ISSN 0798 1015

REVISTA ESPACIOS

Vol. 41 (Issue 10) Year 2020. Page 3

Economic security of the region in context labor market indicators (on the example of the Omsk region, Russia)

Seguridad económica de la región en contexto. Indicadores de mercado laboral (ejemplo: región de Omsk, Rusia)

KARPOV, Valeriy V. 1; FRIK, Olga V. 2; SHTURLAK, Nikolay G. 3 & SHEREMET, Anna A. 4

Received: 22/08/2019 • Approved: 05/03/2020 • Published 26/03/2020

Contents

ABSTRACT:
The article examines the indicators of the regional labor market as an integral part of the economic security of the Russian regional´s economy. The monitoring of the state of the labor market on the example of a region of Siberia, the Omsk region, from 2008 to 2019, it was revised. The focus was on unemployment. Minor positive trends that do not fundamentally change the situation on the labor market are revealed. The study made a forecast of unemployment in the labor market of the Omsk region.
Keywords: economic security, labor market, Russian labor market

RESUMEN:
El artículo examina los indicadores del mercado laboral regional como parte integral de la seguridad económica de la economía regional Rusa. El monitoreo del estado del mercado laboral en el ejemplo de una region de Siberia, la región de Omsk desde 2008 hasta 2019, fue realizado. La atención se centró en el desempleo. Se revelan tendencias positivas menores que no cambian fundamentalmente la situación en el mercado laboral. El estudio hizo una previsión de desempleo en el mercado laboral de la región de Omsk.
Palabras clave: seguridad económica, mercado laboral, Mercado laboral Ruso

1. Introduction

The study of Russia's national security in terms of economic development is a complex, multidimensional process. The economy is the basis of the state’s activities, so it is difficult to overestimate the importance of ensuring economic security for assessing and predicting the state of the country and its constituent regions.

When solving complex problems, a mathematical decomposition method is often used, when the solution of one large problem is replaced by the solution of a series of simpler problems, but necessarily interrelated. In our case, the so-called dismemberment process allows us to consider the economic security of the country as an integral, consisting of separate interconnected regional subsystems, which, in turn, are due to a number of factors influencing the satisfaction of individual and social needs of the population of the region. Considering in this way the economic security of the region, it is possible to take into account not only the specifics of the economic development of

the region, but also those external threats in relation to it that affect the intra-regional economic processes.

From the totality of regional factors affecting economic security, this study highlighted the conditions and characteristics of the development of the Omsk region labor market. The choice of unemployment is not accidental, since it not only reflects the level of employment of the population, but also, as one of the main indicators of the labor market, determines the state of the economy of the region and the country as a whole.

The purpose of the article is to study the indicators of the regional labor market as an integral part of the economic security of the regional economy.

2. Methodology

The interest of researchers to the problem of economic security is explained by the importance, complexity and ambiguity of the processes and events that occur in the economy of the regions, the country, and the world as a whole. Each of the authors gives his own interpretation of economic security and its criteria, which, as a result, generates a large set of approaches to the assessment of economic security of the country as a whole, as well as individual regions (Karpov and Korableva (Eds.), 2017).

Chernenko (2015) emphasizes that all the main components of regional economic security, including features of the formation and development of the labor market, are similar to economic security at the federal level, but have specific features related to the geographical, economic, social, political and other features of each region.

The Article reported by Listopad (2011) concludes that the concept of economic security must be considered on the basis of the substantive aspect of the reproductive approach, which is directly related to the regional labor market.

Modern problems of the labor market and labor relations as an element of economic security are regularly discussed at different levels of government, and also are expressed in legislative acts (Decree of the President of the Russian Federation dated May 13, 2017, № 208 "On the Strategy of economic security of the Russian Federation for the period up to 2030").

Among the main regional problems addressed in most monographs and articles, one can single out low wages, unemployment, income inequality, poverty, shadow economic activity, low labor mobility, etc. Many authors single out unemployment as the main problem, through the solution of which one can enter the optimization of the regional labor market.

