SECTORAL STRUCTURE OF EMPLOYMENT AND INCLUSIVE ECONOMIC GROWTH: EVIDENCE FROM UZBEKISTAN

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Abstract. The article assesses the directions, structural changes, and laws to improve employment in Uzbekistan and its regions using econometric models and diagnostic tests. The authors investigate how changes in employment in agriculture, industry, and services affect ecology and development. Transformation of employment from agriculture to service and industry sectors as well as allocation of labor resources have happened in economic sectors of Uzbekistan on the condition of climate change between 1991 and 2021. This finding provides support for the claim that the transformation of rural areas into urban areas, changes in rural lifestyles, and the improvement of infrastructure in rural areas are directly connected to demographic trends and employment.

JEL Classification: O15; P23; R23
Keywords: employment structure, productivity, climate change, economic growth, working-age population, labor participation.

1. INTRODUCTION

Adapting to climate change, efficient use of labor resources in the early stages of demographic dividend return will ensure inclusive economic growth. The digitization of the economy and the process of globalization is affecting the functioning of the labor market. It is reshaping the national economy and creating a new structural structure of employment. Such interactions require an approach that creates an economic, social, and ecologically synergistic effect on the object of study. In addition, the COVID-19 crisis in 2020 increased the uneven distribution of income internationally and nationally. Such trends require new approaches in the economy.

In the context of an innovative economy, it is important to scientifically and methodologically study the fact that the secondary sector of the economy in Uzbekistan is still a driver of economic growth and to analyze changes in employment in this sector. The level of employment in the economy is one of

the main indicators of the economic efficiency of any country, that is, if the level of employment in the country is low, it indicates that the country's labor resources are not fully used.

The new Development Strategy of Uzbekistan for 2022-2026, aims to accelerate the development of the national economy and ensure high growth rates. By 2030, it is planned to increase per capita income above $ 4,000 and create a basis for joining the ranks of "middle-income countries". In line with Goal 22, a plan has been developed to increase industrial production by 1.4 times, continuing industrial policy aimed at ensuring the stability of the national economy and increasing the share of industry in GDP.[1] Plans have been developed to further liberalize the leading industries and the economy, as well as to complete the transformation process. As part of the industrial sector, it is planned to increase the production of high-value products in the electrical industry by 2 times and exports by 3 times.

The coverage of youth with higher education, the quality of education, and the growth of the employed population in R&D have a direct impact on promoting employment and increasing labor productivity in certain priority industries. Also, the size of the employed population has a strong impact on economic and social policies, as they are the main taxpayers, leading to consumption and labor activity.

A passive labor policy and fewer subsidies for unemployment benefits will make it easier for the state budget balance sheet to emerge. Knowledge of the employment structure by sectors of the economy is important to show in which industries the demand for labor resources will increase and in which sectors the current level of employment in the economy will remain stable.

As a result of this analysis, it will be possible to identify priority sectors of the economy and develop directions for regulating the labor market, to support them. The macroeconomic model realizes the structure of future gross employment and priority areas of production. These results do not directly predict the level of cross-sectoral employment. Therefore, over the years, the analysis of the population's contribution to employment in the sectors.

The first phase of the return of demographic dividends in developing countries, the increase in demographic pressure, high levels of poverty, and informal employment, are leading to various challenges for the labor market and society. This, in turn, creates the need to maintain social stability, which requires improving the structure of employment in various sectors of the economy.

In particular, energy plays a special role in employment in the energy sector. In addition, the aging sector in the energy sector, especially in the fuel industry, and the growing demand for workers with knowledge of the digital economy are creating a gravitational field of high-potential, talent crisis. Globalization allows enterprises to reduce production costs, while highly skilled workers are guaranteed to increase their income. As a result of the positive impact of employment, market potential will increase.

The importance of global production is growing in the context of adapting the value chain to energy technology. Production moves to where it is cheapest. This will affect the reduction of jobs in the energy sector, which is practically operating in the country. For example, in the last decade, the production of solar photovoltaics has shifted from Europe to Asia. Digitization is taking place simultaneously with the conditions of technological development, which in turn has a different impact on the structure of employment in industries, the form of employment in labor, wages, and employment relations. Some types of professions are fully automated. Otherwise, in the automation of professions, the tasks of the profession will change.

