Assessing the impact of the contribution of migration to the dynamics of unemployment in a cross-border region

L Tuktamisheva[1], A Bakirova[2*] and O Stebunova[3]

[1] Orenburg State University, 13 Pobedy Prospekt, Orenburg 460018 Russia
[2] Private higher education institution "Eurasian Institute TIGR," 45/1 Izyumskaya str., Moscow 117624 Russia
[3] Moscow State University of Food Production, 11 Volokolamskoe Shosse, Moscow 125080 Russia

E-mail: lmtuktamisheva@mail.ru

Abstract. The factor determining social stability is the level of unemployment. For a cross-border region, the role of migration may be more significant than for other regions of the country. The mutual influence of migration and unemployment in the region is beyond doubt: the influx of migrants contributes to unemployment, and high unemployment can reduce the number of migrants in the region. To assess the mutual influence of such indicators, vector autoregression models and vector error correction models are used. Also, the analysis of impulse responses is used, which demonstrates the response of one indicator to a single shock in another.

Keywords: migration, unemployment, unemployment rate, labor market, shock

1. Introduction

The Orenburg region, which borders the Republic of Kazakhstan, has one of the lowest levels of officially registered unemployment. Studies show that there is a forced unemployment with a shortage of personnel in the region. This is a characteristic contradiction of the regional labor market [1]. In general, migrant workers fill the demand for seasonal workers in the specialty for which there is a shortage. Remuneration is low here, and hiring is for short periods of time. In this case, we can talk about the precarious employment of migrants [2].

Under conditions when the actual unemployment data are not available, analysis of the contribution to its formation can used to track the contribution of migration to the dynamics of official unemployment, suggesting that over a long period of time, the percentage ratios of actual (unregistered) and officially registered unemployment remain unchanged. The study of the contribution of individual shocks related to the change in the number of migrants to the dynamics of labor market indicators can be carried out on the basis of the mathematical apparatus for constructing vector regression models and vector correction models for errors. On the one hand, such models are aimed at obtaining forecasts. On the other hand, they allow to analyze certain structural shocks (external and internal). This will make it possible to develop management decisions aimed at reducing or leveling the impact of such shocks.

2. Materials and Methods

At present, many different econometric models have been developed that allow tracing the effect of migration on the labor market, determining the effect of various socio-economic indicators on the formation of migration flows and forecasting them [3].

To study the contribution of structural shocks to the dynamics of socio-economic indicators, we can use a family of vector models that are some alternative to complex structural models (for example, systems of simultaneous regression models). The advantage of vector models is the possibility of short-term prediction without the need for separate modeling of exogenous variables. In addition, they allow you to determine structural shocks.

The vector autoregression models are constructed for stationary time series. They are subject to the presence of Granger causation (causality in two directions for two variables, in three directions for a three-dimensional model, etc.). Such models reflect the short-term relationship between the studied indicators, and they are used for short-term forecasting. The model coefficients are meaningful, because they are not interpreted in the case of ordinary regression models. For this purpose, analysis of impulse responses is used. In presence of the both short-term and long-term equilibrium (interrelations), vector-based corrective models of errors are built between variables [4].

In the 90s of the last century, structural vector autoregressive models began to be developed. Mainly they are used to study the transmission mechanisms of the country's monetary policy. However, there are studies in which the apparatus of vector models is used to analyze the labor market. Thus, the work of Vakulenko, E. S. and Gurvich, E. T. examines the relationship between the three main aggregated characteristics of the state of the labor market: the real value of wages, labor productivity, and unemployment [5]. The paper presents interesting general conclusions regarding the mechanisms of the Russian labor market, and the contribution of various channels to the observed wage growth is estimated. In particular, based on vector-based error correction models and analysis of impulse responses, the hypothesis is rejected that the Russian labor market is distinguished by an overly acute wage response to labor productivity shocks.

For the cross-border region, we will study the response of the unemployment rate to migration shocks. We will build a two-dimensional vector model, where in addition to the studied parameters (unemployment rates in the Orenburg region and the number of migrants) we will include exogenous and fictitious variables to take into account seasonal fluctuations, as well as the need of organizations for workers, which are both explicitly stated in employment services. The research information base is presented by monthly data for the period from 2010 to 2018.