Nikerina, Yashkov and Bragina (2018) pay attention to the fact that the development of the labor market will be promoted by improving the skills of workers and their professional mobility (the ability of individuals or a professional group to move flexibly and adapt in the socio-professional structure of society with or without a change in social status), increasing the minimum wage and a possible change in the procedure for the appointment and payment of unemployment benefits.

With an underdeveloped labor market, the possibility of developing self-employment for the inhabitants of a region is of great importance. State policy in relation to self-employed, as noted by Kostrova and Shibarshina (2018), should take into account the multidimensionality of such activities of the population and is aimed at creating the most appropriate mechanisms for its legalization.

With respect to the problem of reducing the imbalance of labor resources, Ganchenko (2019) proposes to solve by implementing the synthesis of traditional, competency and design-network approaches. At the same time, analyzing the movement of labor resources in the South Kuzbass agglomeration, Ganchenko and Yarkova (2019) conclude that economic, social and labor potential is reduced at the periphery of the agglomeration due to the disparity of the professional level of the majority of potential workers, as well as difficulty in graduates' employment.

Popkova (2018) it offers an active type of impact on the level of employment in the Russian labor market by stimulating the creation of new jobs and measures to increase the level of employment in enterprises.

To the main factors influencing the situation on the labor market of the Rostov region, Chernenko (2019) relates the economic crisis, as a result of anti-Russian sanctions, the mismatch between the supply and demand of labor, the lack of competitiveness of the socially vulnerable groups of the population and the unemployed Russians, low population mobility, the discrepancy between vocational education and the labor market, different conditions for creating jobs in urban and rural labor markets.

To measures to combat unemployment in the opinion of Zakunova, Anisimova, Slyuzneva, Gordeev and Zhidkov (2018) can include informing people about the situation on the labor market, strengthening guarantees in the field of wages, developing an unemployment insurance system and providing legal protection for employees.

Merenkova and Novikova (2017) draw attention to the shortage of workers for the industries of the Sverdlovsk region, as a region with a high level of industrial development, and propose measures to improve the image of working professions.

Pleskach and Strekalova (2015) consider as a priority decision both a careful attitude to highly qualified specialists, which ensures the corresponding work of the real sector of the economy, as well as close attention to the needs of small and medium-sized businesses, which provides the necessary number of jobs, which is consistent with the position of the President of the Russian Federation, President of the Russian Federation, Vladimir Putin.

All these problems exist against the background of increasing demand for labor and human resources in the regions, especially in Siberian territories. Socio-economic development requires the adoption of urgent measures to optimize the use of all regional resources, including measures to increase the attractiveness of the labor market. To do this, it is important to reveal the current trends in the development of the unemployment process in such a unique in the industrial potential region of Siberia, as the Omsk region.

The seriousness of the problem dictates the need to quickly track changes in the unemployment rate and make predictions for the timely implementation of measures to adjust the number of unemployed in the region.

Forecasting is based on the use of formalized methods that represent a mathematical relationship that adequately describes the process under study. In this study, time series models were used that allow us to find the dependence of the future value on the past within the process itself and, based on this dependence, calculate the forecast.

Statistical models are suitable for predicting regional labor market indicators: regression models (linear and nonlinear), exponential smoothing model, autoregressive models (ARIMAX, GARCH, ARDLM), maximum-similarity sample model etc .

Time series characterizing economic phenomena, as a rule, have a rather complex structure. Improving the accuracy of the forecast for the time series is associated with the use of a class of models that combine trend, seasonal fluctuations, dependence of residuals (autocorrelation, autoregression). This class includes ARIMA-models, which, with their relative simplicity, often in cope with the task of forecasting better than complex structural models.

