SOCIAL POLICY

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ANALYSIS AND EVALUATION OF THE INTERRELATIONSHIPS OF THE LABOR MARKET INDICATORS OF THE REGIONS (MARZES) OF THE RA AND THE CITY OF YEREVAN

Issues in the field of employment basically predetermine both the current trends in the economic development of any country and long-term expectations. Therefore, the analysis of employment indicators and their qualitative and quantitative assessment form sufficient practical grounds for an objective and scientific solution to the problems of economic activity of the population. In this article, the indicators characterizing the employment market of the territorial units of the Republic of Armenia, including the city of Yerevan, were analyzed, using econometric models. And the relationship and interaction between macroeconomic indicators and employment indicators were evaluated. The results

of the analysis show that, according to territorial units, both employment indicators and other macroeconomic indicators in Armenia are highly polarized, and positive trends in economic development are manifested mainly in Yerevan and Syunik regions. The results of econometric models "economic growth - reduction of unemployment", in turn, reveal the gap between the capital and the regions in terms of reducing unemployment.

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Introduction. Ensuring the employment of the population, as well as solving the unemployment problem, has a key role and significance in ensuring the socioeconomic stability of any state. Unemployment, as a rule, slows down the rate of economic growth of the country, economic resources and capacities are used incompletely and rationally, and the economy is continuously operating under conditions of underemployment. This is also the reason why the continuous growth and development of labor resources, effective use, and increase of the employment level are fixed as priorities of the strategic plans of the Republic of Armenia. At the same time, it is necessary to point out that continuous reforms and development of economic systems, stable growth, and the study of a number of economic issues are simply impossible without realizing the proportionality of territorial development. Let's also note that balanced territorial development is not a manifestation of any government's goodwill, but an important function stipulated by the RA Constitution, which should be an integral part of any government's plan.

Armenia's economic and social environment is not protected from the problems of disproportionality either because the concentration of the population in the capital Yerevan has led to several problems, including polarization of labor resources and employees, which makes the analysis of employment indicators by territorial units, the assessment of their progress and consequences, relevant.

The purpose of this research is a comprehensive analysis of the labor market and employment indicators in the Republic of Armenia according to individual territorial units identifying changes in them and using econometric models to evaluate the relationship between macroeconomic and employment indicators and make predictions.

Literature review. Labor market and employment issues are always relevant. They have been and are in the focus of the attention of foreign and domestic economists and other researchers. A number of studies we reviewed document that youth unemployment remains a serious problem in both developed and developing countries[1]. Factors such as lack of experience and skills, skills

[1] Godfrey M. (2003). Youth Employment Policy in Developing and Transition Countries, Preventions as well as Care, Social Protection: Discussion Paper No.320, World Bank, Washington, DC. Dolgikh E., Statistical analysis of employment and unemployment in the Russian Federation, Moscow, 2010, https://guu.ru/files/referate/dolgih.pdf: Stroykina N.V., Statistical analysis and forecasting of labor market development in the Orenburg region, Moscow, 2011, https://core.ac.uk/download/pdf/197427953.pdf

mismatch, and low school leaving age contribute to high youth unemployment rates compared to adults. At the end of1980s. there were countries that were characterized as by a large excess demand for labor, the absence of unemployment, and high labor participation in economic processes.

The functioning of regional labor markets has been the subject of intensive research in the regional economic literature.[2] The principal aims of the empirical literature on regional unemployment are usually to examine the persistence of unemployment differentials and to develop a model that investigates its determinants.

The purpose of one of the research was to investigate the provincial unemployment differences in the labor market in Italy by using a proper statistical model. Using spatial econometric models for spatial autocorrelation, this paper focuses mainly on the spatial structure of regional unemployment disparities in Italian provinces. The results suggest that there is a clear explanation of unemployment differentials in terms of spatial equilibrium and disequilibrium factors and a significant degree of spatial dependence among labor markets at the provincial level in Italy.[3]

Studying employment issues in the Russian economy, Vakulenko showed that the movement of labor between sectors and regions in Russia is comparatively lower than in other countries.[4] This justifies low scale of intersectoral and interregional interaction against considerable spatial dispersion of settlements and low population density. The relatively large interregional inequalities in unemployment rates and incomes provide an indirect indication of low mobility in Russia.[5] This fact carries a significant risk contributing to the rise in unemployment in several areas of the nation.

Bornhorst and Commander(2006) investigate the persistence of regional unemployment rates in six major transition countries.[6] Finally, Marelli and Signorelli (2010) incorporated an index of "progress in transition" to explain employment growth in a large sample (at the NUTS-3 level of disaggregation) of regions in eight transition countries.[7]

Global Employment Trends for Youth 2022, International Labour Organization • Geneva, https://www.ilo.org/wcmsp5/groups/public/--dgreports/--dcomm/--publ/documents/publication/wcms_853321.pdf

[2] Longhi S., Nijkamp P., Reggiani A. and Maierhofer E., 2005. Neural Network Modelling as a Tool for Forecasting Regional Employment Patterns. International Regional Science Review 28(3): 330-346.

[3] Maria Francesca Cracoliciab∗, Miranda Cuffaroa and Peter Nijkampb, GEOGRAPHICAL DISTRIBUTION OF UNEMPLOYMENT: AN ANALYSIS OF PROVINCIAL DIFFERENCES IN ITALY, Tinbergen Institute Discussion Paper, https://papers.tinbergen.nl/07065.pdf

[4] Vakulenko E. (2020). Comparative Analysis of Interregional and Intersectoral Mobility in Russia. Economy of region, 16(4), 1193-1207, https://doi.org/10.17059/ekon.reg.2020-4-13

[5] Vakulenko E., Gurvich E. (2015). Modeling of the mechanisms of the Russian labor market. Economic issues, 11, 5-29, https://doi.org/10.32609/0042-8736-2015-11-5-29

[6] Bornhorst F., Commander S. (2006). Regional unemployment and its persistence in transition countries. The Economics of Transition, 14(2), 269-288.

