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**MIGRATION AND WELFARE IN THE FAR EAST**

Yuliya V. Aksenova (a)\*, Sergey A. Dukart (b), Lyudmila M. Borisova (c), Ekaterina Anikina (d)

\*Corresponding author

(a) National Research Tomsk State University, Lenin Avenue, 36, 634050, Tomsk, Russia,  
julieaksenova@gmail.com

(b) Tomsk Polytechnic University, Lenin Avenue, 30, 634050, Tomsk, Russia, dukart@mail.ru

(c) Tomsk Polytechnic University, Lenin Avenue, 30, 634050, Tomsk, Russia, unexx@rambler.ru

(d) Tomsk Polytechnic University, Lenin Avenue, 30, 634050, Tomsk, Russia, anikinaea@tpu.ru

***Abstract***

This study analyzes the problem of negative migration flows of the Far Eastern Region as one of the main components of the welfare of the population. The aim of the study is to construct an econometric model describing the correlation between the productive and factor characteristics, which will be of practical importance for the compilation and adjustment of state programs for the development of the Far Eastern Region. The hypothesis of the study is the assertion that the following indicators influence the emigration flows: the volume of industrial production, its rise or decline and the volume of shipped goods of its own production related to manufacturing industries. Therefore, the study reveals factors influencing the high level of emigration flows from the Far Eastern Region. Multilevel factorial regression analysis is performed. The analysis shows that with the state policy unchanged in relation to the increase in living standards and welfare of the Far Eastern Region, migration to other regions of the Russian Federation will exceed 100 thousand people by 2020, which is a critical mark for the region. Thus, recommendations are given on the use of the model in drawing up federal programs to increase the welfare of the Far East.

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**Keywords:** Welfare, migration, the Far East, regression analysis, factor analysis.



## 1. Introduction

The level of welfare of the population of the country is a consolidated component, including various influencing factors. These factors concern different aspects of the life of the population. The change and maintenance of the level of well-being at the required level implies impact at all levels. One of these levels is the sphere of economic regulation. In turn, economic programs to maintain the level of the well-being of the population are an internal policy to improve the most important economic indicators. One of such indicators is the uniformity of the development of the regions of the country.

It is known that the Russian Federation is characterized by uneven development of the regions. In particular, the Far East is an acute problem, which is supported by a number of state programs. However, the problem of a high degree of emigration flows remains the most acute. However, this region is relatively unattractive in comparison with other regions of the country. As a consequence, it is important to understand the migration problem and to justify the methods of solving its solution.

## 2. Problem Statement

Due to the fact that the fundamental problem of the backward development of the Far East is a significant disproportion between the state program for the economic development of the Far Eastern Region and limited labour resources, an important task is the suspension of accelerating emigration flows and the involvement of specialists in the region. It is migration flows, in particular negative ones, which can provoke a negative impact of this phenomenon on the welfare of the population of the region. This study assumes a regression analysis of the impact of emigration processes on the welfare of the region. For the analysis of the economic situation in the Far Eastern Region, the aggregated data of nine constituent entities for the period 2000-2014 were taken.

## 3. Research Questions

In the framework of this study, it is proposed to answer the following questions:

- Prove and justify the negative impact of positive emigration flows from the Far Eastern Region,
- Identify the most significant factors that affect the emigration and welfare of the regions of the Far East, conduct a factorial multi-level analysis,
- To build a model for changing the index of industrial production, taking into account the depreciation of fixed assets and the number of credit institutions,
- To build a model for changing exports from the region, taking into account the degree of depreciation of fixed assets and the number of scientific personnel,
- Combine the two models in one, which will describe the growth of migration flows, depending on the changes in the value of fixed assets, credit institutions and the number of scientific personnel,

To determine the possibilities of using this model for further application in drawing up federal programs to increase the welfare of the population.

#### 4. Purpose of the Study

The aim of the study is to construct an econometric model describing the correlation between the productive and factor characteristics, which will be of practical importance for the compilation and adjustment of state programs for the development of the Far Eastern Region.

#### 5. Research Methods

During the research, the following analysis methods were used: comparison, regression analysis, synthesis and statistical method.