Climate change is a transformational process, which in turn will create new types of occupations related to the "green economy" and adapt some existing jobs to it. Broadly speaking, jobs in the green economy represent jobs in occupations that have a positive impact on the environment. The main objectives of such occupations are to maintain and protect ecosystems and biodiversity based on the

1 Decree of the President of the Republic of Uzbekistan dated January 28, 2022, No. PF-60

*e*ISSN 1303-5150

achievement of high efficiency, as well as the development of strategies or prevent various risks; energy consumption is to optimize the use of raw materials.

The green economy seeks to minimize or eliminate the increase in waste and the spread of toxins. It can be observed that the number of green professions has increased in the European Union over the last decade, and the demand for learning digital skills has increased.

In 2016, green occupations accounted for the highest share in the EU in construction, transport, manufacturing, energy and waste management, and professional services (the share of total green occupations was 73%, 61%, 52%, 58%, and 52%, respectively) (European Commission, 2019b). In the same year, there were 87.6 million green occupations, accounting for 40% of total employment (European Commission, 2019b). Greening has become widespread and profitable in the following sectors: construction, electronic machinery, copper mining, renewable energy production, biomass cultivation, transport, and services. At the same time, jobs in oil and coal mining, refining, and coal-fired power generation have shrunk. This situation may occur partially in the Middle East, and Africa. Global employment in the energy sector reached nearly 58 million in 2017 (IRENA, 2020a). It includes jobs in coal, gas, and oil, nuclear power, as well as renewable energy sources and infrastructure.

The total number of occupations in the energy sector is projected to reach 100 million by 2050, of which 42 million will be in the renewable energy sector (IRENA, 2020a). Scenarios have been developed that by 2050 the world's population will have 87 million jobs in energy, and 25.6 million jobs in renewable energy. According to this, job losses in the extractive fuel networks will be offset by gains in renewable energy sources, along with the creation of new jobs related to energy flexibility and network development.

The Paris Agreement aims to ensure that global warming does not exceed 1.5 percent and increase socio-economic benefits. According to a study by the International Renewable Energy Agency, the return on investment in the renewable energy industry is projected to increase by 2.5% of GDP by 2050 and the global employment rate by 0.2% compared to employment in traditional business activities.

2. LITERATURE REVIEW

2.1. Economic structure. Any economy moves as a system and consists of certain elements. The identification of the elements makes it possible to determine the structure of the economy. Hence, the economic structure is the sum of the elements of the economy and the relationship between these elements (Nowa Encyklopedia Powszechna, [1996], p. 80; M. Klamut, [1996], p. 58; A. Łukaszewicz, A. Karpiński, [2001], p. 451). These elements indicate that the economic structure has a different structure. In the economic literature, the economic structure is grouped as follows (E. Kwiatkowski, [1980], p. 58):

- Institutional structure;
- Territorial structure;
- Production structure.

The institutional structure is a type of economic structure that is distinguished based on forms of ownership of factors of production; including the public sector, the private sector, the public sector, and mixed sectors. The territorial structure is based on economic zones. The structure of production includes various economic activities, for example, industries, departments, and sectors of the economy. (W. Jakobik, [1997], p. 18). The analysis of the economic structure based on these three elements is of broad significance and requires a complete economic analysis. In the analysis of the economic structure, the joint analysis of the structure of production and employment increases the effectiveness of the research.

A. Fisher, C. Clark, and J. Fourastie use the methodology of empirical research of population change in three main sectors in the context of modernization of the country. The economic structure was studied by Fisher, C. Clark, and J. Fourastie based on three dimensions, and applied the following three sector theories: (1) agriculture, (2) industry, and (3) service. The main result of this theory is that a change in the economic structure occurs based on a certain regularity (W. Kwiatkowska, [2009], p. 110).

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A. Fisher points out that the share of labor and capital resources in agriculture is declining and increasing in the service sector as the economy develops. Initially, industrial production resources will increase, and in the next phase of development, the share of these sectors in the national economy will decrease due to positive achievements in the service sector (E. Kwiatkowski, [1980], p. 91).

C. Clark analyzed long-term GDP per capita and changes in the employment structure. According to him, "in the process of development, the number of people employed in agriculture will decrease compared to the number of people employed in industry, and the number of people employed in the service sector will decrease in industry."(C. Clark, [1957], at: E. Kwiatkowski, [1980], p. 91). This trend, in his view, is widely observed in developing and highly developed countries.

A similar conclusion is found in the scientific work of J. Fourastie. It divides economic development into three phases: pre-industrial society, industrialized society, and postindustrial society. At the same time, economic development is manifested in three stages: the initial stage (characterized by the rapid growth of employment in the industry), the expansion stage (maximum industrial employment), the complementary stage (reduction of employment in agriculture occurs with the achievements of the service sector). In the post-industrial phase, employment in the service sector reaches 80% (D. Hubner, M. Lubiński, [1986]).