[7] Marelli E. and Signorelli M. (2010b), Transition, Regional Features, Growth and Labour Market Dynamics, in F.E. Caroleo and F. Pastore (eds.), The Labour Market Impact of the EU Enlargement, Physica-Verlag, Berlin Heidelberg, pp. 99-147.

In their research, Maqbool et al showed that every government should use all factors of production to create employment opportunities for the unemployed.[8] These two terms are related to unemployment leading to low economic growth or low economic growth leads to unemployment. As a result of unemployment, natural and human resources are not fully used, therefore, due to inefficient use of resources, the economy cannot grow within its limits.

According to the results of the research "Analysis of the labor market and the comprehensive solutions of the state regulation of employment in the RA" carried out by the Amberd Research Center of ASUE.[9] The relationship between real GDP and the number of the unemployed in Armenia is negative and is -0.74. GDP and unemployment rates are also negatively correlated (correlation coefficient -0.61). The "ARIMAX" model was used in the research to simulate the relationship between real GDP and unemployment which was based on the IMF consulting model. The result shows that a 1% increase in GDP in Armenia leads to a 0.26% decrease in unemployment. Another research related to the labor market in Armenia was conducted by the Luys Foundation.[10] The results of the study "Poverty, employment and social problems in Armenia, the study of the activities of the RA government" carried out by the Foundation showed that In 2018-2019, at the expense of new (mostly out of the shadow) jobs, employment had expanded. In terms of wages, there is a certain increase, which is more significant for public sector workers, amounting to about an 8.4% wage increase.

Thus, it can be inferred that if the economies of developing nations want to ensure growth and participate in world trade by raising their standard of living, these economies must take steps to create jobs and minimize unemployment in their countries.

Research methodology. Statistical analysis and modeling tools were used in the given research. Based on the purpose of the research, fundamental (factor-based) and technical analysis tools were combined. In technical analysis, the components of a time series describe the series factorially without naming them: trend - the effect of long-term factors, seasonality - short-term, dummy variables - momentary factors, cyclical component - the effect of the economic cycle, and the random component - the rest of the irregular, random factors that are not taken into account. An ARIMA type model was used as a basis for technical analysis to model time series components which summarizes several models: autoregression, integration, moving average. By analyzing the stationarity of the series, the order of integration I component is selected, and the orders of AR and

[8] Maqbool M.S., Mahmood T., Sattar A., Bhalli M.N., Determinants of unemployment: empirical evidences from Pakistan. Pakistan Economic and Social Review, 51(2), 2013, 191-208, http://pu.edu.pk/images/journal/pesr/PDF-FILES/5%20MAQBOOL%20Determinants%20of%20Unemployment_V51_No2_Winter2013.pdf

[9] Source: Analysis of the labor market and the compehensive solutions for the state regulation of employment in the Republic of Armenia AMBERD series, Yerevan 2021, «TNTESAGET» publishing house, https://asue.am/upload/files/amberd/Amberd%2040.pdf

[10] Source: Poverty, employment and social problems in Armenia. Study of the activities of the RA government, Luys Foundation, https://www.luys.am/img/artpic/small/3e01bae5bee0152e9fcb%D4%B1%D5%B2%D6%84%D5%A1%D5%BF%D5%B8%D6%82%D5%A9%D5%B5%D5%B8%D6%82%D5%B6.pdf

MA components are based on autocorrelation and partial autocorrelation functions. And to determine the degree of more accurate approximation Akaike's (AIC), Bayesian (BIC) and other criteria showing the quality of approximation (average error of approximation, average absolute error, average absolute percentage error, etc.) served as the basis. The ARIMAX type model was used to model the RA unemployment-GDP relationship, which differs from ARIMA in that it also contains exogenous variable(s). This model can be called a hybrid of factorial and technical modeling.

As a fundamental analysis tool, a system of simultaneous regression equations was used in the research. With this approach, it is possible to consider the same variable in one equation as an endogenous variable, and in another equation as an exogenous variable, based on the goals and problems of the research. The estimation of simultaneous regression equations also differs, it is multi-step and contains a generalized least squares process. In this study, the system was evaluated using the three-step least squares method in order to obtain more accurate estimates.

Analysis. The level of unemployment is perhaps the key indicator reflecting the situation in the labor market. In 2022, the number of the unemployed in the world will reach 207 million people, which is 21 million more than in the pre-crisis of 2019[11] and the average level of unemployment in the world is 5.5%.

Although unemployment and underemployment are still major concerns for many industrialized countries, the mentioned problems are much more difficult for the economies of developing countries. And, despite that fact, Governments of developing countries do not stand out in terms of developing and implementing employment policies to meet these challenges.

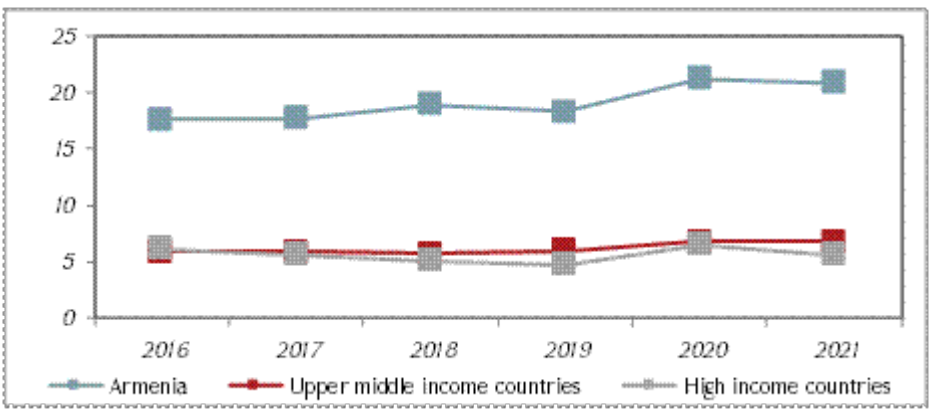

Figure 1. ***The unemployment rate in countries with upper middle incomes and high incomes countries and the RA in 2016-2021***[12]

Studies show that compared to high and upper-middle income countries the level of unemployment in the Republic of Armenia is quite worrying. This indicator is about 4 times higher than the corresponding indicator of countries

[11] Source: https://news.un.org/ru/story/2022/01/1417012
[12] Source: World Bank Open Data, https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?locations=AM

with upper-middle income (Figure 1). In 2021, the unemployment rate in the RA was 15.0%, which decreased by 3.2% compared to the previous year.[13]

Globally the analysis of GDP per capita and unemployment indicators of the RA population are the main indicators that highlight the studies carried out in relation to the identification of more thorough and cause-and-effect relationships of the macro-economic situation created in the country. From that point of view, it is important to evaluate the situation created in the territorial units of the RA, especially in the context of clarifying labor market-related issues.