One of the most important stages in the construction of autoregression models is the determination of the order of autoregression. A preliminary assessment based on an economic analysis allows us to identify those values of the studied indicator that significantly influenced its changes in subsequent periods. The low order of autoregression can give insignificant results due to the fact that the model does not use information about the previous one. Increasing the order in some cases can also lead to a decrease in the quality of the model. In practice, the values of the autocorrelation function (ACF) and the private autocorrelation function (PACF) can be used to determine the order of autoregression (Suslov, Ibragimov, Talysheva and Tsyplakov, 2005, p.449-472).

The definition of a stationary or non-stationary time series is important for the study. A stationary series is a series whose behavior in the present and future coincides with the behavior in the past, i.e. the properties are not affected by the change in the reference time. It is possible to determine whether a series is stationary by conducting the Dickey-Fuller test (augmented Dickey-Fuller test, ADF-test) (Suslov, Ibragimov, Talysheva and Tsyplakov, 2005, p. 556-558). To describe non-stationary homogeneous time series, the Box-Jenkins model (ARIMA model) is used: (Auto Regressive Integrated Moving Average (ARIMA p, d, q). The symbol I (Integrated) is responsible for the order of the serial difference operator.

To build a model of this time series, we use the Gretl . We will perform modeling based on the ARIMA time series model (q, d, p). Where q is the autoregression parameter; d is the value of differences in the levels of a series; p is the parameter of the moving average. From the tests performed, it was determined that the parameter d would be equal to one for a given time series.

If the models differ in the number of parameters, then the so-called information criteria - Akaike *information criterion* (AIC), *Bayesian* information *criterion* (*BIC*) and *Hannan-Quinn* information criterion (HQC) (Suslov, Ibragimov, Talysheva and Tsyplakov, 2005, p.474) are used to compare and select the best model. These criteria act as a tool for the practical implementation of the

principle of the economy of the model — a model is selected that corresponds to the minimum value of the criteria.

3. Results

Monitoring the state of the labor market makes it possible to track the ongoing processes and is the basis for methods that make it possible to predict future events with a certain degree of reliability when planning certain management decisions in the economy.

The results of monitoring the number of unemployed in January-March 2019 show that the size of the labor force (economically active population) over the age of fifteen years in the Omsk Region decreased by 9.1 thousand people, amounting to 1019.6 thousand people. Despite the fact that the total number of unemployed (in accordance with the criteria of the International Labor Organization) decreased, in the structure of the labor force (economically active population) in the Omsk Region the number of employed during the period under review decreased too (See Table 1). This contradiction can be explained mainly by negative migration growth in the region.

Table 1
The number of labor force and unemployed
in Omsk Region, thousand people

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Labor force	1051,4	1066,3	1048,8	1057,4	1051,6	1050,3	1047,6	1029,2	1022,2
Number of unemployed	85,5	83,8	72,0	72,4	70,1	71,7	75,7	72,3	69,3

Source: Federal State Statistics Service

The imbalances in the structure of unemployment in the Omsk region by age characteristics can mainly be explained by the high level of emigration of the able-bodied population (38,078 people in 2017). Migration decrease by working-age population in 2017 was minus 7 331 people. It is important to note that emigrants include highly qualified personnel. Immigration consists of low-skilled personnel who consider the Omsk Region as a temporary place of work. The level of emigration contributes to a significant reduction in unemployment in the region, but it is positive only for statistics, but not for the economy (See Table 2).

Table 2
Indicators of labor migration in
the Omsk region, people

	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
number of immigrants	**47253**	**53910**	**54763**	**59011**	**58165**	**55095**	**54082**
including working-age population	33779	38658	39720	43484	42257	39327	38078
percent of total immigrants	71,49%	71,71%	72,53%	73,69%	72,65%	71,38%	70,41%
number of emigrants	**49039**	**56983**	**57536**	**58309**	**59965**	**61037**	**63935**
including working-age population	35815	41552	42233	42690	43735	43652	45409
percent of total immigrants	73,03%	72,92%	73,40%	73,21%	72,93%	71,52%	71,02%
Migration growth, decrease (-)	**-1786**	**-3073**	**-2773**	**702**	**-1800**	**-5942**	**-9853**
from it at the expense of the	-2036	-2894	-2513	794	-1478	-4325	-7331

working-age population							
Migration gross interchange	**96292**	**110893**	**112299**	**117320**	**118130**	**116132**	**118017**
from it at the expense of the working-age population	69594	80210	81953	86174	85992	82979	83487
percent of total sum	72,27	72,33	72,98	73,45	72,79	71,45	70,74