#### 6. Findings

The hypothesis of the study is the assertion that the following indicators influence the emigration flows: the volume of industrial production, its rise or decline and the volume of shipped goods of its own production related to manufacturing industries.

##### 6.1. Analysis of industrial production index

The volume of industrial production is affected by indicators of the degree of depreciation of fixed assets and the number of credit organizations in the region (Aksyonova & Barysheva, 2016). For calculation, depreciation rates of fixed assets in the construction industry were taken as the most in need of updating in comparison with other branches of production. Also, the volume of industrial production is affected by investment policy, namely, the creditworthiness of the population of the Far Eastern Region (Silifonova et al., 2017). Over the past 15 years, due to the steady decline in the number of credit institutions, the availability of cash for the population is declining. The dynamics of the above indicators are shown in Table 1.

**Table 01.** Dynamics of the index of industrial production, the degree of depreciation of fixed assets, the number of credit organizations in the period from 2000-2015.

Year	Industrial production index	Depreciation of fixed assets (construction),%	Number of credit institutions
2000	108,4	39,3	46
2001	108,8	40,6	45
2002	107,1	41,8	44
2003	107,4	41,8	43
2004	106,5	42,1	43
2005	105,6	42,2	40
2006	104,2	42,2	38
2007	103,1	44,6	36
2008	99,8	47,8	30
2009	102,6	46,2	32
2010	101,9	46,3	30

2011	100,1	47,9	26
2012	99,8	48,1	23
2013	98,7	47,9	22
2014	98,6	48,7	22

When regression analysis is carried out, the P-value (probability of error) of the depreciation ratio is close to 5%, the number of credit institutions is less than 2%, which indicates the sufficient reliability of the obtained model. The R-square (the coefficient of determination) is 96.9%. The results of the regression analysis are presented in Table 2. Consequently, the share of the variance of the dependent variable, explained by the constructed model, characterizes a high level of accuracy. Thus, the equation of dependence has the form:

$$Y_1 = 117,1749 - 0.48703 \times X_1 + 0,230897 \times X_2,$$

where  $Y_1$  – industrial production index,

$X_1$  – degree of depreciation of fixed assets in the construction industry in the Far Eastern Region,

$X_2$  – number of credit institutions in the Far Eastern Region.

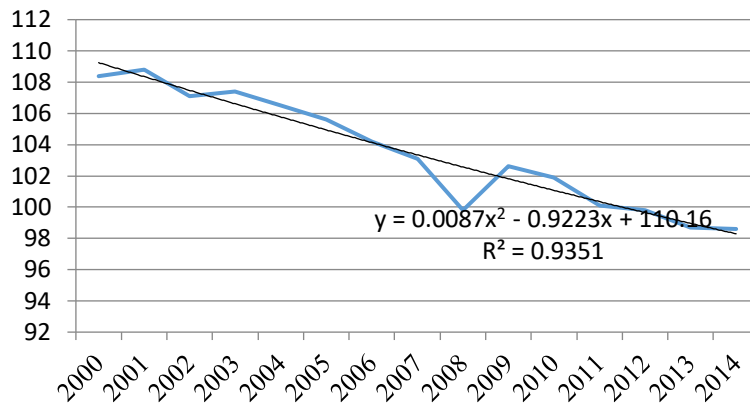
**Table 02.** Data regression analysis on the index of industrial production, the degree of depreciation of fixed assets, the number of credit institutions

<b>CONCLUSION OF THE RESULTS</b>					
<b>Regression statistics</b>					
Multiple R	0,98465				
R-square	0,969536				
The normalized R-square	0,964458				
The standard error	0,682882				
Observations	15				
<b>Dispersion analysis</b>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<b>The significance of F</b>
Regression	2	178,0934	89,0467	190,9527	7,99E-10
Balance	12	5,595941	0,466328		
Total	14	183,6893			
	<b>Coefficients</b>	<b>Standard error</b>	<b>t-statistics</b>	<b>P-Value</b>	<b>Lower 95%</b>
Y-intersection	117,1749	13,0021	9,011999	1,09E-06	88,84576
Depreciation of basic (construction), %	-0,48703	0,228833	-2,1283	0,05472	-0,98561
Number of credit institutions	0,230897	0,083329	2,770892	0,016934	0,049338

Figure 1 shows the dynamics of the change in the index of industrial production. The trend line has the form of a polynomial function of the second degree

$$Y = 0,0087 \times X^2 - 0.9223 \times X + 110,16$$

with an accuracy level of 93.5%. With the help of this equation, the predicted values of the industrial production index until 2020 are calculated.