The analysis of the GDP structure in terms of the RA regions and the city of Yerevan shows that 58.4% of it belongs to the city of Yerevan (Figure 2). The created situation is justified since 37% of the RA population is concentrated in the capital, which corresponds to the concentration of production, scientific and technical, and, in general, economic activity.

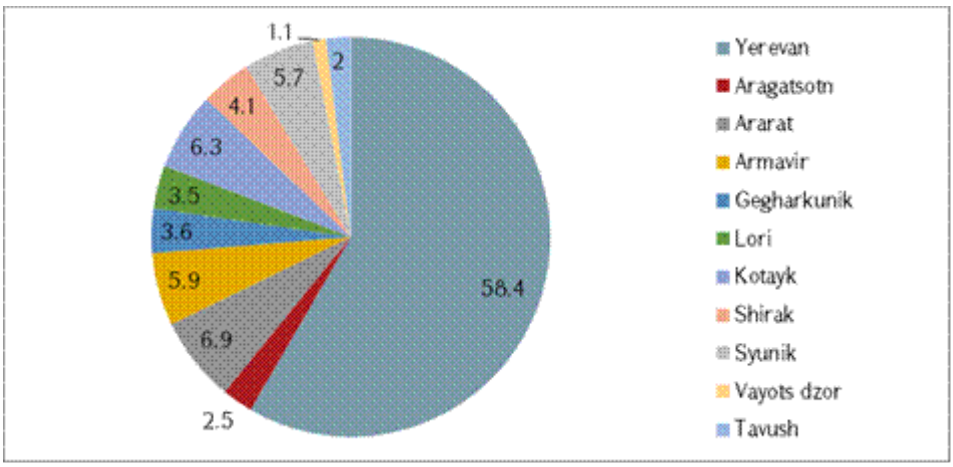

Figure 2. ***The GDP structure of the RA as of 2019 by regions and Yerevan***[14]

The created situation is becoming more worrying when we first compare the difference in terms of GDP between Yerevan, territorial units of Ararat which comes to about 750%. Vayots Dzor region has the lowest GDP share due to both the smallness of the territory and the scarcity of resources. This indicator in the Tavush region is also very worrying because occupying quite a large area, having all the prerequisites for the development of agriculture and tourism, the formed level of socio-economic development of the region is not satisfactory. It is also remarkable that in 2017-2019 the above GDP structure was almost the same except for the city of Yerevan, which according to 2018 data made up 54.1% of the total (a change of about 4.3 percentage points).

According to the numbers of the employed, permanent population of Yerevan and regions and the study of their specific weights in the RA GDP shows that the capital city is the leader in all three variables and 29% of the total employed population belong to Yerevan (Table 1).

[13] Source: Statistical Committee of the RA, https://armstat.am/file/article/sv_12_21a_141.pdf
[14] Source: Statistical Committee of the RA, https://www.armstat.am/file/article/marzer_2021_10.pdf

Table 1

The employed, permanent population in 2020 and the RA GDP shares in 2019 according to Yerevan and regions.[15]

	The share of the employed	*The share of the permanent population*	*Share of the RA GDP*
Yerevan	29%	37%	58.4%
Aragatsotn	5%	4%	2.5%
Ararat	10%	9%	6.9%
Armavir	12%	9%	5.9%
Gegharkunik	7%	8%	3.6%
Lori	9%	7%	3.5%
Kotayk	10%	8%	6.3%
Shirak	8%	8%	4.1%
Syunik	6%	5%	5.7%
Vayots dzor	2%	2%	1.1%
Tavush	4%	4%	2.0%

About 9% of the population is located in Ararat and Armavir however from the point of view of employment the share of Armavir in total is 2 percentage points higher than the indicator recorded in Ararat. However, about 5.9% of GDP is produced in Armavir and 1 percentage point more in Ararat. It is also interesting that it is only in Yerevan and Syunik that the share of the permanent population is less than the share of GDP, and in the rest of the regions, it is the opposite.

The ratio of GDP per capita and national GDP per capita according to individual regions is presented in figure 3. According to the RA 2016-2025 of the standard defined by the territorial development strategy in 2025, GDP per capita in each region will surpass 60% of the average national GDP per capita. However, still 36.3% of the regions of Armenia which are Tavush, Shirak, Lori and Gegharkunik are below the specified. Based on the method of least squares a prediction with linear dependence has been implemented, from which it is clear that the regions that have maintained the standard will maintain the threshold of 60% in the forecast period, and Gegharkunik and Lori are likely not able to achieve the goal.