Source: Federal State Statistics Service

From a comparison of the Omsk Region and the Russian Federation, in general, there is a consistently high level of unemployment for the population of the Omsk Region (See Table 3). According to January-March 2019, total unemployment was 7.4% of the labor force, while the unemployment rate of the Omsk region is significantly higher than the average values for the Russian Federation (4.9 percent).

Table 3
Unemployment Rate in the Russian Federation and Omsk Region, %

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Russia	7,3	6,5	5,5	5,5	5,2	5,6	5,5	5,2	4,8
Omsk region	8,1	7,9	6,9	6,8	6,7	6,8	7,2	7,0	6,8

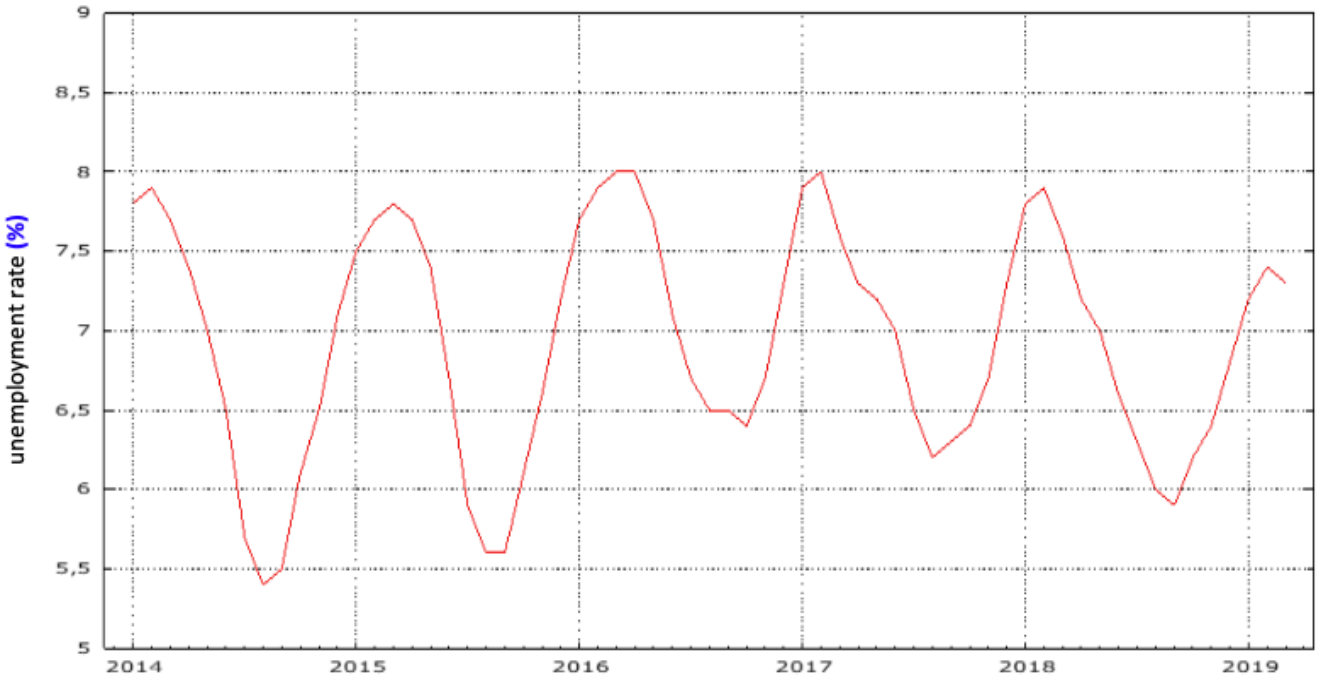
Source: Federal State Statistics Service

Statistical analysis of the number of unemployed shows a tendency to reduce the proportion of people without work, with an increase in the degree of education (from primary to higher vocational). Thus, the share of the unemployed with primary vocational education is 22.7%, with secondary vocational education –15.3%; and in the presence of higher education, their share is 14.5% of the total.