**Figure 01.** Dynamics and trend of industrial production index in the Far East Region

## 6.2. The volume of shipped goods of own production in manufacturing industries

Regression analysis of the exported goods of manufacturing industries in the Far Eastern Region shows that this indicator is a dependent value of the number of scientific personnel in the region and the degree of depreciation of fixed assets for mining (Barsukov, 2015).

The increase of human potential, understood as a set of abilities and opportunities for the performance of a certain type of labour activity, is now an unconditional factor in increasing the competitiveness of products and services (Iremadze & Kulinich, 2013). The knowledge applied by producers of goods obtained in scientific fields allows manufacturers to use effective means of organizing production. Increasing exports of goods from the region presupposes a stable variability of highly developed industries, which in turn generates the need for continuous improvement of the skills of workers. At the same time, the scientific personnel is the mechanism for the formation of innovative potential in the region to increase the competitiveness of exported goods (Barysheva et al., 2016).

The state of the processing industries depends not only on the state of fixed assets in this sector (this indicator has already been taken into account in analyzing the index of industrial production). The efficiency and degree of development of the manufacturing industry is directly proportional to the position of the production of minerals (Ronova & Yakovlev, 2011). When the goods with high added value pass through the full technological cycle, the intermediate phase is the extraction of raw materials. Therefore, the productivity of products, their uniqueness and competitiveness, and therefore, the volume of their exports to other regions and beyond the Russian Federation, directly depends on the state of fixed assets in the extractive industries. In this case, this indicator is the degree of depreciation of fixed assets. The dynamics of the indicators used in the analysis is presented in Table 3.

**Table 03.** Dynamics of the volume of shipped goods of own production (by processing industries), the degree of depreciation of the Oblast (for the extraction of minerals), the number of scientific personnel in the Far Eastern Region in the period 2000-2014

Year	Growth rate of shipped goods of own production (processing industries)	Degree of depreciation of fixed assets (extraction of minerals), %	Number of scientific personnel, persons
2000	114,7	43,2	17025
2001	108,9	45,2	16987
2002	107,7	46,1	16752
2003	108,6	46,3	16423
2004	105,9	48,3	15968
2005	104,9	46,9	15247
2006	108,2	45,5	14356
2007	98,2	46,5	14143
2008	101,9	47,9	13496
2009	97,8	44,6	12923
2010	106,5	42,3	12776
2011	109,3	36,9	13227
2012	108,9	38,8	13942
2013	104,9	39,4	13407
2014	102,7	40,8	13204

When carrying out the regression analysis, the P-value (probability of error) of depreciation of fixed assets is 0.3%, the number of scientific personnel is 0.04%, which indicates the high reliability of the model obtained. The R-square (the coefficient of determination) is 68.2%. The results of the regression analysis are presented in Table 4. Therefore, the proportion of the variance of the dependent variable, explained by the constructed model, characterizes an acceptable level of accuracy. Thus, the equation of dependence has the form:

$$Y_2 = 107.3083 - 0.86123 \times X_3 + 110,16 \times X_4$$

where  $Y_2$  – industrial production index,

$X_3$  – degree of depreciation of fixed assets in the construction industry in the Far Eastern Region,

$X_4$  – number of credit institutions in the Far Eastern Region.

