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An Anatomy of Male Labour Market Earnings Inequality in Serbia – 1996 to 2003

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Abstract

This study uses a regression-based framework to identify the key factors that determine the level and changes in main job earnings inequality for men. A number of different inequality measures are used in our work. The analysis uses data for Serbia drawn from eight annual labour force surveys, which cover both the early episode of sluggish transition and a more recent concerted phase of economic reform. It thus provides some useful insights on the evolution of labour earnings inequality through an uneven transitional process and identifies factors likely to retain an influence on earnings inequality as the market reform processes take greater hold.

JEL: J3, J 4, P2

Key words: Serbia Wage Inequality Education Industry Private Sector

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Introduction

In contrast to most centrally planned economies, the Yugoslav 'self-management' model was more reliant on market forces with worker incomes partly linked to enterprise performance. Given this unique system of economic planning¹, the Socialist Federal Republic of Yugoslavia at the end of the 1980s was generally viewed as well positioned to make a successful and rapid transition to a market-based economy. The secession of Slovenia, Croatia, and Macedonia from the Federation in the early 1990s, however, precipitated the disintegration of socialist Yugoslavia and culminated with war in Bosnia-Herzegovina. The economic situation was exacerbated in the spring of 1992 by the imposition of sanctions on the remaining Yugoslav republics of Serbia and Montenegro by the United Nations Security Council. The collapse of the unified market and the application of international sanctions largely eliminated the Yugoslav traded sector and led to a massive reduction in formal sector output.

The contraction in economic activity led to an increased impoverishment of the Yugoslav population and by the end of the 1990s, about one-third of the population was estimated to be poor (see Pošarac (1998) and Bogičević, Krstić, and Mijatović (2002)). The rise in both open-unemployment and under-employment provides part of the explanation for the observed rise in poverty. However, the collapse in real incomes – primarily labour market incomes – accounts for much of the increase in poverty incidence through the 1990s. In particular, real wages exhibited a sharp decline in the early part of the 1990s, and followed a relatively volatile path through the remainder of that decade.

The structure of wage-setting inherited from central planning strongly influenced the wage determination process that operated in Serbia over the period covering the early 1990s. Under the Yugoslav 'self-management' system, the government set each firm's wage bill and the workers' role was to determine individual wages within the firm. In contrast to other centrally planned economies in Europe, the distribution of incomes in socialist Yugoslavia was more uneven. This was generally attributable to the existence of greater inter-regional differences within the federation than in the other

¹ However, Vodopivec (1993) suggests that basic inefficiencies characteristic of other socialist economies were also strongly evident within the Yugoslav system.

socialist economies of central Europe.² Although Milanović (1998) does not report Gini coefficients for either Socialist Yugoslavia (for the early period) or Serbia (for the later period), the reported estimate for Slovenia exhibits a three-point rise between the late 1980s and the mid-1990s. We estimate that the rise in the Gini coefficient for Serbia based on male labour market earnings over this period is of a similar order of magnitude (see table 1 below).³ This places Serbia among the set of central European countries that have experienced more moderate increases in earnings inequality over this period.

The transition from a socialist to a market-based economic system is generally characterised by an increase in wage and income inequality. According to the estimates of Milanović (1998), the Gini coefficient of income averaged across all transitional economies rose by over one-third between the late 1980s and the mid-1990s. There was also a sharp increase in the dispersion of Gini estimates across transitional economies. The increases in income inequality were generally modest in the formerly socialist economies of central Europe, somewhat more pronounced in Baltic and Balkan countries, and greatest by far in Russia and in the central Asian republics of the former Soviet Union.

Milanović (1998) provides important insights into the factors responsible for the increase in income inequality in the early stages of the transition. The most significant factor is the higher concentration of wages. The importance of labour market earnings in explaining income inequality is further emphasized in the more detailed work of Milanović (1999) where wage inequality was identified as the key factor in explaining overall income inequality in six economies undertaking market-based reforms.⁴

² Vodopivec (1993) reports, for the late 1980s, average net personal incomes in Slovenia as being 47% above the national average, while the average in Kosovo is 57% below the national average.

³ Vodopivec (1993) reports a Gini coefficient for socialist Yugoslavia from the late 1980s of 0.27.

⁴ This particular finding of Milanović (1999) is unaffected by a correction to the methodology outlined in Eastwood (2000).

Poor economic management was a prominent feature of the first post-socialist transition decade in FR Yugoslavia and culminated in a well-documented hyper-inflationary episode (see Petrović, Bogetić and Vujošević (1999)). The practical implementation of market-based reforms was slow and the lack of urgency was strongly felt in terms of the privatization process, where legislation governing the ‘transformation’ of social ownership was originally introduced as early as June 1990.⁵ The progress towards more market-oriented ownership structures was adversely affected by the political crises and wars that led to the collapse of the federation.

The stabilization programme introduced in early 1994 laid the foundation for a degree of financial stability and modest economic growth. However, these gains were reversed with the outbreak of the Kosovo conflict in 1999, which led to a contraction in output of about one-fifth. A more concerted transition process was re-initiated in Serbia in late 2000. This has been associated with stronger stabilization efforts that have stimulated capital inflows and led to a shift in economic activity to the private sector. There has been a sharp reduction in annual inflation and steady real economic growth averaging about 3% per year over this period (see World Bank (2004)). However, the ILO-defined unemployment rate has remained stubbornly high at about 10% over this same period changing little since the mid-1990s. In spite of some modest progress on a number of fronts, the EBRD Transition Indicators of cumulative reform progress continue to rank Serbia and Montenegro close to the bottom of transition economies. In particular, the formal labour market in Serbia, despite the introduction of improved legislation on labour and employment, remained relatively rigid over the post-2000 period and functioned poorly in contrast to its considerably more flexible informal counterpart (see World Bank (2004)).

⁵ Duričin (1997) reviews the history of the early privatisation process and notes three phases: a ‘euphoric’ phase (1990-1994); the ‘annulation’ phase (1994) when legislation constrained the privatisation process; and a ‘slowdown’ phase (1994 onwards).