According to the analysis of the labor market of the Omsk region, we can conclude that unemployment in the Omsk region has a rather complicated structure. Young people, as well as people of pre-retirement age, suffer most from unemployment. The distribution of unemployed by age is bimodal, and has two “humps” in the age categories of young and people of pre-retirement age. The largest share of unemployed is made up of people aged 20 to 24 years (24.5% and 26.6% for women and men in 2017, respectively). The second “hump” in the distribution of the unemployed falls into the growth category from 50 to 54 years (9.8% and 12.4% for women and men in 2017, respectively). The smallest number of unemployed are aged 55 and older, however, the reason for this decrease is that people retire at this age and cease to be classified as unemployed. At 20% there is unemployment among people aged 25 to 29 years, and slightly lower at 9-12% is unemployment for the age group of 50-54 years. Unemployment in the Omsk region often has a long, protracted nature, which has a negative impact on the situation on the labor market in general, provokes economic problems.

The available series of unemployment dynamics in the Omsk region for the period from January 2014 to March 2019 has the following form (See Fig. 1).

Figure 1
The number of dynamics of unemployment in the Omsk region, %
(January 2014 - March 2019)



Source: Federal State Statistics Service

Analysis of the graph allows us to make an assumption about the absence of a trend in the time series under study and the presence of seasonality. It is the analysis of the identified seasonality of a number of unemployment values that makes it possible to construct a more accurate short-term forecast of future unemployment values using the correlogram method (Suslov, Ibragimov, Talysheva and Tsyplakov, 2005, p. 355, 369, 471-473). Estimates of the autocorrelation function (ACF) and private autocorrelation (PACF) with the maximum lag time, (lag) value, which should not exceed 15-20% of the row length are as follows: ACF with ten significant coefficients, PACF - two significant coefficients.

Research test results showed that the time series of unemployment is non-stationary. However, a number of the first differences in the unemployment rate can be considered stationary with a specification without a constant, since the probability value for accepting the null hypothesis is 0.0042, which is less than the allowable value of 0.05. Therefore, the time series of the unemployment rate of the Omsk region is stationary with respect to taking the first differences, that is, it belongs to the class of Difference Stationary (DS-series). The time series model is an ARIMA process. The predicted values for 12 months, obtained using this model, are given in Table 4

Table 4
Predicted values for the ARIMA model

Month	Forecast
2019:04	6,9
2019:05	6,7
2019:06	6,3
2019:07	6,0
2019:08	5,7
2019:09	5,6
2019:10	5,9
2019:11	6,1

2019:12	6,5
2020:01	6,9
2020:02	7,1
2020:03	7,0

Source: Calculated by the authors based on the ARIMA model

The data presented illustrate the increase in unemployment in the first quarter of each year, while in 2019 the unemployment rate will be in the summer period from 6.3 to 5.7%. At the end of 2019, the unemployment rate will be at the level of 6.5%, and at the beginning of 2020 there will be a slight increase in the figure - 7.1%.

The time series of unemployment is significantly affected by the seasonality effect, which manifests itself with a period of one year. The seasonal component has a particularly strong influence on the formation of the levels of the series in December, January, February, i.e. the unemployment rate steadily tends to increase during this period. This factor has the least impact in July, August, September, October and November. February is characterized by the maximum average unemployment rate. In general, it can be said that the unemployment rate will remain within the limits of its previous values; no sharp jumps have been revealed. The obtained forecast results for the model take place subject to the stability of the other factors affecting the unemployment rate of the population of the Omsk Region.

