ORIGINAL SCIENTIFIC PAPER

How Structural Changes Affect Enterprises' Expectations about Employment in Serbia?[1]

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UDC: 330.341.4:331.5(497.11)"2011" ; 331.526 JEL: C13, C35, D21, J23 ID: 203730444

ABSTRACT *– This article examines enterprises' responses to structural changes in the economy of Serbia caused by both transitional changes and the global economic crisis, as well as by influences of other accompanying factors. An assessment of the enterprises' expectations in terms of short-term dynamics of employment needs is provided. Enterprises use different coping strategies, but their potentials for growth and development are particularly tight. The multinomial logit econometric models are employed in order to estimate outcomes in the enterprises' expectations with respect to changes in job flows. The coefficient estimate of the variable that measures the amount of engaged labour at the level of an average enterprise in Serbia shows a statistically significant influence that this variable has on the enterprises' decisions about the fluctuations of workers. Taking the decision that would not result in changes in the number of employees as a baseline alternative, the first rational choice of the employers would be to dismiss old or to employ new workers if they expect unfavourable, i.e. favourable, trends, respectively. The estimated multinomial logit model can be used for predictions of employers' decisions about expected in(out)flows of workers. However, a parsimonious multinomial model was estimated, implying that more accurate predictions would be obtained by using the model with more explanatory variables. For the purpose of the analysis presented in this article, a micro set of the survey data provided by the Public Employment Service of Serbia is used. The survey, with enterprises as primary sample units, was carried out in 2011.*

KEY WORDS: *enterprises' expectations, employment, Serbia, structural changes*

Introduction

Transitional changes are the main driver of structural changes in the economy of Serbia, but the national economy is influenced by global shifts as well. This article examines how enterprises in Serbia respond to structural changes, to influences of the recent global economic crisis, as well as to other accompanying factors, when they make decisions about their future employment needs. The firm-level data, taken from the Employer Survey that is provided by the Public Employment Service of Serbia, are used for the analysis presented in

[*] This paper is part of research projects: 47009 (European integrations and social and economic changes in Serbian economy on the way to the EU) and 179015 (Challenges and prospects of structural changes in Serbia: Strategic directions for economic development and harmonization with EU requirements), financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

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this article. The multinomial logit (MNL) econometric model is employed in order to estimate the most predictable outcomes in the enterprises' expectations regarding the changes in job flows. The estimated model can be used for prediction of the enterprises' expectations, and, therefore, for expected movements in the labour demand, depending on the main characteristics of enterprises.

The global trends show that, in many cases, shifts in the demand for labour are results of the increasing diversity in the supply of labour. Some early studies for the developed European countries pointed out to the persistent decrease in the demand for unskilled labour (Goux and Maurin, 2000). Technological advancement, as a driver of structural changes at the global level, significantly contributed to the appearance of these movements. The countries of the European Union pay a lot of attention to the changes in occupation and skill needs that will occur in the future (Cedefop, 2012). Transition countries like Serbia also have requests for collecting accurate information about the most demanded occupations and skills (Vasić et al., 2011). The more advanced countries have more sophisticated demand for labour. Ognjenović and Branković (2010) found that skills and education of the labour supply in Serbia are not the main obstacle for the creation of better and more productive new jobs.

The useful reviews of the literature for the transition countries, regarding the influence of structural changes on shifts in the labour demand, are provided by Domadenik et al. (2008) (for Slovenia), Micevska (2008) (for Macedonia), and Vehovec and Domadenik (2003) (for Croatia and Slovenia). All studies provide results for the early period of economic transition that was characterized by significant fluctuations of workers and by decreasing rates of net employment. In general, all the counters follow the pattern of slow restructuring. That is the case of Serbia as well (Stošić et al., 2012).

The main research hypotheses that will be explored in this article are as follows:

(i) It will be investigated whether structural changes (approximated by the successive relative changes in the number of employees) are associated with the enterprises' decision processes about in(out)flows of workers.

(ii) The other factors that are associated with the enterprises' expectations on the fluctuations of workers will be identified and tested by conventional statistical tests.