The empirical analysis of the Yugoslav (or Serbian) labour market in recent times has been limited⁶ and this constrains understanding of important factors that are affected by the transitional process. The primary purpose of this paper is to explore the distribution and structure of main job earnings for men in Serbia over a recent time period and identify the key factors that are found to influence both the level and change in wage inequality. The focus on men relates to a concern about potential selection issues that impinge on an analysis that includes women and recognition that data constraints prevent a feasible treatment of this issue for the latter group. We are interested in examining, *inter alia*, the influence that human capital (e.g., education and labour force experience), enterprise ownership (i.e., private sector attachment), and industry affiliation exert on the male wage structure over the relevant period. Using a regression-based methodology the role played by individual factors, or sets of factors, is isolated and a reasonably detailed portrait of the evolution of male wage inequality covering a very recent passage of Serbian economic history is provided. Our analysis post-dates the infamous Serbian hyper-inflationary episode. However, the eight-year period reviewed from 1996 to 2003 covers both the early episode of stalled transition and the more recent phase of active economic reform. It thus provides some useful insights on the impact of an, albeit varied, transitional process on labour market earnings inequality. It is generally accepted that the transition process in Serbia was not deep-rooted even by the end of the period covered in our study and this is particularly so in terms of labour market reforms.

The structure of the paper is now outlined. The following section details a methodology that allows us to attribute the level and change in earnings inequality to its determining factors. Two subsequent sections respectively review the data used and report the empirical results. A final section provides a summary of our findings and some concluding remarks.

⁶ Jovičić, Nojković, and Paranos (2000), Krstić and Reilly (2000), Lokshin and Jovanovic (2002), Reilly and Krstić (2003), and Reilly, Tabet and Krstić (2004) provide exceptions.

Methodology

The estimation of earnings (or wage) equation models has a long tradition in labour economics and has provided a framework within which earnings inequality can be decomposed into a number of component parts.⁷ Mincer (1997), using a basic regression model, demonstrates how to decompose the variance in log earnings into four component parts.⁸ This type of decomposition is largely facilitated by the estimation of relatively austere earnings equations. However, the more conventional approach in the earnings equation literature tends to emphasize richer specifications than those used by Mincer (*op.cit.*). In this context, the type of variance decompositions suggested becomes both more complicated and unwieldy as the number of explanatory variables included in the specification is increased.⁹

In this study we use a regression-based approach suggested by Fields (2002), which allows the contribution of each regression factor to the level of earnings inequality to be quantified and isolated.¹⁰ It is relatively simple to implement even as the number of explanatory variables increases. In addition, the framework can be easily extended to allow the relative contribution of the change in wage determining factors to the change in inequality between two points in time to be isolated in an exact manner.¹¹

⁷ For example, Chiswick and Mincer (1972) used such an earnings equation to decompose earnings inequality in the US into its schooling, experience and weeks worked components.

⁸ Mincer (1997) decomposes the total log earnings variance into the variance attributable to schooling wage differentials, within-schooling differentials, experience differentials, and between-group experience differentials.

⁹ In addition, the estimated coefficients from too austere an earnings equation may be subject to bias if relevant variables are excluded from the specification.

¹⁰ Fields and Yoo (2000) and Ravallion and Chen (1999) provide applications of this methodology to Korea and rural China respectively.

¹¹ See Fields (2002) for a number of additional advantages the methodology possesses over the non-regression based procedures that attempt to isolate overall inequality into its within-group and between-group components.

$$\ln(w_i) = \sum_{j=0}^{k+1} a_j Z_{ji} = \mathbf{a}'\mathbf{Z} \quad [1]$$

where $\ln(\cdot)$ denotes the natural logarithmic operator and $i=1, \dots, N$ individuals, $\mathbf{a} = [\beta_0 \ \beta_1 \ \beta_2 \ \beta_3 \ \dots \ \beta_k \ 1]$ and $\mathbf{Z} = [1 \ \mathbf{X}_1 \ \mathbf{X}_2 \ \mathbf{X}_3 \ \dots \ \mathbf{X}_k \ \mathbf{u}]$

The standard inequality measures, defined on the vector of wage (w_i), are continuous and symmetric functions that equal zero when all workers receive the mean wage. As Fields (2002) notes if the identity $e^{\ln(w_i)}$ is substituted wherever w_i occurs, the resultant inequality measure defined on the log wages is also continuous, symmetric and satisfies the property of being equal to zero when the worker is in receipt of the mean wage. Given the above wage determining function, we can thus define an inequality index on the vector of log wages as $I(\cdot) = I[\ln(w_1), \ln(w_2), \ln(w_3), \dots, \ln(w_N)]$. It can be shown (see Shorrocks (1982)), that the share for the j^{th} factor in the inequality of the income measure used is given by:

$$S_j[\mathbf{w}] = \frac{\text{cov}[a_j Z_j, \mathbf{w}]}{\sigma^2(\ln(\mathbf{w}))} = \frac{a_j \times \sigma(Z_j) \times \text{cor}(Z_j, \mathbf{w})}{\sigma(\ln(\mathbf{w}))} \quad [2]$$

where $\sigma(\cdot)$ denotes the standard deviation, $\text{cor}(\cdot)$ the correlation coefficient, and where $\sum_{j=1}^{k+1} S_j[\mathbf{w}] =$

1.0 holds for any inequality index which is continuous and symmetric.

The Gini coefficient provides one such measure but a broad class of other measures are also feasible (e.g., Generalised Entropy measures). Fields (2002) verifies that once a log-linear model is specified, the results obtained, using this methodology, are not dependent on the inequality measure used.

