744	0.050	0.886	0.124	0.689	0.097	0.729	0.065	0.724	0.051
Vojvodina	-0.145	0.165	-0.081	0.113	-0.205	0.060	-0.130	0.045	-0.145	0.109	-0.257	0.085	-0.184	0.062	-0.166	0.042
N			243				1756				254				1233	
Adjusted R ²	---	---	0.330		---	---	0.330		---	---	0.420		---	---	0.371	
p	0.265	0.318	---		0.873	0.019	---		-0.781	0.050	---		0.868	0.019	---	

Table 7: SPFIML estimation of wage equations

	<i>Hourly wage estimation</i>								<i>Monthly wage estimation</i>							
	Males				Females				Males				Females			
	Private		State		Private		State		Private		State		Private		State	
	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err	Coeff.	Std.Err
Constant	3.947	0.202	3.249	0.180	5.121	0.288	2.207	0.116	9.116	0.214	8.367	0.352	9.247	0.148	7.517	0.094
Experience	0.015	0.011	0.003	0.006	0.009	0.010	-0.003	0.005	0.004	0.011	0.000	0.005	0.027	0.011	-0.005	0.005
Experience ² /100	-0.054	0.033	0.004	0.013	-0.039	0.036	0.024	0.013	-0.030	0.033	0.008	0.013	-0.067	0.037	0.027	0.014
Education																
Primary completed or less	-0.259	0.219	-0.473	0.060	-0.537	0.168	-0.560	0.061	-0.168	0.220	-0.504	0.062	-0.789	0.174	-0.535	0.057
High school completed	-0.274	0.147	-0.447	0.044	-0.492	0.134	-0.401	0.039	-0.101	0.146	-0.465	0.045	-0.724	0.147	-0.404	0.036
Professional school	-0.179	0.223	-0.242	0.060	-0.266	0.176	-0.230	0.053	0.007	0.220	-0.265	0.061	-0.443	0.178	-0.244	0.049
Low-skilled workers	-0.081	0.190	-0.111	0.064	-0.231	0.165	-0.112	0.068	-0.091	0.189	-0.119	0.064	-0.048	0.168	-0.140	0.062
Industry																
Agriculture et all.	-1.028	0.238	-0.158	0.052	-0.560	0.239	-0.157	0.070	-0.610	0.249	-0.147	0.052	-0.459	0.239	-0.167	0.070
Construction	0.134	0.115	-0.086	0.060	0.033	0.218	0.092	0.093	0.104	0.124	-0.055	0.059	-0.007	0.220	0.110	0.089
Transport and com.	-0.204	0.159	-0.054	0.044	-0.430	0.198	0.107	0.060	-0.372	0.144	-0.024	0.045	-0.395	0.200	0.131	0.062
Trade	-0.142	0.088	-0.307	0.057	-0.328	0.080	-0.312	0.044	-0.235	0.090	-0.303	0.058	-0.237	0.081	-0.290	0.043
Tourism and catering	-0.199	0.118	-0.255	0.094	-0.335	0.107	-0.101	0.066	-0.234	0.122	-0.266	0.095	-0.172	0.111	-0.099	0.065
Crafts	0.041	0.104	-0.148	0.114	-0.352	0.115	-0.464	0.105	-0.078	0.112	-0.101	0.114	-0.266	0.115	-0.271	0.102
Region																
Serbia w/o Belgrade	-0.492	0.079	-0.294	0.040	-0.411	0.077	-0.276	0.032	-0.370	0.082	-0.311	0.040	-0.352	0.077	-0.261	0.032
Montenegro	0.699	0.115	0.740	0.049	0.718	0.096	0.887	0.045	0.761	0.113	0.742	0.050	0.671	0.097	0.931	0.044
Vojvodina	-0.371	0.097	-0.152	0.045	-0.369	0.083	-0.196	0.037	-0.216	0.103	-0.134	0.045	-0.238	0.085	-0.165	0.037

Table 8: Simulated Log wages *conditional* on being employed in the particular sector, by education, experience and sector of employment (SPFIML).