4. Discussion

The problems of employment, unemployment and the movement of labor resources are becoming increasingly relevant now. Forecasting the unemployment rate of the population is of great importance for the activities of federal and regional government bodies, as well as for economic entities. These circumstances make it necessary to forecast unemployment of the population, which will determine the main directions of change in the number of unemployed. Forecasting unemployment will also allow for timely measures that will help prevent negative trends in the development of a regional labor market.

To predict regional unemployment, the authors propose using ARIMA models, which, with their relative simplicity, often cope with the task of forecasting better than complex structural models, providing the necessary forecast accuracy. Time series combine trend, seasonal fluctuations, dependence of residuals (autocorrelation, autoregression) and take into account the stationarity or non-stationarity of the time series. If the models differ in the number of parameters, then the so-called information criteria - Akaike information criterion (AIC), Bayesian information criterion — BIC and *Hannan-Quinn* information criterion (HQC) are used to compare and select the best model.

5. Conclusions

Summarizing the above, we can draw the following conclusions:

1. Modern trends in economic development exacerbate the problems associated with the economic security of the regional economy. Despite the large variety of approaches and methodological tools for analyzing economic security, there are problem areas, the study of which currently requires increased attention. One of these areas is the unemployment rate in the regional labor market.

2. Monitoring the state of the labor market in the Omsk region from 2008 to 2019 showed that unemployment in the Omsk region with a relatively stable trend is mainly long-lasting, protracted, which has a negative impact on the situation on the labor market as a whole and provokes economic problems. Some positive trends do not fundamentally change the situation on the labor market of the Omsk region: the number of labor resources continues to decline, there is a migration decline in the able-bodied population, there is a high number of unemployed people compared to the figure for Russia as a whole.

3. The unemployment rate in the labor market of the Omsk Region was predicted using the ARIMA model, which is a type of autoregressive models that make it possible to find the dependence of

the future value on the past within the process itself. The best model was selected based on the so-called information criteria - Akaike information criterion (AIC), Bayesian information criterion (BIC) and Hannan-Quinn criterion (HQC).

4. The predicted values of the unemployment rate in the Omsk region labor market for the period from 04.2019 to 03.2020 show the strong influence of the seasonal component on the unemployment rate: an increase in December, January, February and a decrease in July, August, September, October and November, while February has the highest average. In general, the unemployment rate will remain within its previous values; no sharp jumps have been identified.

This study was carried out on the state order of the Omsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences **(project registration number AAAA-A17-117041210229-2).**

Bibliographic references

BOLLERSLEV, T., ENGLE, R.F. AND NELSON, D.B. (1994) ARCH models. Handbook of Econometrics, Vol. 4, part 10, chapter 49.

BOX, G.E.P. AND JENKINS, G.M. (1976). Time Series Analysis: Forecasting and Control, Revised Edition, San Francisco: Holden Day. CHERNENKO, D.I. (2019) Unemployment in the Rostov

CHERNENKO, D.I. (2019) Unemployment in the Rostov region as a socio-economic problem of the region. Modern research and innovation, 6. Retrieved from: http://web.snauka.ru/issues/2019/06/89776

CHERNENKO, O.B. (2015) Economic security of the region: definition and methodological approaches to support. Bulletin of Rostov state University of Economics, 4 (52), 113-118.

Decree of the President of the Russian Federation dated May 13, 2017, № 208 "On the Strategy of economic security of the Russian Federation for the period up to 2030". Consultant plus

FORNARI, F., MELE, A. (1997) Sign and Volatility-Switching and ARCH Models: Theory and Applications to International Stock Markets. Journal of Applied Econometrics, Vol. 12, 49-65.

GANCHENKO, D.N. (2019) Labor resources of the territories of advanced socio-economic development of the Kemerovo region: problems and prospects. Labor Market, 6 (1), 194-208.

GANCHENKO, D.N., YARKOVA, T.A. (2019) Current trends in the development of the labor market of the South Kuzbass agglomeration. Labor Market, 6 (1), 229-244.