In order to account for differences in inequality between two time periods (0 and 1), we note:

$$[I(\cdot)]_1 - [I(\cdot)]_0 = \sum_{j=1}^{k+1} [S_{j,1} \times [I(\cdot)]_1 - S_{j,0} \times [I(\cdot)]_0] \quad [3]$$

The contribution of the j^{th} factor to the change in equality over the two time periods is given by:

$$\Pi_j = \frac{[S_{j,1} \times [I(\cdot)]_1] - S_{j,0} \times [I(\cdot)]_0}{[[I(\cdot)]_1 - [I(\cdot)]_0]} \quad [4]$$

where $\sum_{j=1}^{k+1} \Pi_j = 1.0$

The methodology outlined above has not been free of critics. In particular, Wan (2004) argues that the use of a semi-logarithmic form for the income generating function may potentially introduce errors into the empirical work. In the Fields (2002) methodology, it is also the case that the constant term is not permitted to exert an effect on inequality, which may not be entirely plausible given the findings reported in Podder and Chatterjee (2002). These criticisms are acknowledged. However, the use of the logarithmic specification in our application is motivated by a strong labour economics tradition that provides a sound theoretical basis for such a form. In addition, an objective of our work is to identify the key observable wage determining factors that explain the movements in Serbian male wage inequality. The role of either the constant term or the estimated residuals (which may capture the role of unobservable prices and quantities), though of interest in their own right, is not the primary concern of this paper. Finally, it is also the case that the Fields (2002) methodology is less computationally burdensome than the alternative suggested by Wan (2004), which is not a trivial consideration in regard to choice of methodology.¹²

¹² Indeed, Wan (2004) recommends very parsimonious regression specifications because of the computing demands associated with his procedure, which is not desirable in our particular application.

Data

The data for this study are drawn from eight annual Labour Force Surveys (LFS) conducted over the period 1996 to 2003. The formerly Yugoslav LFS is based on a nationally representative random sample and uses a two-staged stratified sampling method (see Federal Statistical Office (1998)). The target group of the survey was individuals aged over fifteen years as chosen from within each selected household. The first survey was undertaken in May and September of 1996, and the remaining ones were all conducted in the month of October.

The labour market concepts adopted are based on definitions used in comparable surveys undertaken for developed capitalist economies. The questionnaire consists of two sections. The first focuses on individual demographic characteristics including age, gender, marital status, nationality and educational attainment. The second section elicits information on labour market status, the nature of employment, labour force experience, industry branch level, enterprise ownership, earnings, and hours worked in the respondent's main job.

The earnings measure available within the LFS is based on monthly pay in the main job only and includes any additional wage payments (e.g., subsidies or payments in kind).¹³ However, it excludes taxes, pensions, and any welfare payments related to the earnings received. The survey questionnaire does not allow for a distinction between individuals who failed to report their earnings and those who received no main job earnings in the reference month due to arrears. There is no information available that allows us to determine whether the earnings measure reported reflects arrears in the reference month. It is acknowledged that arrears may impact on wage dispersion over time depending on whether its incidence is declining or increasing. However, there is no reasonable way we can resolve this

¹³ Our analysis is restricted to nominal wages and no attempt is made to control for inflation. It should be stressed, however, that the substantive results reported in this paper are invariant to whether nominal or real wage measures are actually used. In addition, the analysis was also undertaken using hourly wages but the overall findings of this paper were again not materially altered when using this measure.

problem given data constraints within the LFS.¹⁴ In common with many transition economies, second-job holding is a significant phenomenon in Serbia (see Krstić (1998)) and has recently been the subject of more detailed investigation where about one-third of Serbian employees were found to be engaged in such activity (see Reilly and Krstić (2003)). The LFS is weak in regard to measuring this type of activity. Thus, earnings obtained from second-job holding or other informal activities are not the subject of direct investigation here.

The empirical analysis in this study excludes respondents from Kosovo and Montenegro and focuses exclusively on those from Serbia. This is because our focus is on the Serbian experience. In any event, we do not have consistent responses for Kosovo over the full period, and Montenegro, though remaining within the Federation, pursued a more independent economic policy from that of Serbia during the latter part of the period reviewed here. The samples for each year are based on male respondents who reported non-zero earnings in their main job and are employees aged between 18 and 64 years.

Table A1 in the appendix provides summary statistics for earnings and other labour market characteristics for each year. The table reveals that the sample proportions across most characteristics exhibits a high degree of stability over the relevant period. However, the proportion of workers with primary level education or less records a mild decline over the eight year period. This might be attributable to the withdrawal of workers with poorer levels of human capital from the formal labour market or more likely it simply reflects cohort effects. Regardless of the explanation, the scale of the decline is unlikely to affect the thrust of our findings. The trend in the proportion of respondents working in privately-owned enterprises exhibits a very steady rise over the period reviewed, with the proportion quadrupling between 1996 and 2003. This growth in private sector employment appears impressive and is likely to continue as the privatisation process in Serbia gathers momentum. However, the definition of private sector is clearly problematic in this context and some caution is

¹⁴ The Serbian Living Standards Surveys (LSMS) report that wage arrears in the formal sector, defined as a delay in payment of over one month, affected 10.4% and 13.2% of all workers in 2002 and 2003 respectively.

clearly required in terms of how the outcomes for this particular variable are interpreted. Filer and Hanousek (2002) provide some cautionary observations on this definitional issue.

Empirical Results

It is instructive in the first instance to compute some summary inequality statistics for each year using the monthly formal sector labour market earnings. Table 1 reports estimates of inequality for each of the eight years using three members of the Generalised Entropy class (i.e., GE(0), GE(1), GE(2)),¹⁵ the Gini coefficient, the standard deviation in log monthly earnings and the log variance of monthly earnings. The estimated asymptotic standard errors are reported for the first four of these measures.¹⁶ In addition, selected inter-decile ratios are also reported. Some of the reported measures are sensitive to gaps in earnings at different points of the wage distribution. For instance, the GE(0) and GE(1) measures are sensitive to gaps at the bottom end of the wage distribution, while the GE(2) measure is sensitive to earnings gaps at the top end of the wage distribution. The use of a range of inequality measures, commonly used in the distributional analysis literature, allows us to examine the sensitivity of our results to the choice of measure.