(iii) From the point of view of the MNL model estimation, it is important to check for the independence of the decision made between two alternatives, relative to the decision that may result from additional alternatives, in order to confirm the assumption about identically and independently distributed error terms across all existing alternatives. The problems related to this issue are: (i) this assumption is usually violated in empirical studies, and (ii) there is a limited number of tools for the models with qualitative dependent variables that can be used when the distributional assumptions are violated.

The article includes three main sections. After the introductory part, section two provides the descriptions of the theoretical and empirical models that will be examined in this article, as well as the estimation methods that will be used for obtaining the estimated coefficients. In the second and third parts of this section, the data sources and the results of estimation will be discussed. The final section of the article contains concluding remarks.

Empirical model estimation

Theoretical model and estimation methods

According to the economic theory of firm, the labour demand model can be expressed by the following function:

$$q_f = g(L, Z), \tag{1}$$

where q_f measures the current level of firms' capacities, while *L* represents workers' labour, and Z includes all other factors that may influence the level of capacity of firms. In addition, due to the fact that firms are represented by employers, then, according to the theory of rational expectations of economic subjects, one may conclude that firms will behave in a way that will ensure maximisation of firms' profits alongside with minimisation of firms' costs.

Taking into account that the data sources that are usually used for creation of variables of the economic model are often deficient, in this article the following econometric model will be specified and estimated:

$$\exp_i = \alpha + \beta L_i + \gamma Z_i + \varepsilon_i, i = 1,..,N. \tag{2}$$

In the equation (2), the variable $\exp_i$, on the left side, approximates the level of firms' capacities by representing enterprises' expectations on the fluctuations of workers related to the future developments of their businesses, i.e. the expected increase (decrease) in the business activity due to favourable (unfavourable) business environment. These expectations, as we assumed, are based on their rational business decisions, having in mind that they are aware of potential market risks and other uncertainties. L_i and Z_i are labour and other explanatory variables related to the characteristics of the *i*-th firm (*i*=1,…,*N*), while α, β and γ represent an intercept term and a set of unknown regression coefficients, respectively, that will be estimated by appropriate methods; ε_i is an error term.

The equation (2) can be expressed in the general form of a multinomial logit (MNL) model for unordered outcomes following Greene (2000):

$$y_j = x'\beta_j + \eta_j, j = 1,...,J \tag{3}$$

where x is a *(1+k)x1* vector of explanatory variables, including a vector of units as a first element, which are individual-specific variables and are identical across alternatives. On the other side, a *(kx1)* vector of unknown regression coefficients β_j differs across alternatives, while the error terms η_j are independently and identically distributed across alternatives. (The notation for individual firm *i* is exempt from the formulas.)

Based on the MNL model (3), the response probabilities across alternatives are given as:

$$P(y=j\mid x)=\exp(x'\beta_j)/[1+\sum_{l=1}^{J}\exp(x'\beta_l)],\ j=1,...,J \tag{4a}$$

$$P(y=0\mid x)=1/[1+\sum_{l=1}^{J}\exp(x'\beta_l)], \tag{4b}$$

where the equation (4a) represents the probability that the *i*-th firm made a decision *j*, while the equation (4b) results from the condition that the response probabilities across the alternatives must sum to one, i.e. $\sum_{l=1}^{J}P(y=j\mid x)=1$. The log-odds, across alternatives, can be calculated as: $\log(P_j/P_l)=x'(\beta_j-\beta_l)=x'\beta_j$, assuming l is the baseline alternative, which implies the normalization at $\beta_l=0$ (the results can be normalized by the probability of any alternative from *j*=1,...,*J*). This implies that the log-odds ratio of the alternative *j* relative to the baseline alternative *l* in x is given as: $\partial\log(P_j/P_l)/\partial x=\beta_j$. This is a useful result that allows for direct interpretation of the coefficient estimates. In addition, one may be interested in reporting the marginal effects after the estimation of the MNL model. The marginal effects of x on the response probabilities are calculated by using the formula: $\mu_j=(\partial P_j/\partial x)=P(\beta_j-\overline{\beta})$, where $\overline{\beta}$ is the average of the βs for all alternatives. If the marginal effects are obtained for each case and then averaged for all cases, we deal with the average marginal effects. The marginal effects for the MNL model will not be reported in this article in order to simplify yielded results interpretation. Standard errors of the estimated coefficients are provided by using the delta method. As in the case of the binary logit model, the MNL model is consistently estimated by the maximum likelihood estimator. The details are provided in Greene (2000).