[15] Source: Statistical Committee of the RA, https://www.armstat.am/file/article/demog_2021_2_.pdf, https://www.armstat.am/file/article/lab_market_2021_4.2.pdf, https://www.armstat.am/file/article/marzer_2021_10.pdf

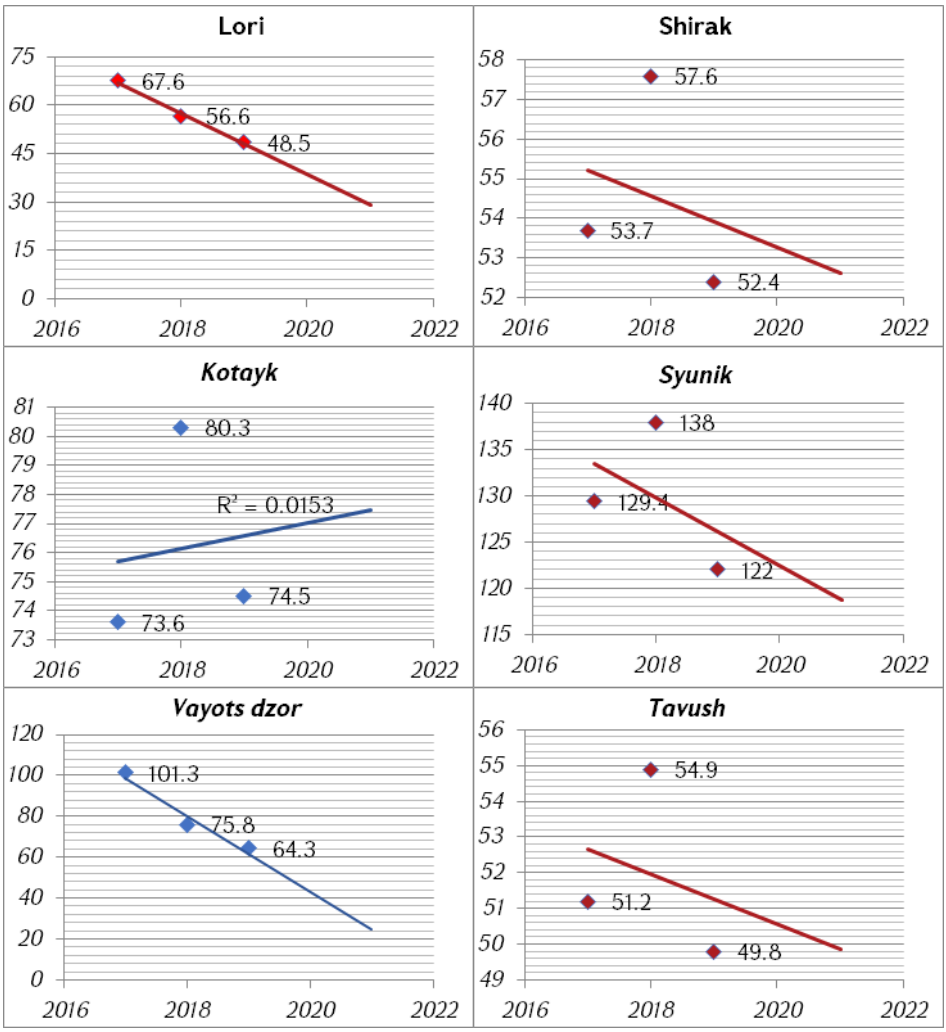

Figure 3. ***Ratio of the RA regional GDP per capita and national GDP per capita in 2016-2019***[16]

One of the important indicators characterizing the socio-economic situation of the regions is the size of the GDP per employed person. The GDP per employed person represents labor productivity: output per unit of labor input (Figure 4). According to the data of 2021, the observed index was calculated for 52 countries and the annual growth rate of real GDP per employed person in Armenia was 4.5%, which is 25th among 52 countries.[17] With this indicator, Russia, a member of the Eurasian Economic Union, recorded a negative trend in 2020: -1.1% however, in 2021, it provided a sharp increase, surpassing Armenia, by 5.1%. All the other member states of the Eurasian Economic Union, as well as Azerbaijan and Georgia, are behind the results recorded by Armenia. Let's consider this indicator is on the regional level as well.

[16] Calculations were performed by the author, data source: RA Statistical Committee publications, regions of the Republic of Armenia and the city of Yerevan by numbers, 2018-2021.

[17] Source: Statistical Committee of the RA, https://w3.unece.org/SDG/en/Indicator?id=118

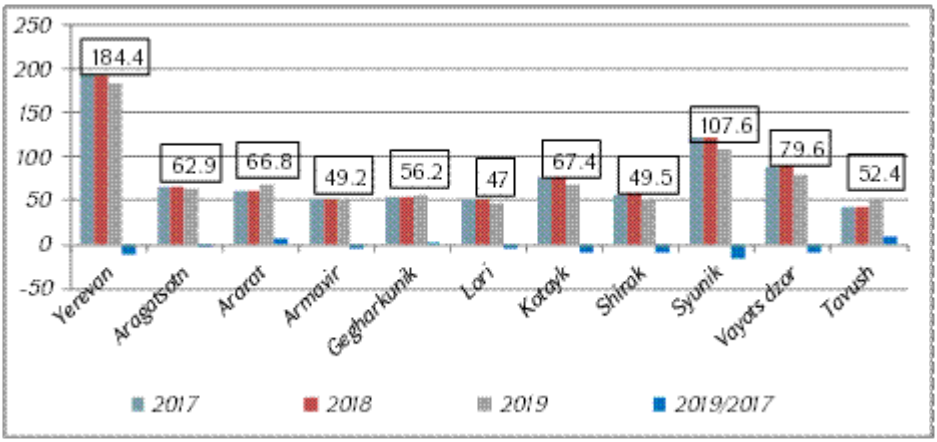

Figure 4. ***Gross domestic product per employed person, compared to the average indicator of the Republic of Armenia in 2017-2019, %***[18]

In the capital city, GDP per employee surpasses the RA average by about 1.84 times and in Syunik by 1.07 times or 107.6% in 2019. It is also noteworthy to mention the fact that in 2019, in comparison to 2017, the 2 regions with the highest GDP per employed person recorded a decline, which can be viewed positively in the context of the balanced regional development of the RA. During the observed period the highest growth by 9 percentage points was recorded in Tavush, Ararat by 5.9 percentage points and Gegharkunik by 2.8 percentage points.

In 2020, the labor force participation rate in Armenia was 58.5%. Significant differences are observed on the basis of this indicator between men (69.3%) and women (49.4%), as well as between urban and rural areas (Figure 5). The level of employment in the rural communities has a more positive trend compared to the cities, therefore the unemployment rate is also high in the cities of Armenia.