A. Fisher and C. Clarks argue that the main decisive factor in changes in economic structure and employment structure is the change in consumer demand that occurs in the process of economic development. In certain phases of economic development, income results in the satisfaction of consumption, which is determined by an elastic coefficient (W. Kwiatkowska, [2000], p. 5).

In the process of development, the elasticity of income to agricultural products decreases to a high degree and reduces the share of agriculture in GDP. As for the industry, the growing trends in demand for products in this industry are completely different. In the first stage of income growth, the income elasticity coefficient increases. At the upper stage, it is observed that the demand for these products is met. As a result, the share of industry in GDP is declining.

At all stages of economic development, the coefficient of elasticity of demand for services and income increases. Increased demand in this area is driving the rapid development of this sector. Considering the changes in these three sectors, the following conclusions can be drawn:

- One of the main indicators of economic development is the sectoral structure of employment;
- In the process of economic development, the demand for services will increase. In our view, the increase in labor productivity in industry and services will allow for the redistribution of labor in favor of the service sector;
- The "Gravity Center" of economic activity will move from the first sector to the third sector;
- Economic development changes the economic structure and contributes to improving the quality of life together.

While three sector theories are useful in assessing changes in a country’s economic structure, they create difficulties in redistributing employment across sectors. It also requires the calculation of income elastics for each sector and the study of their interrelationships. It is also important for economic sectors to take into account changes in domestic sectors. It is also of scientific importance to assess the role of investment in increasing income elasticity. This article examines and evaluates changes in the employment sector structure in Uzbekistan from 2000-2021.

In the empirical evaluation of the theory put forward by A. Fisher, C. Clark, and J. Fourastie, the results of the process of modernization of the country were covered and statistically analyzed. A methodology for assessing changes in the network structure was used.

2.2. Labor allocation. Employment elasticity and productivity affect employment in industries. It is known that the development of the economy undergoes structural changes, that is, they redistribute economic activity in different sectors. Recent scientific literature has extensively highlighted that

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In our opinion, in the analysis of economic activity based on the division of labor in the sectors, it is possible to analyze the employment of the population in the material and service sectors. According to Lewis's (1954) Dual Economic Model, employment is transformed from low-productivity agriculture to high-productivity industries (Islam and Yokota, 2008, Gong et al. 2008, Minami and Ma, 2010).

According to China's economic growth experience, there is a direct correlation between changes in employment in sectors of the economy and changes in GDP per capita. At the same time, the migration turnover will increase in this process (Ding and Knight, 2012, Ercolani and Wei, 2011). The occurrence of labor surplus in rural areas allows for determining the turning point of the phases of economic development of Lewisian (Cai, 2010, Golley and Meng, 2011, Knight et al. 2010, Du and Wang 2010). This is important to understand how the country's growth could be sustainable in the coming decades, along with the recently announced central government plan to relocate 250 million rural residents to cities by 2025, which will affect the effective growth of net employment changes.

Why should the economy sometimes not focus its resources on high-yield sectors? You will notice the importance of this when prices do not change. If prices are exogenous variables, an increase in productivity in one sector relative to other sectors increases the relative marginal product of labor in that sector. As a result, it requires a redistribution of labor in this sector. However, in practice, prices are an indigenous variable. In such a situation, a complex situation can arise between intersectoral productivity and optimal division of labor. An increase in productivity in a particular sector increases the volume of production in that sector, resulting in lower product prices. If this affects the volume of supply, it reduces the marginal value of the product. Under these conditions, it is effective to reduce employment in this sector. The manifestation of this depends on the nature of the demand structure. Theoretically, an increase in demand for goods in a particular sector increases the cost of goods and services in the relevant sectors. This has the effect of increasing the wages of workers in the network.

The redistribution of employment to this network is a process related to labor mobility. However, the supply of goods based on the regulatory mechanism of the economy may be inelastic in price. Even if labor mobility is present, in this situation employment does not change from one network to another. In this case, the redistribution of employment by sector can be done by the state.

Shioji (2010) argues that it is not necessary to carry out the transformation of labor resources from productive sectors to other sectors. On the other hand, an increase in productivity increases the marginal value of labor, and a decrease in price per unit of output occurs as a result of an increase in supply in that sector. This reduces the marginal value of labor in the network. Changes in productivity lead to changes in employment in cross-sectoral labor.