[TABLE 1 ABOUT HERE]

The estimated Gini coefficients suggest an approximate inverted U-shaped pattern in wage inequality over the time period. There is a modest rise in the Gini between 1996 and 1997, and then a decline in 1998, a peak in 1999 but steady falls thereafter to 2003. This pattern of movement is broadly confirmed by most of the other measures reported with earnings inequality reaching a peak in 1999 but thereafter steadily narrowing. An exception is provided by the inter-decile (9th/1st) ratio where the peak appears to be in 1997. In general and across all measures, declining inequality appears to commence from 2000 onwards but shows a relatively sharp fall between this year and 2001. This sharp fall in inequality roughly coincides with the initiation of the new Serbian government's programme for transition to a market-based economy in January 2001.¹⁷ However, and perhaps of more relevance, this period also coincides with a sharp increase in the minimum wage in Serbia (see below).

¹⁵ Cowell (1995) provides a detailed description of these measures.

¹⁶ See Cowell (1989) for the technical details regarding the calculation of the sampling variances.

¹⁷ As noted in the data section, the earnings relate to October of the relevant year from 1997 onwards.

The computed standard errors for the Gini coefficient and the three Entropy measures allow us to formally test whether the point estimates are statistically different across selected years. In comparisons between 1996 and 2003, all the estimated z-scores comfortably exceed the absolute value of two suggesting a rejection of the null hypothesis of no statistical difference in the point estimates at a conventional level of statistical significance. In addition, the F-test values based on the squared standard deviations for the same comparator years also confirm the rejection of the null for this measure. Thus, there is unambiguous evidence for a decline in formal labour market earnings inequality in Serbia over the period reviewed.

The scale of the reduction in earnings inequality between 1996 and 2003 is partially sensitive to the measures used. The Gini, the standard deviation and the log variance suggest a contraction in earnings inequality in a range between 20% and 37%. On the other hand, the Entropy measures generally reveal higher reductions that are sensitive to the weights assumed for earnings values in the tails of the distributions. The inter-decile (9th/1st) ratio contracts by almost one-quarter between the two years with the greater part of the contraction attributable to a narrowing at the bottom end of the earnings distribution.

The overall contraction in earnings inequality noted above may reflect the impact of minimum wage policies in Serbia. The national minimum wage in Serbia as a percentage of the average wage increased sharply in the post-2000 era (see table A2 of the appendix). It rose from 11.7% of the average net wage in 2000 to 39.4% in 2003. Though designed to boost the earnings of low paid workers, and set with the mutual consent of government, employers, and the trades unions in Serbia, this is relatively generous by the standards of most transitional economies. An illustrative bivariate regression of the Gini on the minimum wage as a percentage of the average wage (MW) yields a very well determined negative relationship:

$$\hat{Gini}_t = 0.362 - 0.002MW_t$$

(0.019) (0.0007) [5]

OLS standard errors are in parentheses; Adjusted R - Squared = 0.61; T = 8.

This serves to highlight the potential importance of this labour market institution in influencing overall earnings inequality in Serbia over the period reviewed here.

We now examine in more depth the nature of Serbian wage inequality by decomposing the inequality measures by factor (or group) components using an approach adopted by Jenkins (1995). This allows for a separation of the total wage inequality into parts attributable to between-group and within-group inequality using the Generalised Entropy measures from table 1. The analysis is undertaken for groups comprised of educational level, labour force experience, private enterprise ownership, settlement type¹⁸, and industry sector for selected years. Table A3 of the appendix reports the detailed results. The general findings are that the educational level is responsible for the greatest part of between-group inequality followed by the industry sector. In both cases, the trend over time is upwards. There is very little between-group wage inequality explained by the labour force experience of workers and the pattern observed relating to private sector ownership lacks coherence. However, there is evidence of a potentially important role for the settlement type within which an employee resides.

We now turn briefly to the monthly wage equation estimates reported in table A4 of the appendix. The fits of the equations are satisfactory and in most years the included regressors explain between one-fifth and one-quarter of the total variation in monthly earnings. The estimated coefficients for the human capital measures (the educational qualifications and the labour force experience variables) are generally well determined in all years. The estimated wage returns appear to rise monotonically with labour force experience and the returns to the higher educational qualifications are reasonable by the standards of transitional economies (see Newell and Reilly (1999)). However, in regard to the estimated human capital effects, there is an indication that the point estimates are contracting though these reductions are not found to be statistically different from zero.¹⁹

The estimated industry effects are generally well determined. The estimated average industry *ceteris paribus* wage premia are large in the transport and financial services sectors but more modest in the

¹⁸ The settlement within which an employee resides may not be coterminous with where they work. This is acknowledged as a problem but data limitations prevent a more adequate interrogation of this particular problem.

¹⁹ For example, assuming four years for a university qualification, the annualised private rate of return to a university qualification is computed at 10% in 1996 falling to 8.5% in 2003.

trade, catering and tourism and crafts industries. There is little evidence that inter-industry wage differentials are widening overall. The private sector wage premium is well determined in all cases and, in the earlier years, appears sizeable. However, it does behave erratically over the time period and from 2000 onwards the premium exhibits a sharp decline. There may be definitional issues at play here (see Filer and Hanousek (*op.cit.*)), so some interpretational caution is required. The estimated wage effects associated with residing in a Serbian city, though adhering to no obvious pattern in the initial years, appears to have converged on a well determined stable premium from 2000 onwards. Finally, the effects of marital status, regions and ethnicity are generally poorly determined in most years and merit no additional comment.²⁰

We now turn attention to examining the more important factors that determine the level of labour market earnings inequality as reported in table 2.²¹ The first point to note is that although the fits of the estimated equations are acknowledged as respectable (see table A4), a considerable amount of the total variation in log monthly earnings in any given year is unexplained by the wage determining factors. The residual components, though declining over time, are sizeable and most of the inequality is thus unexplained.²² There remains a great deal of noise in the wage determination process in Serbia and unobservable factors appear to dominate the process. In terms of the explained component, however, table 2 identifies educational qualifications (in some years accounting for well over one-half of the explained level of inequality) and industries (comprising, on average, about one-fifth of the explained level of inequality) as the most important factors. The negligible role played by labour force experience in explaining the level of earnings inequality in Serbia perhaps captures the fact that labour

²⁰ Table A5 of the appendix also reports Wald tests for the joint statistical significance of the estimated coefficients associated with key sets of variables. In general, and for most years, the estimated effects for experience, education, settlement type and industries are well determined at a conventional level of statistical significance.