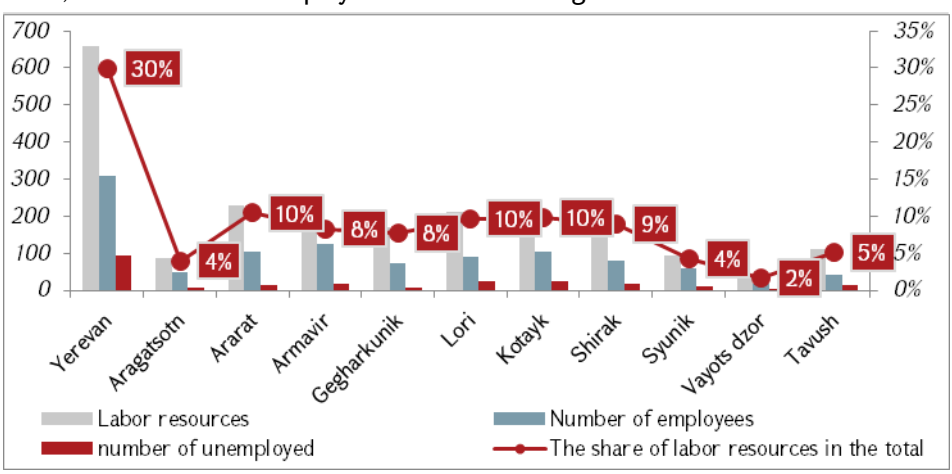

Figure 5. ***The number of labor resources, employed and unemployed in Yerevan and regions in 2020***[19]

[18] Source: Regions of the Republic of Armenia and the city of Yerevan by figures, 2021, www.armstat.am

From the point of view of the distribution of labor resources, there is a significant polarization, and about 30% of the labor resources are in the capital, but it should also be noted that despite this polarization of labor resources, the leader with 41% of the unemployed is also the capital Yerevan. This trend continues in the case of all other areas, that is, areas with a large proportion of labor resources are also characterized by a large share of unemployment.

In terms of employment and unemployment, uneven distribution remains a problem in the regions of the Republic of Armenia and in the city of Yerevan. Armavir region leads in terms of employment - 68.3%, followed by Syunik region - 61.9% and Aragatsotn region - 56.6% (Table 2):

Table 2

Employment and employment levels in the regions of the Republic of Armenia and the capital of Yerevan in 2018-2020[20]

	Employment level			*Unemployment level*		
	2018	*2019*	*2020*	*2018*	*2019*	*2020*
Yerevan	43.5	48.3	46.7	27.1	22.7	23.6
Aragatsotn	57.6	56.9	56.6	7.5	8.8	10
Ararat	55.7	52.2	46	9.6	13.4	12.6
Armavir	65.5	70.2	68.3	12	11.6	12.6
Gegharkunik	42.3	40.3	42.1	11.3	8.6	9.7
Lori	41.3	38.5	42.6	15.2	19.9	20.5
Kotayk	44.1	46	47.6	24.7	20.7	20.1
Shirak	44.5	45.5	41.2	18.8	18	17.3
Syunik	60.7	58.8	61.9	13.1	15	13.1
Vayots dzor	45.4	45.2	44.3	21	22.4	20.4
Tavush	36	42.5	38.4	31	26.9	23.6

During 2020 the unemployment rate in Armenia continued to be the highest in Yerevan - 23.6%, as well as in the Tavush region. The lowest unemployment rate was in the Gegharkunik region, where, of course, the employment rate was the second highest after Tavush. It is also interesting that the highest average gross domestic product per employed person was recorded in the capital - 184.4%, although the employment rate in Yerevan, compared with the leader of Armavir, was 21.6% lower. It is also noteworthy to compare the employment level of the Armavir region and the average GDP of the Republic of Armenia per employed person. From the comparison of the above mentioned two indicators, it turns out that the Armavir region with the highest level of employment is about 68.3%, and per employed person - according to the average indicator of the GDP of the Republic of Armenia (49.2%) - more than the Lori region (47%). It can be concluded that there is a certain problem with labor productivity in the Armavir region. As for the unemployment level, in 45% of the regions (Yerevan, Lori, Kotayk, Vayots Dzor, Tavush), the it is higher than the republican average.

[19] Source: Statistical Committee of the RA, https://statbank.armstat.am/pxweb/hy/ArmStatBank/?rxid=9ba7b0d1-2ff8-40fa-a309-fae01ea885bb

[20] Source: Statistical Committee of the RA, https://statbank.armstat.am/pxweb/hy/ArmStatBank/?rxid=9ba7b0d1-2ff8-40fa-a309-fae01ea885bb

One of the features of the RA labor market is also the low level of employment of women compared to men. In 2020, from 1052 thousand people only 566 thousand (53.8%) were men.[21] During the observation period, the highest growth in women's employment in the regional context was recorded in the Aragatsotn region, where their employment averaged 53%. A high rate of average growth in women's employment was also recorded in Vayots Dzor and Tavush, which corresponds to 36% and 24%. In Yerevan, too, in 2020 compared to 2018, the number of women employed increased by 27.3 thousand. The indicator has a negative trend in Armavir and Ararat on average 8% and 7%, respectively, in Shirak and Syunik - 3%. The highest rate of male employment was again registered in the Aragatsotn region, with an average of 38% per annum, followed by 25% and 11% in Vayots Dzor and Tavush regions, respectively, as well as in Yerevan and Lori are 7% and 1%. In other regions, the indicator has a negative trend. In Shirak - 16%, Gegharkunik - 11%, Kotayk - 6%, etc.