Shioji (2010) analyzes the coefficients of elasticity in the two sectors through the consumer utility function. In his view, if there are many substitute goods, the coefficient of elasticity will be equal together, and the goods in these two industries will be elastic in price.

Such a situation does not depend on the redistribution of labor into industries. If the elasticity is suddenly lower, the demand curve will be in a sufficiently upright position. The redistribution of labor in a network depends on price. In addition, the change in cross-sectoral employment depends on the current state of the industry in terms of the product life cycle.

When the sector is still young, few consumers will have access to its product and demand will be highly elastic. As a result, the industry encourages increased productivity, increasing product sales without lowering the price of the product. If a commodity reaches the maturity stage of its life cycle, the

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demand for it decreases and the demand for labor also decreases, leading to changes in inter-sectoral employment.

In our opinion, internal and external factors influence the change in cross-sectoral employment. Labor productivity in the sector, increase in highly skilled labor resources, changes in wages affect changes in the internal employment structure, government subsidies in certain sectors, changes in market prices, climate change, etc. In turn, these two factors contribute to the stability, expansion, and transition of the employment structure in the economy.

Increasing labor productivity requires diversification of the highly skilled part of the labor force. The role of higher education institutions and various centers in creating the diversification of highly skilled labor resources is high. While the structure of employment in the economy has a direct impact on the quantitative support of economic growth, the high qualification, professionalization, and high mobility of labor resources have a positive impact on the quality of economic growth by increasing effective employment.

The share of those employed in agriculture in total employment is declining in all high-income countries. Globally, the figure fell from 44 percent in 1991 to 28 percent in 2020, with the largest share of the decline coming from middle-income countries. In 2020, 63% of employment in low-income countries were still employed in agriculture, down from 8% in 1991. In addition, in high-income countries, employment in the manufacturing sector is declining, while employment in the service sector, including construction, non-market services, and market services is growing.

When analyzing the sectoral distribution and movement of labor resources in Germany, the United States, Switzerland, Japan, South Korea, and Taiwan (China), employment in the agricultural and industrial sectors declined significantly between 2007 and 2020 but increased in the service sector. observed. In particular, the share of the population engaged in agriculture in Japan fell from 4.29% to 3.49% (-0.08%), in South Korea from 7.59% to 4.89% (-2.7%), and in China from 40.8% to 27.0% (-13.8%).

In the above countries, the difference in the share of the population employed in the industry is almost non-existent, averaging 26.4%. The significant difference in employment in Uzbekistan compared to the surveyed countries is 13.5% in the industrial sector, which is 51.1% less than the average weight of the countries compared.

3. METHODOLOGY

3.1. Research design. The research conducted was included in the type of explanatory research, namely explaining the effect of variable X on Y through testing the structural model. In general, the data presented is in the form of figures that will be calculated through a statistical test. In some empirical tests, the missing data on changes in employment by sector were supplemented using the extrapolation method. Appendix B describes the results of the statistics and the nature of the variables. All indicators were logarithmized to flatten the data for the years studied. In the absence of a logarithmic value of the negative values in some years, they were vectorized to a parallel positive coordinate. All coefficients were evaluated using the least squares method. The column coefficients (1) - (2) are evaluated by the simple least squares method.

In the least squares method, labor activity and the number of able-bodied people of working age were evaluated as endogenous factors. Primary R-squared values were correlated with a high correlation of endogenous factors with employment rates at 70–90 percent latitude. The proposed hypothesis was identified by comparing the Chi2 value of the Hansen J test with the critical value. Based on the Durbin-Wu-Hausman test, the H0 hypothesis or the H1 alternative hypothesis was selected.

By Barro and Sala-i-Martin (1995), the composition of X external factors influencing productivity increases was covered by countries and provinces of the PRC. It covers the share of total investment in

*e*ISSN 1303-5150

GDP, foreign trade relations, foreign direct investment, coverage by higher education, geographical location, and the role of the public and private sectors.

In the study, the factors analyzed by Barro and Sala-i-Martin (1995) were analyzed and synthesized in the case of positive gross regional product, changes in employment in regional sectors, changes in investment flows, and changes in labor productivity in sectors of the economy. The relationship between the variables in general and within each network was calculated.