Data

The data that will be used in this article come from the Employer Survey that was carried out by the Public Employment Service of Serbia in 2011 (Public Employment Service of Serbia, 2011). The main characteristics of the population of enterprises selected in the sample were recorded in the Statistics Business Register provided by the National Bureau of Statistics. The sample units, i.e. enterprises, were selected according to the following stratification criteria: districts, economic activity, size (only enterprises with 10 and more employees were chosen), and ownership structure. The realized sample consists of the total of 4,083 sample units. The Region of Kosovo and Metohija is excluded from the data set, because only 14 enterprises from the Kosovsko-Mitrovački district responded to the survey. Full description of the methodology and of the sample selection process is provided by Vasić et al. (2011).

A set of variables that will be used in the estimation of the MNL model is defined as follows. The dependent variable is created as a qualitative response variable that takes on three values: 0 if no change in terms of increase or decrease in the number of employees is expected, 1 if enterprises expect increase in the number of employees and 2 if they expect decrease in the number of employees. A set of independent variables includes: the total

number of employed in the year that precedes enterprises' expectations (this variable represents the amount of engaged labour) (*lnemp*), a dummy variable for *the size of enterprises*, which are classified according to the three criteria (the number of employees, total annual turnover and average annual balance sheet) prescribed by the Accounting and Auditing Law (large-sized enterprises are the reference category), a dummy variable for *the region* (the Southern and Eastern Serbia region is the reference category), a dummy variable for *sectors of economic activity* (the economic activity of agriculture, forestry and fishing is the reference category) and a dummy variable for *ownership* structure (other forms of ownerships are the reference category). An additional variable that measures relative changes in the number of employees in two successive years is included in the MNL model. This variable is a proxy for the effects that the recent economic crisis and structural changes may have had on the expected job flows (*proxy_re*).

Results of estimation and discussion

As it was already stated in the previous section, the dependent variable expresses three possible outcomes (alternatives), regarding the employers' decisions about expected in(out)flows of workers. These outcomes are: no change that represents steady-state (*expectation*=0), to employ new (*expectation*=1) and to dismiss old (*expectation*=2) workers, so that the net employment is positive for the former and negative for the latter. Following the logic of the binary logit model, it is suitable to assume that the first alternative (*expectation*=0) is the baseline alternative. In the sample, the distribution among the alternatives is as follows: 55, 31, and 14 percent for no expected changes, increase and decrease in employment, respectively.

The results of the estimated MNL model are reported in Table 1. We built the model in order to investigate potential influences of long-term structural changes, the recent global economic crisis, and the characteristics of enterprises on the employers' decisions about expected job flows. The results of the research studies for transition countries show that structural changes that are mainly driven by the transitional changes caused significant fluctuations of workers (see for instance Domadenik et al. (2008) for Slovenia, Micevska (2008) for Macedonia, Vehovec and Domadenik (2003) for Croatia and Slovenia). Using the expanded data set Ognjenović and Branković (2012) found that the economy of Serbia creates and destroys almost the same percent of jobs on average, which results in the excess job reallocation rate of above 14 percent and in no significant changes in the net employment rate.

The intercept terms are found to be both negative and statistically significant in the estimated MNL model. A negative sign of the estimates underlines the skewness of the enterprises' expectations towards the alternative that will not result in the significant fluctuations of workers in the incoming period. This result is in accordance with the findings of some previous analyses of job flows (Ognjenović and Branković, 2012) and the assessment of the implementation of structural reforms in the economy of Serbia (Stošić et al., 2012). Stošić et al. (2012) concluded that enterprises need to be determined to create more effective strategies that will improve their performances in the long-run under the conditions of significantly improved business climate.