		<i>Hourly wage estimation</i>				<i>Monthly wage estimation</i>			
		Males		Females		Males		Females	
Education	Experience	Private	State	Private	State	Private	State	Private	State
Primary completed or less	Less than 5 years	2.58	2.58	2.47	2.55	7.88	7.73	7.68	7.64
	5 to 15 years	2.88	2.54	2.42	2.43	8.09	7.68	7.60	7.54
	More than 15 years	3.01	2.67	2.72	2.46	8.27	7.77	7.85	7.58
High school completed	Less than 5 years	2.75	2.72	2.69	2.60	8.05	7.87	7.90	7.72
	5 to 15 years	2.89	2.72	2.77	2.56	8.12	7.86	7.95	7.66
	More than 15 years	3.01	2.77	2.65	2.66	8.21	7.88	7.83	7.74
Professional school	Less than 5 years	3.71	2.93	2.86	3.17	8.86	8.08	8.03	8.27
	5 to 15 years	3.27	2.94	2.60	2.80	8.43	8.07	7.78	7.88
	More than 15 years	3.32	2.99	3.02	2.84	8.56	8.08	8.16	7.93
University of higher	Less than 5 years	3.04	3.35	3.31	3.21	8.17	8.50	8.77	8.34
	5 to 15 years	3.44	3.38	3.36	3.21	8.52	8.53	8.55	8.32
	More than 15 years	3.32	3.28	3.38	3.15	8.39	8.39	8.74	8.25
Total		2.91	2.82	2.73	2.71	8.15	7.93	7.92	7.80

Figure 1: Labor force participation by gender (95% confidence interval)

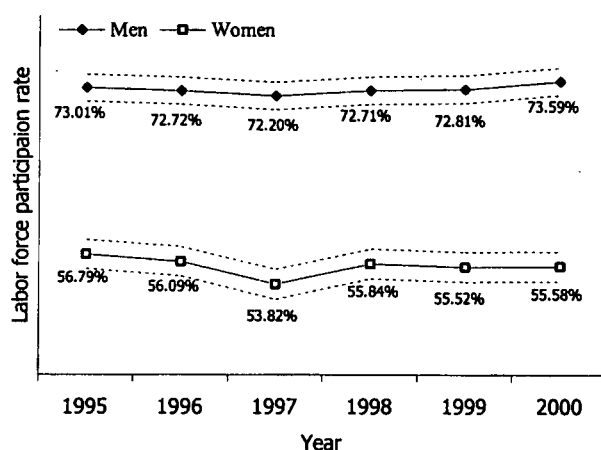


Figure 2: Changes in the rate of unemployment by gender (95% confidence interval)

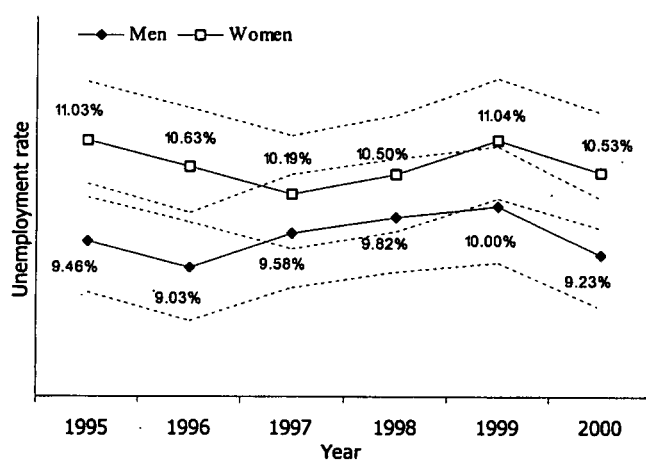


Figure 3: Changes in proportion of private sector employees in the economy by gender, 1995-2000. (95% confidence interval)

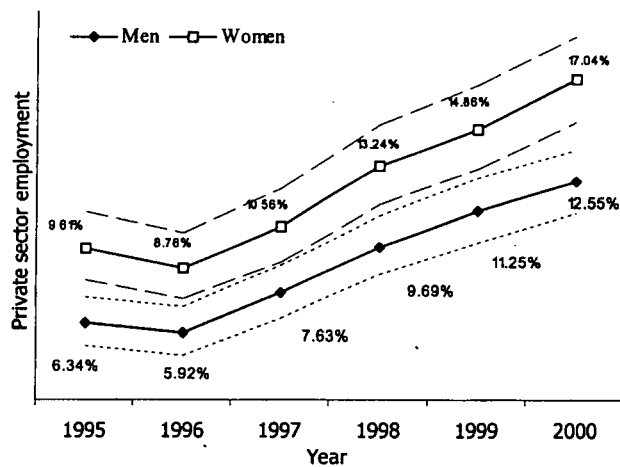


Figure 4: Wage distribution in the private and state sectors by gender. October 2000.