Each of the time series was tested for the presence of a unit root using the extended Dickey-Fuller criterion and the KPSS criterion. The analysis shows that the considered series contain a one-unit root. The audit also shows the cointegration of the studied time series. When choosing the model order (the number of lags), we focused on the values of the information criteria.

3. Results

Let, as a result of the analysis, a two-dimensional VECM model of the form be chosen:

$$\begin{aligned}\Delta unempl_t &= \alpha_1 EC_{1,t-1} + \theta_1 \Delta migr_{t-1} + \mu_1 \Delta unempl_t + \varphi_1 demofLab_t + \psi_1 S_{6t} + \gamma_1 S_{7t} + \varepsilon_{1,t} \\ \Delta migr_t &= \alpha_2 EC_{2,t-1} + \theta_2 \Delta migr_{t-1} + \mu_2 \Delta unempl_t + \varphi_2 demofLab_t + \psi_2 S_{6t} + \gamma_2 S_{7t} + \varepsilon_{2,t}\end{aligned} \quad (1)$$

As a result of the evaluation, we receive a model evaluation:

$$\hat{\Delta unempl}_t = \underset{(0,0024)}{0,0119} EC_{2,t-1} + \underset{(0,0826)}{0,4824} \Delta unempl_{t-1} - \underset{(0,0031)}{0,0054} \Delta migr_{t-1} - \underset{(0,0000)}{0,0001} demofLab_t - \underset{(0,90)}{2,17} S_{6t} - \underset{(0,94)}{1,85} S_{7t} \quad (2)$$

$$\hat{\Delta migr}_t = \underset{(0,0878)}{-0,2934} EC_{1,t-1} - \underset{(2,29)}{0,3018} \Delta migr_{t-1} - \underset{(0,0008)}{4,34} \Delta unempl_t + \underset{(25,04)}{0,0016} demofLab_t + \underset{(26,28)}{67,92} S_{6t} + 6,42 S_{7t}$$

1. According to the results obtained in the previous period, the increase in migration has a negative effect on the increase in unemployment. The high unemployment rate in the summer months is

explained by the enrollment of graduates into the region's higher educational institutions and secondary specialized educational institutions to employment agencies, as well as the influx of migrants in the summer period for earnings.

2. An increase in the unemployment rate in the previous period leads to a decrease in migration in the current period, i.e. an increase in tension in the region's labor market reduces the influx of migrants in the short term.
3. The growth in demand for labor leads to a decrease in unemployment and an increase in migration. In the bulk, migrants close vacancies in construction, trade, and agriculture. The stated need by organizations for employment agencies in the general structure coincides with the working specialties in this area.

Estimates of the impulse response functions by model (2) are shown in Figures 1-2.

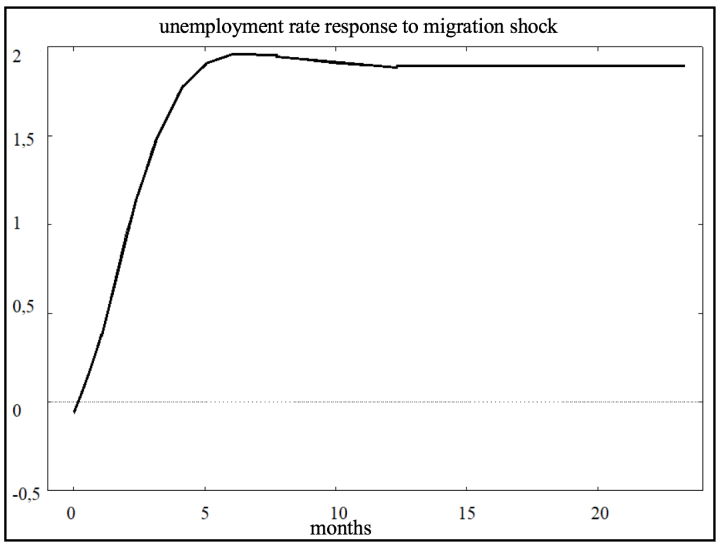

Figure 1. Impulse response to shock in migration.