One of the important sections of labor market research is the study of wages. According to current data, in March 2022 the average monthly salary amounted to 227,173 thousand drams and compared to the same period last year, the growth rate was 14.7%. We should also add that according to preliminary data for April, the average monthly salary was 217.033 thousand drams, and the growth rate compared to the same period last year - 9.8%. In 2022 compared to the same period of 2021 wage levels in all regions increased (Figure 6):

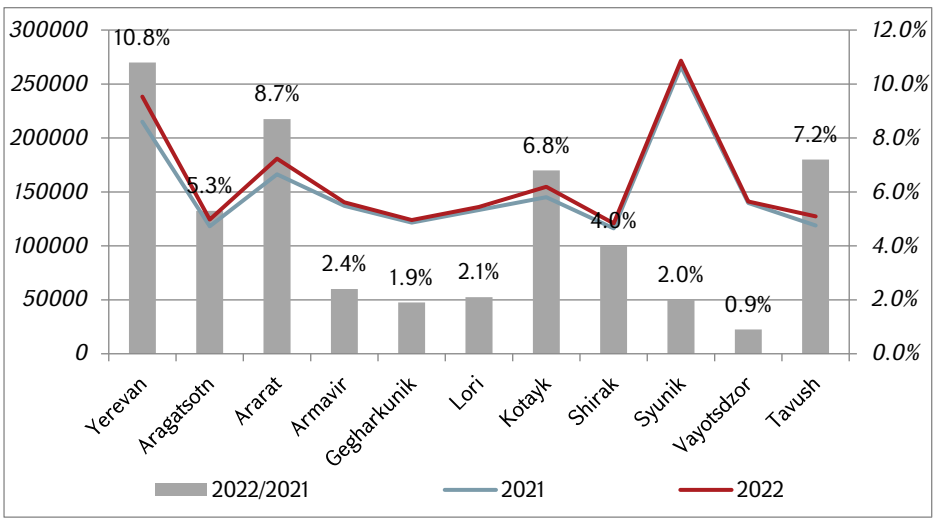

Figure 6. ***Average monthly nominal salary of the regions of the Republic of Armenia and Yerevan 1 2022, I quarter***[22]

The growth rates of wages were particularly significant in the capital - 10.8%, Ararat-8.7%, Tavush, and Kotayk - 7.2%, and 6.7%. The highest level of average salary is registered in Syunik – 271,710 thousand drams, and the lowest in Shirak – 120,811 thousand drams (about 2.3 times less).

[21] Source: Statistical Committee of the RA, https://www.armstat.am/file/article/sv_04_22a_142.pdf
[22] Source: Statistical Committee of the RA, https://www.armstat.am/file/article/sv_04_22a_142.pdf

The growth of the well-being of the population and overcoming poverty are among the main guarantees of the development of the country's human capital. The reduction of poverty in Armenia in the pre-crisis period was largely due to steady economic growth. In 2009, as a result of the economic downturn caused by the crisis, the opposite trend was recorded. Poverty and extreme poverty in Armenia both in the pre-crisis period and after it, as a rule, are more common in small and medium-sized urban areas. In 2020 compared to 2019 the poverty level increased by 0.6 percentage points and amounted to about 27% (Table 3). However, as the data illustrated in the table and the previous analysis show, the problem of poverty in the remaining territorial units is of great concern. The poverty level in Gegharkunik and Shirak reaches 48.1% and 42.9%, respectively, that is, in Gegharkunik, the poverty level is about 21.1 percentage points higher than the republican average. It is also interesting to consider the salary levels according to the regions of Armenia. In the observed period, the employees of Syunik received the highest average monthly salary among the RA regions, which is mainly due to the fact that mining companies operate here. In the Syunik region, the picture is completely different, here the poverty rate was 6%, it was 21 percentage points lower than the average for the republic, and the salary level was also high - 269.784 drams. Syunik is followed by Yerevan, where the average monthly salary was AMD 208,044, which was largely due to the concentration of labor, financial and other resources. In the Shirak region in 2020 the population received the lowest average monthly salary, which amounted to 117,888 drams, and Gegharkunik - the 3rd lowest, followed by Aragatsotn.

Table 3

The wages and the level of poverty in Yerevan and the regions in 2018-2020[23]

	Salary (AMD)			*Poverty rate, %*		
	2018	2019	2020	2018	2019	2020
Yerevan	194,754	201,527	208,044	19.9	14.1	19.9
Aragatsotn	105,562	113,538	119,464	16.2	51.4	32.9
Ararat	124,623	168,027	175,721	19.8	29.4	32.8
Armavir	128,292	135,081	138,167	23.5	22.5	32.2
Gegharkunik	109,133	114,479	121,940	22.4	43.5	48.1
Lori	114,123	124,293	129,807	29.4	30.1	19
Kotayk	132,557	137,388	146,076	22.7	31.9	17.4
Shirak	107,111	110,876	117,888	42.2	48.4	42.9
Syunik	234,601	266,832	269,784	16.7	12.1	6.1
Vayots dzor	118,280	126,740	134,099	18.6	19.3	21.9
Tavush	115,336	118,446	122,894	25.6	25.6	37.5

Comparing also the indicators of poverty and employment, we can state that in some regions there are obvious inverse dependencies of the levels of employment and poverty. It should also be noted that during the observation period, only 3 regions of Armenia recorded a decrease in the level of poverty (Syunik, Kotayk, Lori), in the rest the picture is not positive.

Unemployment-GDP

[23] Source: Statistical Committee of the RA, https://statbank.armstat.am/pxweb/hy/ArmStatBank/?rxid=9ba7b0d1-2ff8-40fa-a309-fae01ea885bb

To model the relationship between real GDP and unemployment, the ARIMAX model was used, which means a model with autoregression, an integrated moving average, and exogenous variables.[24] The basis for the choice of the model was the IMF advisory model. The IMF offers countries the following approach to modeling the relationship between the labor market indicators and GDP:

$$U = c_1 + c_2 \times GDP + c_3 \times control_{variables} + \varepsilon, \quad (1)$$

Where

U_t- unemployed persons in period t,

GDP_t- GDP in period t

$control\_variables_t$- the group of variables that also affect unemployment, based on the specifics of the economy or modeling features. Such variables can be components of a time series: trends, seasonality, cyclicity, dummy variables, etc. It turns out that the total effect of all other influencing variables shows.