3.1.1. Sampling. Changes in the structure of cross-sectoral employment in 2000-2020 were analyzed in the example of Uzbekistan. The research sample includes the following regions: the Republic of Karakalpakstan, Tashkent city, and 12 regions - Andijan, Bukhara, Jizzakh, Kashkadarya, Navoi, Namangan, Samarkand, Surkhandarya, Syrdarya, Tashkent, Fergana, Khorezm. Over the years, the population was analyzed based on statistics on changes in GDP per capita, labor resources, and employment. Annual data were obtained from the State committee of the Republic of Uzbekistan on statistics.

3.1.2. Empirical model. Following Bloom et al. (2010), we begin with the identity:

$$\frac{Y}{N} \equiv \frac{Y}{L} * \frac{L}{WA} * \frac{WA}{N} \quad (1)$$

Here, Y is GDP at constant prices, N is the number of permanent population, L is the number of people employed in the economy, and WA is the number of working age population. If we find the differential value after logarithmizing both sides of the equation, we can determine the growth interval of the function:

$$\mathbf{(\frac{Y}{N})_{gr} = (\frac{Y}{L})_{gr} + (\frac{L}{WA})_{gr} + (\frac{WA}{N})_{gr} \text{ or } y_{gr} = z_{gr} + LFP_{gr} + WAP_{gr} \quad (2)}$$

Here y-GDP per capita, z-production volume per worker or labor productivity per worker, LFP - labor force participation ratio [2] and *WAP* is the working-age to population ratio As in Bloom et al., we then decompose productivity growth, noting first that in level terms and add an addition that belongs to labor skills: $L=L_s+L_u$; where subscripts L denotes Labour force, L_s is skilled workers (L_u is vise verse, this is unskilled ones). $L_i = L_s^i + L_u^i$; i represents a sector of the economy. Skilled workers' productivity is higher than unskilled ones.

Here L is the number of people employed in the relevant sector, i represents a particular sector of the economy. Like Bloom et al, we expressed productivity growth as follows:

$$\mathbf{\frac{Y}{L} = \frac{L_A}{L}\frac{Y_A}{L_A} + \frac{L_I}{L}\frac{Y_I}{L_I} + \frac{L_S}{L}\frac{Y_S}{L_S} \quad (3)}$$

Here, A, I, and S represent the agricultural, industrial, and service sectors respectively. Gross productivity is expressed as the sum of the productivity of a network and its product following the occupied part of the total labor resources in them.

Productivity growth is represented by the following function:

$$z_{gr} = \left\{\frac{Y_A}{Y}(\frac{Y_A}{L_A})_{gr} + \frac{Y_I}{Y}(\frac{Y_I}{L_I})_{gr} + \frac{Y_S}{Y}(\frac{Y_S}{L_S})_{gr}\right\} + \left\{\frac{z_A}{z}d\left(\frac{L_A}{L}\right) + \frac{z_I}{z}d\left(\frac{L_I}{L}\right) + \frac{z_S}{z}d\left(\frac{L_S}{L}\right)\right\} (4)$$

Here, the first three components represent the sum of the productivity of the sectors in terms of their contribution to the total product, while the next three components represent the sum of the productivity of each sector in gross productivity and the product of cross-sectoral changes in employment.

However, as we expanded the model to analyze changes in rural and urban populations, changes in the number of children per mother in urban and rural areas, and the proportion of highly skilled and unskilled people in urban and rural areas, we obtained the following equation(5):

[2] Following Kelley and Schmidt (2005) and Bloom et al. (2010), we refer to *L/WA* as the 'labor force participation ratio'. However, this is an imperfect definition, because people outside of the 15-64 age bracket may be economically active, while many inside it may be inactive.

*e*ISSN 1303-5150

$$\frac{WA}{N} = WAP = \frac{N_U^S}{N} WAP_U + \frac{N_R^S}{N} WAP_R + \frac{N_U^u}{N} WAP_U + \frac{N_R^u}{N} WAP_R \qquad (5)$$

Here, U and R represent urban and rural compatibility, respectively.

$WAP_i=WA_i/N_i$ as well as $(N_U^S;\ N_R^S)$ and $(N_U^u;\ N_U^u)$ represent the skilled (non-skilled) urban and rural population.

Their growth rates are as follows:

$$WAP_{gr} = \left\{\frac{WA_U}{WA}(WAP_U)_{gr} + \frac{WA_R}{WA}(WAP_R)_{gr}\right\} + \left\{\left(\frac{\frac{WA_U}{N_U} - \frac{WA_R}{N_R}}{\frac{WA}{N}}\right) d\left(\frac{N_U}{N}\right)\right\} \qquad (6)$$

The first two additions here represent the percentage growth rate of the working-age population in urban and rural areas. The ratio of urban population change to total population change and the change in the working age of urban and rural populations and the ratio of their ratio to the total working age are expressed.