²¹ The results reported in this table are not materially affected by the exclusion of statistically insignificant variables like marital status and nationality from the wage equations.

²² This is not uncommon for transitional economies. See Newell and Reilly (1999) for wage equation fits for a selection of transitional economies.

force experience acquired under central planning may have become relatively obsolete given the new demands of the reforming economy.

[TABLE 2 ABOUT HERE]

One important feature of table 2 worthy of independent comment relates to the role of the enterprise ownership variable. The importance of the privatisation process to economic growth in Serbia has been well documented elsewhere (see Djuričin (1997)) and some empirical work has attempted to quantify the private sector wage premium for Yugoslav workers.²³ As noted earlier, the proportion of Serbian workers employed in privately-owned enterprises increased sharply over the eight-year period (see table A1). Nevertheless, the private sector's factor share reflects the behaviour of the estimated private sector coefficient reported for the wage equations and by the terminal year of the study accounts for a negligible share of earnings inequality in Serbia. Our analysis thus suggests a declining importance for enterprise ownership in the influence exerted on the male Serbian earnings structure.²⁴

Table 3 provides further insights into the change in inequality using expression [4], as it isolates the changing factors that drive the differences in earnings inequality between 1996 and 2003. In this exercise we use the Gini, the three Entropy measures and the variance of log wages as the dispersion measures. Given the decline in earnings inequality between 1996 and 2003 a negative (positive) sign indicates factors responsible for widening (narrowing) earnings inequality. It is salutary that there is a consensus across all measures regarding the directional effect the factors exert on inequality. Both industry and the human capital measures are found to exert a narrowing influence on inequality. However, the relative importance of these factors appears sensitive to the inequality measure used. The one factor that consistently acts to widen earnings inequality is an employee's settlement type, which is perhaps suggestive of a widening inequality between city-dwellers and others in Serbia.

[TABLE 3 ABOUT HERE]

²³ See Lokshin and Jovanovic (2002) and Reilly, Tabet and Krstić (2004)).

²⁴ In order to explore the robustness of the results in table 2, the wage equations were re-estimated by varying the base category for education, labour force experience and industry used in estimation. The results reported are invariant to this particular exercise.

Summary and Conclusions

This study implemented an OLS regression-based methodology to identify the key factors determining the level of main job earnings inequality within a given year and the change in that inequality between selected years using data drawn from eight annual labour force surveys for Serbia. The study spans an initial period of great turbulence and uncertainty in both political and economic terms, and a later one of more active economic reform.

We believe that the empirical exercise undertaken provides an informative portrait of the evolution of the male Serbian wage structure over a reasonably volatile period and is best interpreted as a descriptive exercise. Our analysis revealed a large residual or unexplained component in the earnings determination process and, by extension, in the factor shares describing the level of main job earnings inequality. This large amount of noise is to be anticipated given the turbulence that has impacted the economic system in Serbia. It is worthy of note, however, that during the period of more active reform, the unexplained factor share components have exhibited a steady decline mirroring the improvements in the fits of the underlying earnings equations. However, it is difficult to infer that these improved fits can be attributed entirely to the reform programmes undertaken.

The temporal pattern in earnings inequality is described by an inverted U-shape with a narrowing in inequality post-2000 corresponding to the era of an ostensibly more active economic reform process. This is slightly in conflict with the findings of Milanović (1998) for other selected transitional economies where a positive relationship between reform and inequality is detected. This appears to be partly explained in the Serbian context by a weakening role for private sector attachment in explaining earnings inequality and a relative stability in the estimated returns to educational qualifications over the time period reviewed (see table A4). It is generally acknowledged (see World Bank (2004)) that the nature of the reform process in Serbia is still largely in its infancy and lacks depth. In spite of some cosmetic reforms, the formal labour market remains fairly rigid and lacks the flexibility characterised by its large informal counterpart. In the more recent years reviewed here, the minimum wage appears to have assumed an increased importance in constraining wage inequality. The apparent stability in

returns to educational qualifications is likely to alter as the labour reform process takes deeper hold and the Serbian education system is re-oriented towards the demands of a more market-based system. The effect of such reform on the returns to education will ultimately help shape the future evolution of earnings inequality in Serbia.

The role of the private sector provides a separate issue warranting some discussion. There has been a sharp increase in private sector employment over the eight years examined here and by 2003 one in four male employees' main job was within this sector. The estimated average *ceteris paribus* premium for this employment fell steadily over the period and was a modest eight per cent by 2003. Our findings indicate that the effect of private sector ownership on wage inequality in Serbia has weakened over time. Enterprise ownership is not emerging as an important correlate of main job earnings as Serbia proceeds down the transitional path towards greater privatisation. The existence of a modest private sector premium may be insufficient to attract appropriately qualified and motivated workers to a sector that ultimately provides an important engine for economic growth and improved living standards. However, it should be noted that over the eight-year period covering this study, about one-half of all private sector workers were found to be located in the Trade, Catering and Tourism, and Craft industries. Thus, part of the private sector effect may be absorbed by the branch level controls and this distorts any insight in to the role private ownership exerts on the wage structure. This pattern may become clearer as the privatisation process proceeds and there is greater absorption of informal sector enterprises into the formal economy. Once reforms render the labour market more flexible, private ownership may re-emerge as an important factor determining wage inequality in Serbia.

Finally, our analysis highlighted an important role for an employee's residence settlement type, which acts to widen earnings inequality. This could reflect the fact that labour market inequalities between city and the non-city areas in Serbia are widening and that the benefits of the transition, despite being in its more immature phase, are disproportionately accruing to the city-based population.