According to Figure 1, we can conclude that a single shock in migration leads to a response of the unemployment rate (almost doubled) during the first 4-5 months, which was followed by stabilization.

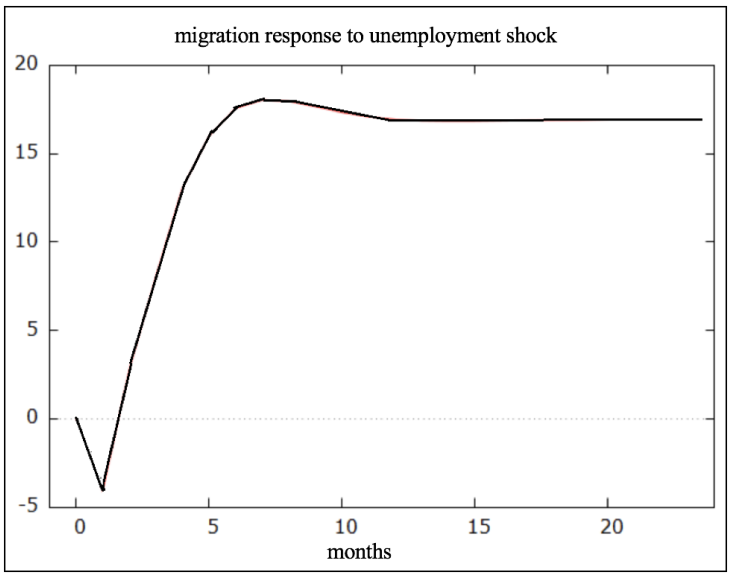

Figure 2. The impulse response to shock in the unemployment rate.

In the first two months, a single shock in the unemployment rate leads to a negative response (decreasing to -5) and subsequent growth (increasing to +17) in the following months. At the same time, the shock in the unemployment rate has a much longer effect on the dynamics of migration than the shock of migration on the unemployment rate.

4. Discussion

According to the obtained results, the labor market of a cross-border region is under the influence of an external shock (migration). The territorial proximity and similarity of the level of socio-economic development of the regions of Kazakhstan neighboring the Orenburg region determines the bi-directional relationship between migration and unemployment in the region. Labor migrants compensate for the shortage of working specialties. At the same time, increasing unemployment in the region leads to a decrease in labor migration.

It should be noted that labor migration in all countries was taken into account in modeling. At the same time, 41% of all arrivals in the Orenburg region in 2018 were the migrants from Kazakhstan. It should be noted that this is the highest proportion among other countries. For example, the next country in terms of the share of migrants is Tajikistan. About 12.5% of all migrants arrived from Tajikistan in 2018.

The constructed model does not take into account other external channels affecting the region's labor market. In particular, we are talking about financial channels, the impact of external sanctions, etc. Since it is almost impossible to influence these shocks. However, the goal was to clarify the impact of migration. In the future, this model can be expanded by including these external shocks, as well as including other indicators of the socio-economic development of the region.

5. Conclusion

According to the data for 2010-2018, the paper analyzes the dynamics in unemployment rates in the Orenburg region on the basis of a vector-based correction model for errors. Based on the model, the unemployment shocks in response to a single shock in migration is determined, as well as the response shock of migration to a single shock in the unemployment rate.

The existing policy between the Russian Federation and Kazakhstan, the common border length, the proximity of the socio-economic development in neighboring areas, and the possibility of obtaining higher and secondary special education in Orenburg determine the interdependence of unemployment and migration in the short and long term. The research clearly shows that, on the one hand, labor migrants solve the issue of disproportions in the region's labor market (compensate for the existing shortage of workers with unemployment). On the other hand, a sharp influx of migrants can double the region's unemployment rate.

The results are of interest to regional authorities in the development of programs of socio-economic development, as well as in cooperation with the Republic of Kazakhstan.

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