The results of modeling the unemployed and GDP are similarly as follows:

ARIMA (1,0,0) (0,0,0) [4]

$$\widehat{U_t} = 316,9 - 0,05520 \times \widehat{GDP_t} + 0,3489 \times \widehat{U_{t-1}} \quad (2)$$

The dependent variable of the model is the number the of unemployed (thousand people). The regressors of the model are real GDP (million drams) and the first lag the number of the unemployed. The coefficient of elasticity is -0.26. The result shows that the GDP growth in Armenia by 1% implies a reduction of the unemployed by 0.26%. This model also allows one to predict unemployment. Thus, at the end of 2022, Armenia plans to record 7% economic growth, therefore, in 2022, only due to economic growth, the number of unemployed will decrease by 1.8%. [25] Using the ideas of empirical weights and cumulative/aggregative nature of GDP, we can calculate reduction of unemployment size by region according to the model estimated above (Table 4):

Table 4

Reduction of the size of unemployment by regions (forecast 2022)

Regions	*Growth rate (planned)*	*Reduction of unemployment (forecast)*
Yerevan	4.09%	625
Aragatsotn	0.18%	27
Ararat	0.48%	74
Armavir	0.41%	63
Gegharkunik	0.25%	39
Lori	0.25%	37
Kotayk	0.44%	67
Shirak	0.29%	44
Syunik	0.40%	61
Vayots dzor	0.08%	12
Tavush	0.14%	21
Total	**7%**	**1070**

[24] Source: https://www.imf.org/external/pubs/ft/tnm/2012/tnm1201.pdf

[25] Source: https://www.imf.org/external/pubs/ft/tnm/2012/tnm1201.pdf

The table shows that Yerevan accounts for a significant part of the economic growth, therefore, a greater reduction in the number of unemployed will be considered in Yerevan, and the least is in the Vayots Dzor region.

Employment and Marco-system

To model the relationship between employment and macroeconomic indicators, a system of regression equations containing 2 equations is constructed. One is an equation based on the Cobb-Douglas function,[26] the other is an excerpt from the concept of the gravitational trading model.

The system has the following form:

$$\begin{cases} \text{Turnover} = c_1 + c_2 * \text{GDP} + \acute{\varepsilon}_1 \\ \text{GDP} = c_3 + c_4 * L + c_5 * K + \acute{\varepsilon}_2 \end{cases} \quad (1)$$

Where,

Turnover – external turnover of the RA,

GDP – GDP of the RA

L – wages as expenditures on the labor adjusted by employed people,

K – capital expenditures,

c_1, c_2, c_3, c_4, c_5 - model unknown parameters,

$\varepsilon_1, \varepsilon_2$ - model errors

The system contains 2 endogenous and 2 exogenous variables. Endogenous variables are GDP and foreign trade turnover, and exogenous variables are work and capital(expenses). In the first equation of the model, GDP is an exogenous variable, and in the second it is already endogenous.

The given model view looks as follows:

$$\begin{cases} \text{GDP} = a_{11} * L + a_{12} * K + u_2 \\ \text{Turnover} = a_{21} * L + a_{22} * K + u_2 \end{cases} \quad (2)$$

The given model view matrix

	GDP	*Trade*	*K*	*L*
Equation 1	-1	0	c_2	c_3
Equation 2	c_5	-1	0	0

Equation 1. The number of predefined variables in the equation that is not included in 0, the number of endogenous variables of the model minus 1 is 0. It turns out that this equation is accurately identified by the necessary condition. The rank of a matrix with coefficients of variables not included in the equation is -1, not 0, so equation 1 is precisely identified.

Equation 2. The number of predefined variables is not included in the equation 2, the number of endogenous variables of the model minus 1 is 1. It turns out that this equation is superidentified in accordance with the necessary condition. The rank of a matrix with coefficients of variables not included in the equation is 1, not 0, so equation 2 is superidentified.

[26] Cobb C.W., Dauglas P.H. (1928). Theory of Poduction // American Economic Reviw, Sypplement, March, pp. 139-165.

The system was evaluated using a three stage least squares algorithm and R statistical package.[27] Tables 5, 6 and 7 present the results of the evaluation of the model with 3 stage least squares.

Table 5

Coefficients of determination of the system

System	Coefficient of determination
Total	0.96
Equation 1	0.97
Equation 2	095

Table 6

Correlation matrix of the residuals of the system equations

Matrix	GDP	Turnover
GDP	1.00	0.75
Turnover	0.75	1.00

Table 7

Results of evaluation of system variables

Variable	Coefficient	t stat.	Significance level
Equation 1			
Capital	0.65	5.87	0.00 ***
Labor	26,582,473	20.00	0.00 ***
Equation 2			
GDP	0.51	18.45	0.00 ***

It can be seen from the above tables that the degree of approximation of the models individually and in the general system is high, since the coefficients of determination are equation 1: 0.97, and equation 2: 0.95, the general system is 0.96. The coefficients of the equations are significant at the level of 99%. The growth of GDP per unit leads to an increase in trade turnover by 0.51 units. An increase in wages per unit leads to an increase in GDP by 26,582,473 units, and an increase in capital per unit leads to an increase in GDP by 0.65 units. We can consider the cross-coefficient: salary-trade turnover: an increase in wages by $ 1 leads to an increase in foreign trade turnover by $ 13,557,061, in particular, to an increase in exports by $ 3,931,548 and imports by $ 9,625,514. It should also be noted that during the observed period, the impact of wage growth on GDP on average decreases by $ 913,579 per year, that is, the impact of inflation is $ 3.4 per year%.

Let's also consider the coefficients of elasticity of GDP-wages by region (Table 8). Each coefficient of elasticity shows how many units of wage growth in 1 dollar in a given area will lead to an increase in gross product.

[27] Kremer N.Sh., Putko B.A., Econometrics: textbook. - M: UNITY-DANA, Chapter 6, 2002, p. 311.