APPENDIX

Table A1: Summary Statistics for Labour Market Characteristics in Serbia - 1996 to 2003

Variable	1996	1997	1998	1999	2000	2001	2002	2003
Monthly Wage – Log	5.302	5.572	5.447	5.309	5.187	5.810	5.977	6.020
Work Experience								
<=5 years	0.121	0.142	0.152	0.133	0.143	0.151	0.155	0.144
5<years<=10	0.117	0.101	0.098	0.090	0.086	0.103	0.096	0.111
10<Years<=20	0.339	0.320	0.310	0.287	0.262	0.262	0.236	0.258
20< Years <=30	0.310	0.324	0.323	0.339	0.348	0.355	0.345	0.306
Years>30	0.113	0.112	0.117	0.151	0.160	0.129	0.168	0.181
Educational Levels								
No formal Education	0.041	0.039	0.032	0.034	0.032	0.023	0.023	0.025
Primary	0.166	0.181	0.154	0.164	0.145	0.155	0.153	0.144
Secondary	0.594	0.601	0.628	0.611	0.632	0.635	0.644	0.644
High School	0.096	0.083	0.082	0.083	0.081	0.077	0.076	0.075
Higher/University	0.102	0.096	0.104	0.107	0.110	0.109	0.103	0.113
Marital Status								
Single	0.167	0.196	0.200	0.207	0.212	0.225	0.228	0.250
Married	0.786	0.759	0.758	0.740	0.744	0.714	0.711	0.685
Divorced/Widowed	0.047	0.045	0.042	0.053	0.045	0.061	0.061	0.065
Settlement Type								
Rural	0.117	0.130	0.123	0.141	0.124	0.145	0.147	0.150
Town	0.204	0.205	0.210	0.194	0.196	0.224	0.222	0.217
City	0.679	0.665	0.667	0.665	0.680	0.631	0.631	0.633
Region								
Central Serbia	0.724	0.729	0.729	0.723	0.746	0.738	0.732	0.741
Vojvodina	0.276	0.271	0.271	0.277	0.254	0.262	0.268	0.259
Nationality								
Serbian	0.867	0.867	0.867	0.869	0.880	0.863	0.851	0.868
Montenegrin	0.016	0.019	0.016	0.021	0.017	0.012	0.014	0.012

Other	0.116	0.114	0.117	0.110	0.104	0.125	0.135	0.120
Private sector	0.064	0.078	0.107	0.120	0.131	0.170	0.183	0.247
Industry Branch								
Manufacturing & Mining	0.423	0.414	0.405	0.387	0.405	0.385	0.374	0.338
Agriculture	0.066	0.064	0.064	0.065	0.064	0.081	0.079	0.082
Construction	0.075	0.083	0.073	0.085	0.076	0.094	0.080	0.083
Transport	0.100	0.097	0.107	0.107	0.097	0.079	0.093	0.094
Trade & Crafts	0.111	0.133	0.140	0.147	0.158	0.104	0.111	0.128
Catering & Tourism	0.031	0.033	0.032	0.025	0.026	0.029	0.026	0.027
Financial & Other Services	0.022	0.026	0.026	0.023	0.021	0.022	0.017	0.018
Education, Culture and Health Services	0.096	0.083	0.086	0.091	0.086	0.079	0.082	0.096
Administration	0.074	0.066	0.067	0.070	0.066	0.126	0.138	0.134
Monthly Hours (log)	5.155	5.153	5.158	5.158	5.161	5.169	5.164	5.170
Sample Size	1464	1489	1483	1417	1631	1602	1556	1545

Notes to table A1:

- (a) The data are drawn from various rounds of the Yugoslav Labour Force Surveys (YLFS). See text for details.
- (b) The samples used relate to male employees, aged between 18 and 64, who reported non-zero main job earnings.
- (c) All variables with the exception of monthly earnings (logged) and monthly hours (logged) are binary variables.

Table A2: Minimum Wage as % of the Average Net Wage in Serbia, 1995-2003

	1996	1997	1998	1999	2000	2001	2002	2003
Minimum Wage as % of								
Average Net Wage	33.0	23.3	25.1	19.7	18.2	11.7	35.0	38.8

Notes to table A2

Source: For minimum wage over 1996-2001, see Republican Statistical Office (various issues); for 2002 and 2003 see World Bank (2004, p.107).

**Table A3: Percentage of Total Wage Inequality
Explained by Inequality Between Groups by Selected
Years**

	GE(0)	GE(1)	GE(2)
Experience			
1996	0.78	0.77	0.76
2000	0.59	0.59	0.59
2003	0.84	0.83	0.83
Industries			
1996	7.84	7.71	7.68
2000	4.47	4.49	4.53
2003	7.19	7.40	7.68
Settlement Type			
1996	3.84	3.69	3.56
2000	2.26	2.19	2.13
2003	2.76	2.72	2.67
Private			
1996	1.62	1.77	1.93
2000	4.36	4.73	5.15
2003	0.06	0.06	0.06
Education			
1996	16.27	17.82	20.08
2000	7.25	7.94	8.79
2003	19.56	21.39	23.86

Notes to table A3:

The entries show the percentage of total inequality explained or accounted for by labour market earnings inequality between-groups in each year.

Table A4: OLS Regression Equation Estimates for Monthly Labour Market Earnings in Serbia - 1996 to 2003

	1996	1997	1998	1999	2000	2001	2002	2003
Work Experience								
<=5 years	f	f	f	f	f	f	f	f
5<years<=10	-0.069 (0.062)	0.006 (0.061)	0.069 (0.057)	-0.031 (0.073)	0.071 (0.055)	0.120** (0.047)	0.106* (0.043)	0.108* (0.042)
10<Years<=20	0.061 (0.053)	0.040 (0.051)	0.051 (0.054)	0.069 (0.055)	0.087 (0.048)	0.091* (0.041)	0.043 (0.045)	0.107** (0.039)
20< Years <=30	0.068 (0.055)	0.076 (0.054)	0.119** (0.054)	0.113* (0.056)	0.166** (0.049)	0.121** (0.042)	0.092* (0.043)	0.137** (0.041)
Years>30	0.079 (0.065)	0.118 (0.063)	0.177** (0.063)	0.093 (0.062)	0.145** (0.053)	0.189** (0.049)	0.154** (0.048)	0.186** (0.045)
Educational Level								
No formal Education	-0.180* (0.080)	-0.085 (0.076)	-0.186 (0.098)	-0.171 (0.093)	-0.158 (0.097)	-0.093 (0.077)	-0.027 (0.075)	0.054 (0.090)
Primary	f	f	f	f	f	f	f	f
Secondary	0.098* (0.041)	0.136** (0.043)	0.090* (0.041)	0.114** (0.044)	0.062 (0.042)	0.116** (0.036)	0.207** (0.031)	0.194** (0.033)
High School	0.322** (0.059)	0.406** (0.068)	0.226** (0.066)	0.312** (0.064)	0.281** (0.057)	0.342** (0.048)	0.386** (0.047)	0.385** (0.050)
Higher/University	0.733** (0.054)	0.727** (0.064)	0.658** (0.055)	0.719** (0.064)	0.594** (0.056)	0.704** (0.043)	0.741** (0.043)	0.727** (0.041)
Marital Status								
Single	f	f	f	f	f	f	f	f
Married	0.015 (0.044)	0.049 (0.042)	0.046 (0.046)	-0.007 (0.045)	0.061 (0.040)	0.009 (0.032)	0.026 (0.038)	-0.033 (0.031)
Divorced/Widowed	0.042 (0.077)	0.070 (0.069)	0.056 (0.067)	0.101 (0.078)	0.076 (0.064)	0.093 (0.053)	0.121* (0.052)	-0.021 (0.047)