Table 1. Multinomial Logit Estimates and Odds Ratio for the Econometric Model

Explanatory Variable	Estimated Coeff.	Signif.	Exp (beta)	Estimated Coeff.	Signif.	Exp (beta)
	Expectation=1			*Expectation=2*		
lnemp	0.240	0.000	1.271	0.325	0.000	1.389
proxy_re	0.335	0.067	1.398	-1.626	0.000	0.197
Size of firm						
d_small	0.832	0.001	2.297	0.311	0.336	1.365
d_medium	0.721	0.000	2.056	0.151	0.520	1.163
d_large						*F*
Region						
d_belgrade	-0.417	0.003	0.659	-0.499	0.009	0.607
d_vojvodina	-0.311	0.002	0.732	-0.364	0.005	0.695
d_sumadija_west	-0.044	0.641	0.957	0.061	0.624	1.062
d_south_east						*F*
Economic activity						
d_agriculture						*F*
d_industry	0.261	0.100	1.298	-0.262	0.151	0.769
d_construction	0.139	0.435	1.149	-0.109	0.603	0.897
d_business_services	0.169	0.279	1.185	-0.326	0.072	0.721
d_other_services	0.125	0.489	1.133	-0.100	0.643	0.905
Ownership						
d_private	0.224	0.068	1.251	0.012	0.936	1.012
d_public	-0.215	0.225	0.806	-0.429	0.063	0.651
d_other						*F*
Intercept	-2.367	0.000		-2.463	0.000	
Log-likelihood: -3868.7655						
χ^2 (26)=198.477, p=0.000						
Percent correctly predicted (p≥0.50): 55.14%						
Test for the Independence of Irrelevant Alternatives Assumption:						
Omitted Alternative (*Expectation=1*): $\chi^2(14)$=5.975, p=0.967						
Omitted Alternative (*Expectation=2*): $\chi^2(14)$=23.561, p=0.052						

Notes: Expectation=0 is the reference alternative. F denotes the reference category for dummy explanatory variables.
Source: Author's calculation.

The coefficient estimate of the variable that measures the amount of engaged labour at the level of an average firm in Serbia shows the statistically significant influence that this variable has on the enterprises' decisions about the fluctuations of workers. Greater amount

of unproductive labour, alongside with the low level of enterprises' capacities engagement, would probably result in the decisions about dismissals of workers. The odds ratio associated with this variable would increase the probability of choosing the third, instead of the baseline alternative, by about 1.4 times, holding all other variables in the MNL model fixed. The second choice, according to the estimated model, would be that the enterprises, which expect some favourable developments, will opt for new employment over the alternative that will not cause any change in the number of employees. In this case, the odds ratio would be expected to increase by about 1.3 times, holding all other factors constant.

Information about the positive successive relative increases in the number of employees from the past, taken by employers when they make decisions about the new employment, would more likely make them decide to increase the number of employed rather than not to change it. This implies that the effects of the recent global economic crisis on the performance of successful enterprises were only transitory and that they benefited from structural changes (for instance, positive cases include transformed old enterprises, new enterprises established in growing economic sectors, enterprises that produce tradable goods or services that can be sold in the international markets, etc.). The odds ratio would be expected to increase by about 1.4 times, holding all other variables in the model fixed. The estimate is statistically significant at the 10 percent level. On the other hand, those enterprises that have experienced unfavourable trends recently, or expect them in the near future, are more likely to report that no changes are expected to occur in the number of employees in the incoming period.

Small and medium-sized enterprises are more likely to expect inflows of new workers than the large-sized ones, compared to the baseline alternative. Those small and medium-sized enterprises that would opt to decrease the number of employees cannot expect statistically significant changes, relative to the baseline alternative. The sector of small and medium-sized enterprises employs about 65.3 percent of the total number of employees in the non-financial sector in Serbia (Ministry of Finance and Economy of Serbia et al., 2012). The potentials of this sector are of great importance for the economic development of Serbia, but, unfortunately, the indicators of their business performance are still unfavourable (OECD et al., 2012).