KARPOV, V.V., KORABLEVA, A.A. (Eds.). (2017) Theory and practice of economic security assessment (on the example of the Siberian Federal district. Novosibirsk: Publishing house of the Institute of Economics and Industrial Engineering within the Siberian Branch of the Russian Academy of Sciences.

KOSTROVA, Y.B., SHIBARSHINA O.Y. (2018) The Analysis of approaches to the regulation of self-employment: Russian and international experience. Labor Market, 5 (4), 1137-1146.

LISTOPAD, M.E. (2011) Evolution of ideas about economic security. Theory and practice of social development, 3. Retrieved from: http://cyberleninka.ru/article/n/evolyutsiya-predstavleniy-ob-ekonomicheskoy-bezopasnosti-1

LYAPINA, I.R., GALKINA, E.E. Ensuring complex development of the region: reproductive aspect. Retrieved from: https://cyberleninka.ru/article/n/obespechenie-kompleksnogo-razvitiya-regiona-vosproizvodstvennyy-aspekt

MERENKOVA, A.S., NOVIKOVA, N.V. (2017) Analysis of the current state of unemployment and employment in the region on the example of the Sverdlovsk region. Humanitarian research, 2. Retrieved from: http://human.snauka.ru/2017/02/20583

NIKERINA, E.V. YASHKOV, A.B., BRAGINA, Z.V. (2018) Regional labor market and prospects of its development. Labor Market, 5(2), 433-440.

PLESKACH, T.I., STREKALOVA, S.A. (2015) Problems of unemployment in the Russian Federation. Politics, state and law, 5. Retrieved from: http://politika.snauka.ru/2015/05/2884

POPKOVA, I.S. (2018) Statistical review of employment. Economics and management of innovative technologies, 1. Retrieved from: http://ekonomika.snauka.ru/2018/01/15701

State strategy of economic security of the Russian Federation (Main provisions). Retrieved from: http://base.garant.ru/106503/#ixzz3p cS2WYZB

SUSLOV, V.I., IBRAGIMOV, N.M., TALYSHEVA, L.P., TSYPLAKOV, A.A. (2005) Econometrics. Novosibirsk: SB RAS Publ., 345-540.

ZAKUNOVA, E.D., ANISIMOVA, A.E., SLYUZNEVA, K.V., GORDEEV, K.S, ZHIDKOV, A.A. (2018) The Problem of unemployment in modern Russia. Modern scientific researches and innovations, 11. Retrieved from: http://web.snauka.ru/issues/2018/11/88163

---

1. Doctor of Economic Sciences, Professor, Omsk scientific center of Siberian Branch of Russian Academy of Sciences; Omsk; Russian Federation, E-mail: karpov-v51@yandex.ru

2. Candidate of Philosophical Sciences, Associate Professor, Siberian Institute of Business and Information Technology, Omsk; Financial University under the Government of the Russian Federation; Omsk Branch; Russian Federation, E-mail: ofrik@mail.ru

3. Candidate of Economic Sciences, Institute of Economics and Industrial Engineering Siberian Branch of the Russian Academy of Sciences; Omsk; Russian Federation, E-mail: finansaudit@sfko.ru

4. Candidate of Philosophical Sciences, Associate Professor, Department of Philosophy, Dostoevsky Omsk State University; Omsk; Russian Federation, E-mail: SheremetAA@omsu.ru

5. These models and tools are widely known, applied and are constantly being improved. Further development arises from Fornari and Mele (1997), Bollerslev, Engle and Nelson (1994) (for ARCH, GARCH), Box and Jenkins (1976) (for ARIMA). For a fundamental and extensive review was made, for example, by Suslov, Ibragimov, Talysheva and Tsyplakov (2005).

6. Gretl is an econometrics package, including a shared library, a command-line client program and a graphical user interface. Gretl user's guide: http://gretl.sourceforge.net/gretl-help/gretl-guide.pdf

---

Revista ESPACIOS. ISSN 0798 1015
Vol. 41 (Nº 10) Year 2020

[Index]