Settlement Type								
Rural	f	f	f	f	f	f	f	f
Town	0.079	0.154**	0.099*	-0.044	0.061	-0.102*	-0.070*	-0.048
	(0.050)	(0.050)	(0.049)	(0.054)	(0.044)	(0.040)	(0.036)	(0.039)
City	0.115**	0.183**	0.100*	-0.003	0.087*	0.122**	0.106**	0.105**
	(0.045)	(0.044)	(0.043)	(0.045)	(0.040)	(0.035)	(0.031)	(0.034)
Region								
Central Serbia	-0.050	-0.059	-0.071	0.005	-0.095**	-0.023	-0.006	0.009
	(0.037)	(0.037)	(0.037)	(0.035)	(0.036)	(0.029)	(0.029)	(0.029)
Vojvodina	f	f	f	f	f	f	f	f
Nationality								
Serbian	0.090	-0.008	-0.018	0.007	0.033	0.073	0.073*	0.035
	(0.053)	(0.050)	(0.051)	(0.047)	(0.048)	(0.039)	(0.037)	(0.038)
Montenegrin	-0.031	-0.101	-0.012	0.255*	-0.193	0.001	-0.071	-0.034
	(0.128)	(0.142)	(0.151)	(0.106)	(0.181)	(0.104)	(0.090)	(0.084)
Other	f	f	f	f	f	f	f	f
Private sector	0.285**	0.277**	0.386**	0.284**	0.402**	0.151**	0.128**	0.081**
	(0.085)	(0.061)	(0.054)	(0.071)	(0.056)	(0.037)	(0.034)	(0.029)
Industry Branch								
Manufacturing & Mining	0.258**	0.363**	0.208**	0.028	0.244**	0.134**	0.050	0.010
	(0.058)	(0.065)	(0.062)	(0.057)	(0.058)	(0.044)	(0.047)	(0.052)
Agriculture	f	f	f	f	f	f	f	f
Construction	0.283**	0.329**	0.208**	0.052	0.335**	0.120*	0.124*	0.116
	(0.081)	(0.080)	(0.075)	(0.080)	(0.078)	(0.061)	(0.057)	(0.063)
Transport	0.497**	0.501**	0.409**	0.196**	0.324**	0.296**	0.286**	0.230**
	(0.068)	(0.077)	(0.072)	(0.070)	(0.069)	(0.050)	(0.052)	(0.056)
Trade & Crafts	0.173*	0.272**	0.055	-0.023	0.168*	0.023	-0.062	0.013
	(0.071)	(0.075)	(0.074)	(0.071)	(0.069)	(0.058)	(0.060)	(0.059)
Catering & Tourism	0.053	0.119	-0.110	-0.183	0.100	-0.061	0.039	0.089
	(0.095)	(0.098)	(0.088)	(0.110)	(0.094)	(0.097)	(0.093)	(0.094)
Financial & Other Services	0.494**	0.770**	0.634**	0.284*	0.463**	0.231**	0.467**	0.310**

	(0.101)	(0.084)	(0.093)	(0.128)	(0.093)	(0.072)	(0.088)	(0.091)
Education, Culture and Health Services	0.387**	0.484**	0.252**	-0.003	0.127	0.119*	0.093	0.128
	(0.064)	(0.074)	(0.068)	(0.071)	(0.065)	(0.049)	(0.052)	(0.054)
Administration	0.582	0.644**	0.491**	0.277*	0.362**	0.255**	0.169**	0.205**
	(0.064)	(0.071)	(0.069)	(0.072)	(0.070)	(0.047)	(0.048)	(0.055)
Monthly Hours (log)	0.273	0.337	0.556**	0.217	0.535**	0.781**	0.365**	0.402**
	(0.140)	(0.180)	(0.149)	(0.127)	(0.190)	(0.148)	(0.121)	(0.116)
Constant	4.122**	4.200**	3.561**	5.777**	4.363**	4.254**	6.701**	6.678**
	(0.723)	(0.942)	(0.775)	(0.664)	(0.985)	(0.773)	(0.635)	(0.615)
Adjusted-R ²	0.245	0.237	0.232	0.178	0.189	0.270	0.269	0.261
Regression Standard Error	0.535	0.565	0.540	0.567	0.526	0.446	0.432	0.421
Breusch-Pagan Test	136.4	94.5	91.4	94.5	130.7	134.1	106.2	105.7
Sample Size	1464	1489	1483	1417	1631	1602	1556	1545

Notes to table A4:

- (a) The data are drawn from various rounds of the Yugoslav Labour Force Surveys (YLFS). See text for details.
- (b) The samples used relate to male employees, aged between 18 and 64, who reported non-zero main job earnings.
- (c) The dependent variable is the log of monthly earnings. All explanatory variables with the exception of monthly hours (logged) are binary variables.
- (d) The estimation procedure is OLS and White (1980) estimated standard errors are reported in parentheses.
- (e) The critical value for the Breusch-Pagan test for heteroscedasticity at the 0.05 level is 22.5 in all cases.
- (f) f denotes category omitted in estimation.
- (g) ** and * denote respectively statistical significance at the 0.01 and 0.05 levels using two-tailed tests.