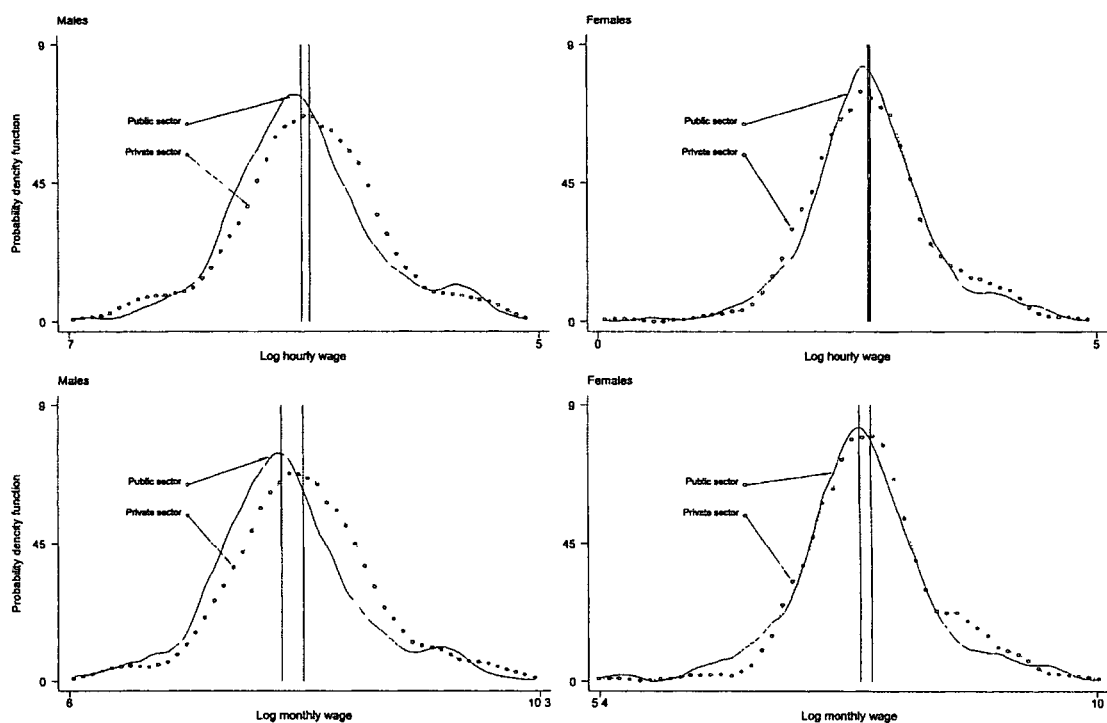
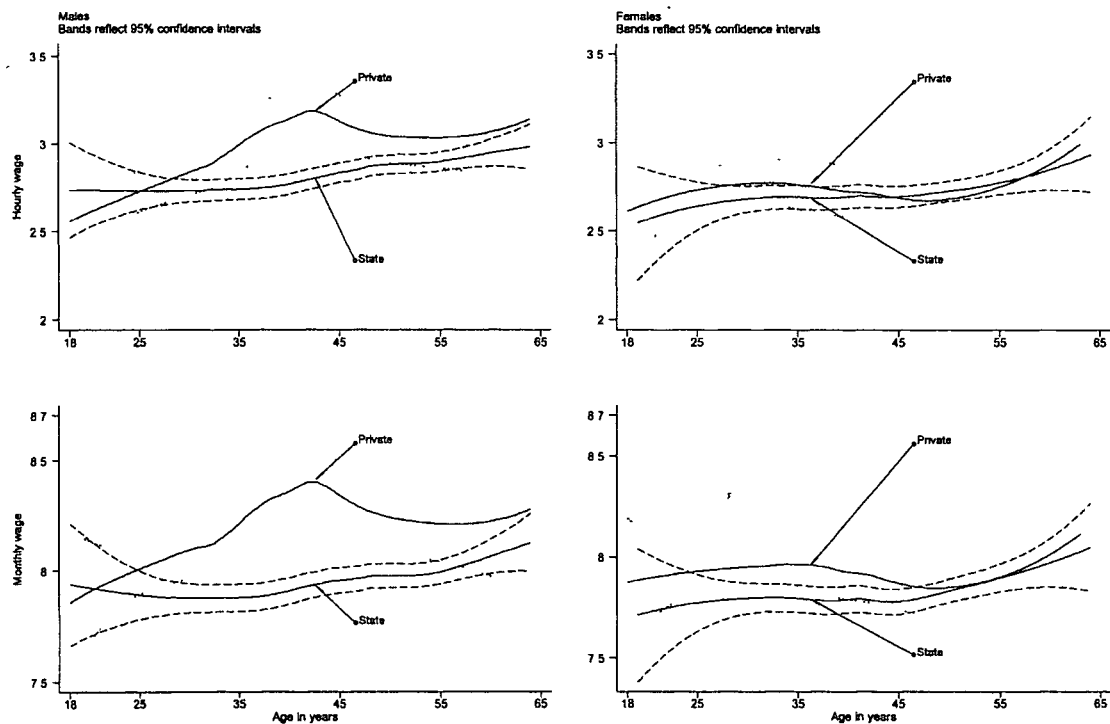


Figure 5: Non-parametric estimation of the age-earnings profile by gender and sector of employment. October 2000.



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