**Table 04.** Data regression analysis on the index of industrial production, the degree of depreciation of fixed assets, the number of credit institutions

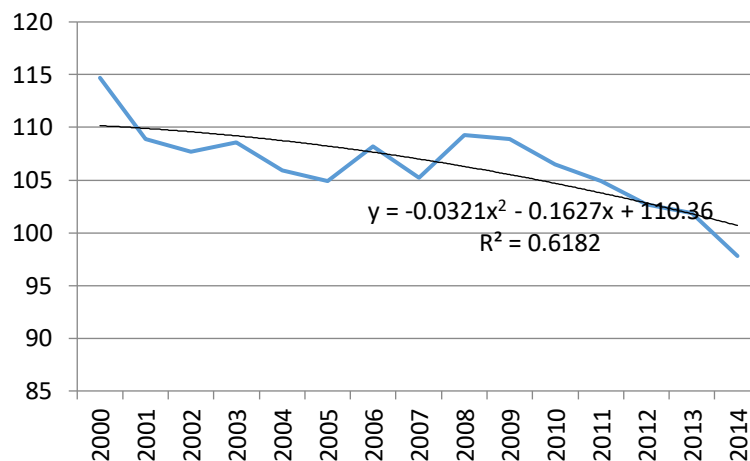
CONCLUSION OF THE RESULTS					
Regression statistics					
Multiple R	0,825683				
R-square	0,681752				
The normalized R-square	0,628711				
The standard	2,706945				

error					
Observations	15				
<b>Dispersion analysis</b>					
	<b>df</b>	<b>SS</b>	<b>MS</b>	<b>F</b>	<b>The significance of F</b>
Regression	2	188,3654	94,1827	12,85323	0,001039
Balance	12	87,9306	7,32755		
Total	14	276,296			
	<b>Coefficients</b>	<b>Standard error</b>	<b>t-statistics</b>	<b>P-Value</b>	<b>Lower 95%</b>
Y-intersection	107,3083	9,448259	11,35747	8,91E-08	86,7223
Depreciation of basic (construction),%	-0,86123	0,232442	-3,70515	0,003007	-1,36768
Number of credit institutions	0,002487	0,000518	4,798974	0,000434	0,001358

Figure 1 shows the dynamics of changes in the growth rates of shipped goods of own production in the manufacturing industries. The trend line has the form of a polynomial function of the second degree

$$Y = -0,0321 \times X^2 - 0,1627 \times X + 110,36$$

with a level of accuracy of 61,8%. With the help of this equation, the forecasted values of the growth rates of the shipped goods of own production until 2020 are calculated.



**Figure 02.** Dynamics of changes in the growth rates of shipped goods of own production in processing industries and the trend in the Far Eastern Region

### 6.3. Analysis of the level of migration from the Far Eastern Region to other regions of the Russian Federation

The analysis of the industrial production index is due to the fact that it reflects a change in the real level of production in the Far Eastern Region, in contrast to the domestic regional product discounted to the level of inflation. Due to the fact that there is a significant disproportion between the statistical data of

the consumer price index and the opinions of people living in the given territory, there can be doubts about the reliability of the inflation indicator (Kundakchyan & Zulfakarova, 2013).

The volume of industrial production is an indicator of the standard of living in the region due to the fact that it is a derivative of the level of incomes of the population, the number of jobs, social payments due to changes in tax revenues (Tchigirinskaya, Tchigirinsky & Chesnokov, 2015). Thus, the increase in migration flows to the western regions of the Russian Federation is due to a slowdown in the dynamics of industrial production.

The volume of shipped goods of its own production affects the welfare of the population and emigration flows through capital inflows from export transactions. Inflow of capital promotes increase of investment activity of the population (Masaya & Atsushi, 2014). According to the law of diminishing marginal return on capital (Chicherina & Tolkacheva, 2017), the Far East as an underdeveloped region will bring a greater return on investment than a more developed region, which will have a beneficial effect on the economy of the Russian Federation as a whole (Platonova & Panina, 2015).

Over the past 15 years there has been a steady positive dynamics of migration from the Far Eastern Region to other regions of the country. Table 5 shows the dynamics of the level of migration to other regions, the index of industrial production and the volumes of shipped goods of own production.