Table A5: Wald (Chi-squared) Tests for Joint Significance of Sets of Variables in Wage Equations

Variables	0.05 CV	1996	1997	1998	1999	2000	2001	2002	2003
Experience	9.49	8.32	5.04	11.60	6.68	13.24	15.84	15.76	18.32
Education	9.49	269.12	168.36	211.84	164.44	187.44	405.60	321.48	377.76
Marital	5.99	0.30	1.60	1.10	2.44	2.52	3.70	6.82	1.16
Settlement	5.99	6.72	17.82	5.82	1.02	4.80	67.60	46.96	35.94
Nationality	5.99	3.62	0.50	0.12	6.40	2.20	3.86	6.46	1.52
Industries	15.5	140.16	145.84	144.40	45.76	60.64	77.20	98.72	75.28

Notes to table A5:

(a) The column headed 0.05 CV denotes the relevant critical values at the 5% level for the relevant sets of variables.

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TABLES

Table 1: Monthly Labour Market Earnings Inequality, 1996-2003

Year	GE(0)	GE(1)	GE(2)	Gini	$\sigma(\log \text{ wages})$	Log Variance	9 th Decile/ 1 st Decile	9 th Decile/ Median	Median/ 1 st Decile
1996	0.183	0.188	0.267	0.322	0.610	0.372	4.546	2.000	2.273
	(0.011)	(0.017)	(0.047)	(0.010)					
1997	0.198	0.201	0.321	0.331	0.642	0.412	5.312	2.000	2.656
	(0.013)	(0.026)	(0.108)	(0.012)					
1998	0.174	0.167	0.200	0.312	0.610	0.372	4.400	2.000	2.200
	(0.008)	(0.009)	(0.020)	(0.006)					
1999	0.196	0.213	0.361	0.333	0.620	0.385	4.615	2.143	2.154
	(0.014)	(0.027)	(0.105)	(0.012)					
2000	0.165	0.168	0.225	0.308	0.579	0.335	4.091	1.956	2.091
	(0.009)	(0.013)	(0.031)	(0.007)					
2001	0.131	0.132	0.164	0.274	0.518	0.268	3.542	1.821	1.944
	(0.007)	(0.009)	(0.020)	(0.006)					
2002	0.123	0.124	0.146	0.269	0.501	0.250	3.550	1.868	1.900
	(0.006)	(0.007)	(0.011)	(0.006)					

2003	0.112	0.109	0.123	0.256	0.486	0.236	3.167	1.727	1.833
	(0.005)	(0.006)	(0.010)	(0.005)					

Notes to table 1:

- (a) Data are drawn from various rounds of the Yugoslav Labour Force Surveys (YLFS). See text for details.
- (b) Sample relates to male employees, aged between 18 and 64, who reported non-zero main job earnings
- (c) Wages are defined as monthly labour market earnings on the main job and are expressed in new Dinars.
- (d) GE(0), GE(1) and GE(2) are Entropy measures and Gini refers to the Gini coefficient.
- (e) $\sigma(\log \text{ earnings})$ denotes the standard deviation of the log of labour market earnings
- (f) Log variance denotes the log variance of the labour market earnings.
- (g) 9th (1st) decile is the value at the 90th (10th) percentile of the labour market earnings distribution.
- (h) Asymptotic standard errors for the Entropy measures and Gini coefficient are reported in parentheses and are based on Cowell (1989).
- (i) See table 2 for sample sizes used in each year.

Table 2: Factor Inequality Shares for Labour Market Earnings in Serbia –1996-2003

Factors	1996	1997	1998	1999	2000	2001	2002	2003
Experience	0.0064	0.0048	0.0071	0.0055	0.0056	0.0107	0.0092	0.0078
Education	0.1469	0.1269	0.1092	0.1215	0.0948	0.1567	0.1642	0.1735
Marital	0.0003	0.0016	0.0008	0.0015	0.0021	0.0019	0.0033	-0.0005
Settlement	0.0103	0.0186	0.0067	0.0018	0.0060	0.0327	0.0273	0.0227
Region	0.0003	0.0007	0.0024	0.0001	0.0020	0.0001	-0.0001	0.0002
Nationality	0.0019	-0.0001	0.0003	0.0042	0.0014	0.0038	0.0043	0.0014
Private	0.0056	0.0067	0.0254	0.0134	0.0404	0.0064	0.0055	0.0018
Industries	0.0710	0.0765	0.0687	0.0290	0.0268	0.0331	0.0525	0.0491
Hours(log)	0.0026	0.0014	0.0109	0.0011	0.0100	0.0246	0.0024	0.0047
Residual	0.7546	0.7629	0.7685	0.8220	0.8109	0.7300	0.7314	0.7392
Sample Size	1464	1489	1483	1417	1631	1602	1556	1545

Notes to table 2:

The calculations are based on expression [2] in the text.

Table 3: Contribution of Factors to Changes in Labour Market Earnings Inequality – 2003 vs 1996

	Gini	GE(0)	GE(1)	GE(2)	Log Variance
Factors					
Experience	0.0010	0.0042	0.0044	0.0052	0.0040
Education	0.0443	0.1048	0.1099	0.1243	0.1011
Marital	0.0032	0.0015	0.0013	0.0009	0.0016
Settlement	-0.0378	-0.0094	-0.0070	-0.0003	-0.0111
Region	0.0005	0.0004	0.0004	0.0003	0.0004
Nationality	0.0042	0.0029	0.0027	0.0024	0.0029
Private	0.0202	0.0116	0.0109	0.0088	0.0121
Industries	0.1554	0.1057	0.1014	0.0896	0.1087
Hours(log)	-0.0054	-0.0007	-0.0003	0.0008	-0.0010
Residual	0.8143	0.7791	0.7761	0.7678	0.7813

Notes to table 3:

(a) The calculations are based on expression [4] in the text