Table 8

GDP-wages elasticity coefficients

Regions	*1 $ wage – GDP growth (USD)*
Yerevan	15,325,872
Aragatsotn	367,555
Ararat	1,403,398
Armavir	1,028,780
Gegharkunik	540,204
Lori	559,655
Kotayk	1,138,145
Shirak	598,003
Syunik	1,908,944
Vayots Dzor	181,096
Tavush	309,775

Conclusion: Summing up, it can be stated that the geographical location of the territorial units of Armenia, natural and climatic conditions have determined the socio-economic features of the development of territorial units. Economic development is mainly concentrated in Yerevan, then also in Syunik, partly in Kotayk. In particular, the analysis of GDP estimates shows that economic development is mainly concentrated in Yerevan and the Syunik region. The ratio of GDP per capita to the same republican average is the highest here. In 2019 in Yerevan, it amounted to about 184.4% of the average republican GDP, and in Syunik - 107.6%. The analysis of labor market indicators shows that the highest level of employment is in Armavir and Syunik regions, and the lowest is in Shirak and Gegharkunik regions. The indicator also causes concern in the capital, because, having quite positive trends in the population, labor resources, GDP per capita, average monthly wages, the problem of unemployment of the population continues to be relevant in the capital.

In order to overcome the disparity created between the levels of development in the territorial units of Armenia, it is important to identify and solve a number of key problems, the successive solution of which will be the basis for solving the problem of employment in regions, remaining indicators of the labor market, and raising the level of well-being in regions in general. It is important to include a differentiated policy approach in the territorial development strategy, which will allow to identify the most vulnerable regions, evaluate the characteristics of each region and accordingly implement a more targeted policy. For the purpose of economic stimulation of regions, we emphasize the separation of the so-called promoting branches that contribute to the development of the region, combined with the development of the region's infrastructure the implementation of which will certainly have a positive effect on many other sectors of the economy as well as on labor market indicators.

The simulation results also show that due to the concentration of the growth of the Armenian economy, changes in the GDP indicator, a reduction in the number of unemployed is predicted most in Yerevan - 625 people (58%), followed by the Ararat region - 7% reduction in the number of the unemployed. The effect already caused by wage growth in Yerevan is 66% of the effect of the whole republic, namely, the growth of the salary by unit in Yerevan provides 66%

of the effect of GDP growth all over Armenia. The next major contribution to GDP by wage unit is the Syunik region, which accounts for about 8% of the total growth, followed by the Ararat region - 6%. according to this indicator, the Vayots Dzor and Tavush regions have minimal elasticity - 1% of the total growth.

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ԶՈՅԱ ԹԱԴԵՎՈՍՅԱՆ
Հայաստանի պետական տնտեսագիտական համալսարանի միջազգային տնտեսական հարաբերությունների ամբիոնի պրոֆեսոր, տնտեսագիտության դոկտոր

ԿԱՄՈ ԴԱՎԹՅԱՆ
Հայաստանի պետական տնտեսագիտական համալսարանի տնտեսամաթեմատիկական մեթոդների ամբիոնի ասպիրանտ

ԴԻԱՆԱ ՄԱԹԵՎՈՍՅԱՆ
Հայաստանի պետական տնտեսագիտական համալսարանի միջազգային տնտեսական հարաբերությունների ամբիոնի ասպիրանտ

ՀՀ մարզերի և Երևան քաղաքի աշխատաշուկան բնութագրող ցուցանիշների փոխառնչությունների վերլուծությունն ու միտումների գնահատումը.– Զբաղվածության ոլորտում առկա հիմնախնդիրները հիմնականում կանխորոշում են ցանկացած երկրի տնտեսական զարգացման ինչպես ընթացիկ միտումները, այնպես էլ հեռանկարային սպասումները: Ուստի զբաղվածության ցուցանիշների վերլուծությունը և դրանց որակական ու քանակական գնահատումը գործնական բավարար հիմքեր են ձևավորում բնակչության տնտեսական ակտիվության հիմնախնդիրներին օբյեկտիվ և գիտական լուծումներ տալու առումով: Սույն հոդվածում վերլուծվել են Հայաստանի Հանրապետության տարածքային միավորների, այդ թվում Երևան քաղաքի զբաղվածության շուկան բնութագրող ցուցանիշները, էկոնոմետրիկ մոդելների միջոցով գնահատվել են մակրոտնտեսական ցուցանիշների և զբաղվածության ցուցանիշների միջև կապն ու փոխազդեցությունը: Վերլուծության արդյունքները փաստում են, որ, ըստ տարածքային միավորների, ՀՀ-ում և՛ զբաղվածության, և՛ մակրոտնտեսական այլ ցուցանիշներ խիստ բևեռացված են, տնտեսական զարգացման դրական միտումներ դրսևորվում են հիմնականում Երևանում ու Սյունիքի մարզում: «Տնտեսական աճ – գործազրկության կրճատում» էկոնոմետրիկ մոդելների արդյունքները, իրենց հերթին, բացահայտում են մայրաքաղաքի և մարզերի միջև առկա խզումը՝ գործազրկության կրճատման առումով:

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Анализ и оценка взаимосвязей показателей, характеризующих рынок труда областей (марзов) РА и города Еревана.– Проблемы в сфере занятости в основном предопределяют как текущие тенденции, так и перспективные ожидания экономического развития любой страны. Следовательно, анализ показателей занятости и их качественная и количественная оценка формируют достаточные практические основы в плане предоставления объективных и научных решений проблем экономической активности населения. В данной статье проанализированы показатели, характеризующие рынок занятости территориальных единиц Республики Армения, в том числе города Еревана. С помощью эконометрических моделей была оценена связь и взаимодействие между макроэкономическими показателями и показателями занятости. Результаты проведенного анализа свидетельствуют о том, что по территориальным единицам и занятость, и другие макроэкономические показатели в Армении сильно поляризованы, положительные тенденции экономического развития наблюдаются в основном в Ереване и Сюникской области. Результаты эконометрических моделей «экономический рост - сокращение безработицы», в свою очередь, показывают разрыв между столицей и областями (марзами) с точки зрения сокращения безработицы.

Ключевые слова: *занятость, безработица, территориальная единица, неравномерное развитие, поляризация, ARIMA, эластичность*
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