Enterprises whose business activity is mainly concentrated in the regions of Belgrade and Vojvodina are less likely to expect inflows of new workers, so that they are more likely to keep the current level of employment unchanged. The answers of enterprises from the Šumadija and Western Serbia region report statistically not significant expectations on outflows of workers. Comparing the enterprises' expectations in the rest of Serbia with the Southern and Eastern Serbia region, we can conclude that no concentrations are expected to occur, which would result in the statistically significant fluctuations of workers. This is probably due to the fact that the majority of large commercial privatisations have been already finished. Additionally, the global economic crisis has slowed-down the inflow of foreign direct investments in the European transition countries (Ślusarczyk, 2010).

The estimated MNL model shows that there are no statistically significant changes in the enterprises' expectations on the fluctuations of workers across the main sectors of economic activity. Regarding the ownership structure of the enterprises, the privately owned ones are more likely to expect some inflows of new workers than to decide not to make changes in the

current number of employees. On the other hand, those enterprises that are owned by the central and local governments are more likely to expect outflows of workers, instead of expecting no changes in the number of employees.

The overall success rate of the estimated model is 55.14 percent, meaning that the estimated model correctly predicts more than a half of outcomes with the probability that is equal to or exceeds 0.5. This implies that the estimated model can be used for predictions of employers' decisions about expected in(out)flows of workers. However, it should be stressed that the modal expectation of firms occurs in the alternative *no expected changes* that is used as a baseline alternative. The obtained results seem credible, having in mind that the decisions of enterprises, which may result in the fluctuations of workers, are influenced by the long-term structural changes (slow but persistent influence) and global economic crisis (transitory influence).

Testing for the independence of irrelevant alternatives assumption confirms that we cannot reject the null hypothesis that the observed alternatives are independent (Small and Hsiao, 1984). The null hypothesis is tested at the 5 percent level. This implies that the results of the estimated MNL model can be interpreted within the conventional confidence intervals. In addition, it can be confirmed that the estimates of the MNL model do not change significantly by omitting irrelevant alternatives.

In addition, the Wald test for testing the joint significance of the explanatory variables across alternatives is conducted too. The results of the test are given in Table 2A in the Annex. The estimated MNL model is based upon a parsimonious specification, because a limited set of variables was at disposal. Among the explanatory variables, the vast majority are related to the characteristics of interviewed enterprises. Analysing the results of the test leads us to the conclusion that the sets of dummy variables for sectors of economic activity and ownership structure are not statistically significant at the 5 percent level across alternatives, but some of the estimated coefficients for dummies, representing a particular industry or the type of ownership, were statistically significant for one of the alternatives in the MNL model. That was the reason why these explanatory variables are not excluded from the estimated model. Neglecting the potential influence of these variables does not significantly change the predicting power of the MNL model, but still it can be informative for the policy making. All other estimated coefficients are statistically significant at the 5 percent level.

Concluding remarks

In this article, an empirical specification of the MNL econometric model for the enterprises' expectations on the fluctuations of workers in Serbia is developed and estimated. The estimated model is built upon the research hypotheses that are specified in order to investigate potential influences of the factors, such as long-term structural changes, the recent global economic crisis, and the characteristics of enterprises, on the employers' decisions about expected job flows. Enterprises have opted for three alternatives: the first alternative means that enterprises prefer not to change the current level of employment, rather than to increase or decrease the total number of employees, which are the second and third alternatives, respectively. It is assumed that all decisions depend on their business

prospects. The first alternative is taken as the baseline alternative. The overall success rate of the estimated MNL model is 55.14 percent, so that the model can be used for the prediction purposes. However, more accurate predictions of the enterprises' expectations should be based on the model with more explanatory variables included. That would confirm the robustness of the estimation results reported in this article.