**Table 05.** The dynamics of changes in the level of migration to other regions, the index of industrial production and the volume of shipped goods of own production in the Far Eastern Region in the period 2000-2014

Year	Migration to other regions of the Russian Federation, people.	The index of industrial production	The growth rate of the volume of shipped goods of own production (processing industries)
2000	40118	108,4	114,7
2001	40268	108,8	108,9
2002	41606	107,1	107,7
2003	41927	107,4	108,6
2004	42192	106,5	105,9
2005	44800	105,6	104,9
2006	46712	104,2	108,2
2007	46331	103,1	105,2
2008	48046	99,8	109,3
2009	49141	102,6	108,9
2010	58154	101,9	106,5
2011	67689	100,1	104,9
2012	81769	99,8	102,7
2013	86322	98,7	101,9
2014	88591	98,6	97,8

In the regression analysis, the P-value (probability of error) of the industrial production index is 0.8%, the growth rate of the volume of shipped goods of own production by processing industries is 2.3%, which indicates the high reliability of the model obtained. R-square (coefficient of determination)



is equal to 80.9%. The results of the regression analysis are presented in Table 6. Therefore, the proportion of the variance of the dependent variable, explained by the constructed model, characterizes an acceptable level of accuracy. Thus, the equation of dependence has the form:

$$Z = 535505.4 - 2605.85 \times Y_1 - 1981.75 \times Y_2$$

Where  $Z$  – migration to other regions of the Russian Federation, persons,

$Y_1$  – the index of industrial production,

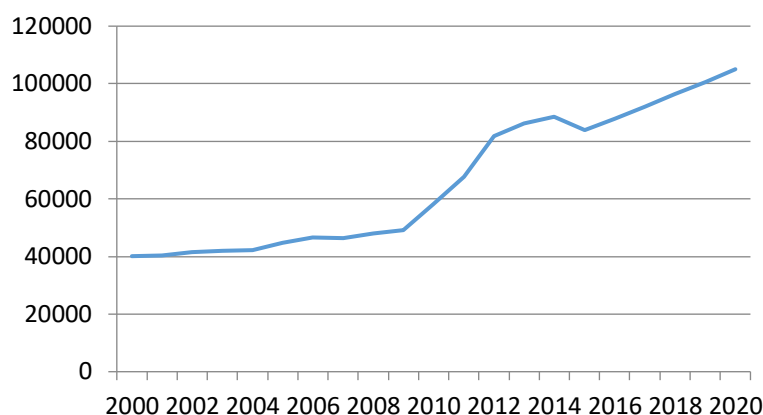
$Y_2$  – the rate of growth in the volume of shipped goods of own production by processing industries.

**Table 06.** Regression analysis of the level of migration from the Far Eastern Region to other regions of the Russian Federation

CONCLUSION OF THE RESULTS					
Regression statistics					
Multiple R	0,899993				
R-square	0,809987				
The normalized R-square	0,778318				
The standard error	8232,59				
Observations	15				
Dispersion analysis					
	df	SS	MS	F	The significance of F
Regression	2	3,47E+09	1,73E+09	25,57676	4,71E-05
Balance	12	8,13E+08	67775543		
Total	14	4,28E+09			
	Coefficients	Standard error	t-statistics	P-Value	Lower 95%
Y-intersection	535505,4	67233,16	7,9649	3,93E-06	389016,9
Depreciation of basic (construction),%	-2605,85	822,9312	-3,16655	0,008121	-4398,87
Number of credit institutions	-1981,75	763,0173	-2,59725	0,023344	-3644,22

Using formula (3), using the obtained predictive data of factor characteristics, we calculate the migration rates from the Far Eastern Region to other regions until 2020. The dynamics of migration flows with the current economic situation of the Far East is presented in Figure 3.

The analysis shows that with the state policy unchanged in relation to the increase in living standards and welfare of the Far Eastern Region, migration to other regions of the Russian Federation will exceed 100 thousand people by 2020, which is a critical mark for the region.



**Figure 03.** Dynamics of migration flows with the current economic situation of the Far East

Dynamics of changes in the growth rates of shipped goods of own production in processing industries and the trend in the Far Eastern Region.

## 7. Conclusion

The study of migration processes from the Far Eastern Region to other regions of the Russian Federation is not perfect because in this econometric model. There is a breakdown of factor characteristics into additional dependent quantities. In this case, such a need is that the number of elements of the time series must exceed the number of factor attributes by a factor of 7-8.

However, due to the limited availability of statistical data (since 2000), it is impossible to build a single model with many factors. At the same time, this approach makes it possible to compile and adjust state programs to support the Far Eastern Region, numerically determine by what levers it is possible to most effectively influence the level of migration flows from the region.

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