The results of the estimated MNL model show that enterprises respond slowly to potentially needed adjustments in the demand for labour. The estimated intercept terms are found to be both negative and statistically significant, which points to the skewness of the enterprises' expectations towards the alternative that will not result in the significant fluctuations of workers in the incoming period. Enterprises with favourable business performances would more likely opt for new employment over the alternative that will not cause any change in the number of employees. Both explanatory variables, the amount of engaged labour in the year that precedes enterprises' expectations, as well as a proxy variable for structural changes, affected the employers' decisions. The estimates of both coefficients are positive and statistically significant at the conventional levels.

Regarding the characteristics of interviewed enterprises, small- and medium-sized ones would be the main drivers of new employment. The size does not significantly determine the enterprises' decisions when they opt for dismissals of workers instead of expecting no changes in the number of employees. Variations of enterprises' expectations throughout the sectors of economic activity are not statistically significant across the alternatives. Privately owned enterprises would more likely expect inflows of workers, while the public enterprises would expect outflows of workers over the alternative that would not make changes in the number of employees. The distribution of answers of enterprises across the regions points to the fact that enterprises would not behave differently regarding the expected changes in the number of employees, regardless in which region they are pursuing their business activities. Only in the Šumadija and Western Serbia region some outflows of workers would be expected. These results can be used for the policy making process.

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Kako strukturne promene utiču na očekivanja preduzeća o zapošljavanju u Srbiji?

REZIME *– U ovom članku se razmatraju odgovori preduzeća na strukturne promene u ekonomiji Srbije koje su uzrkovane kako tranzicionim promenama i globalnom ekonomskom krizom tako i uticajima drugih pratećih faktora. Ocenjena su očekivanja preduzeća o kratkoročnoj dinamici potreba za zapošljavanjem. Preduzeća koriste različite strategije preživljavanja, međutim, njihovi potencijali za dalji rast i razvoj su prilično suženi. Korišćeni su multinominalni logit ekonometrijski modeli kako bi se ocenili verovatni ishodi u očekivanjima preduzeća vezano za promene u kretanju broja radnika u preduzeću. Ocena koeficijenta uz promenljivu koja meri količinu angažovanog rada na nivou prosečnog preduzeća u Srbiji ukazuje na njen statistički značajan uticaj na odluke preduzeća o fluktuacijama zaposlenih. Uzimajući odluku koja ne bi dovela do promene broja zaposlenih kao baznu, prvi racionalan izbor poslodavaca bi bio da otpuste postojeće i zatim da zaposle nove radnike, ako*

očekuju nepovoljna ili povoljna kretanja, respektivno. Ocenjeni multinominalni logit model može da se koristi za predviđanja poslodavčevih odluka o očekivanim tokovima radnika. Međutim, ocenjen je štedljiv multinominalni model, tako da bi za dobijanje tačnijih predviđanja trebalo koristiti model sa više objašnjavajućih promenljivih. Za potrebe analize prikazane u ovom radu, korišćeni su podaci Nacionalne službe za zapošljavanje Srbije iz ankete u kojoj su preduzeća učestvovala kao jedinice istraživanja. Anketa je sprovedena 2011. godine.

***KLJUČNE REČI**: multinominalni logit model, očekivanja preduzeća, Srbija, strukturne promene, zaposlenost.*

Annex

Table 2A. Wald Test for the Joint Significance of Explanatory Variables across Alternatives

Explanatory Variable	χ^2	**df**	**Signif.**
lnemp	26.731	2	0.000
proxy_re	68.884	2	0.000
Size of firm			
d_small	11.546	2	0.003
d_medium	14.963	2	0.001
d_large		*F*	
Region			
d_belgrade	12.912	2	0.002
d_vojvodina	14.195	2	0.001
d_sumadija_west	0.644	2	0.725
d_south_east		*F*	
Economic activity			
d_agriculture		*F*	
d_industry	6.410	2	0.041
d_construction	1.185	2	0.553
d_business_services	5.682	2	0.058
d_other_services	0.936	2	0.626
Ownership			
d_private	3.448	2	0.178
d_public	4.129	2	0.127
d_other		*F*	

Source: Author's calculation.

Article history: Received: 12 July 2013
Accepted: 15 November 2013