Equations (4) and (6) are used to assess the impact of changes in the number of workers, and changes in productivity on changes in GDP per capita. Productivity itself, which is an integral element of this equation, also changes under the influence of certain variables. Therefore, it is necessary to form a model that represents productivity. According to the standard production model of Bloom et al. (2010): $Z_{gr}=c(z^*-z_0)$ (7)

z^* is the potential level of productivity, z_0 is the initial fertility rate and the c-dependence coefficient. Potential fertility is manifested under the influence of various endogenous and exogenous factors. In particular, investments in productivity, changes in employment levels in the industry, and changes in the working-age population. Therefore, the linear functional model of productivity can be expressed as a vector appearance over the period and regions as follows: $z^*=a+bX_{it}+cP_{it}$

Here, X represents the vector magnitude of productivity independent of demographic factors (the amount of a given area i at time t), while P represents the vector magnitude dependent on demographic factors. Kelley and Schmidt included age groups of urban and rural populations of these sizes, their 1 km. the number per square included the change in employment in the network.

Bloom et al. (2010) formed the following equation by expressing productivity within two sectors - agriculture and non-agriculture - by multiplying the change in productivity by the difference between them and the change in employment(9):

$$z_{gr\ sectoral} = s_{it} = d\left(\frac{L_A}{L}\right)\left(\frac{z_A}{z} - \frac{z_{NA}}{z}\right) \qquad (9)$$

According to him, productivity in the region i occurs with changes in employment in the sectors. Changes in employment in agriculture are represented on the basis of the increase in productivity in agriculture and non-agriculture.

In Equation (6) above, the migration of rural workers to the city, i.e., the employment of the rural population mainly in agriculture, is considered high. The migration of the rural population to urban areas is changing employment in agriculture. In our study, changes in agricultural employment were associated with changes in agricultural productivity rather than migration. The transition of the agricultural population to industry and services may also occur in rural and urban areas. Economic growth is more affected by changes in cross-sectoral employment than migration.

As a result, the increase in gross productivity is generated in parallel with the change in productivity in the three sectors. From the sum of equations (7) and (8) it is possible to obtain the following gross productivity:

$$z_{gr} = \alpha - \varphi z_0 + \beta X_{it} + \gamma P_{it} \qquad (10\ a)$$

Equations (7) and (8) for determining the gross network performance within each sector can also be derived from:

$$z_{gr\ Agr} = \alpha - \varphi z_{0,Agr} + \beta X_{it} + \gamma P_{it} \quad (10b)$$

*e*ISSN 1303-5150

$z_{gr\ Ind} = \alpha - \varphi z_{0,Ind} + \beta X_{it} + \gamma P_{it}$ (10c)

$z_{gr\ Ser} = \alpha - \varphi z_{0,Ser} + \beta X_{it} + \gamma P_{it}$ (10d)

The regression analysis of productivity growth based on equations (10a-d) is performed below.

4. RESULTS AND DISCUSSION

4.1. Results. The distribution of employment by type of economic activity in Uzbekistan has shown a positive trend in the period under study. The level of employment in agriculture, forestry, and fisheries, industry, construction has decreased, while in the service sector it has increased.

Table 1 provides an equivalence analysis of the relationship between demographic factors and GDP per capita (10). According to the results of the 1st column OLS regression model, the ratio of the economically active population to the working age population, ie the level of economic activity, has a more significant impact on GDP growth than the growth rate of labor productivity, disbursed investments, and loans. A 1% increase in the level of economic activity will have a positive impact on the growth of GDP per capita by 1.45%. According to the F-test result, there is no strong correlation between outcome and influencing factors in regression (p-value <0.05).

Column 2 used the 2SLS regression model. The economically active population was taken as an endogenous factor, and the increase in employment and the number of graduates in the population's ITKI was considered to increase the level of economic activity. According to the model results, the factors have a positive correlation with each other, i.e. p-value (p=0.57)>0.05 according to the F-test result. Based on the results of the Durbin-Wu-Hausman test, the level of economic activity is an endogenous factor, which has a positive impact on its growth and the increase in employment and the number of graduates in the ITKI of the population with a probability of 95.9%. According to the Hansen J test result, the influencing factors are not mutually diffuse (p-0.003).

Table 1: Determinants of productivity growth, 2000-2021 [3]

2SLS Dep. var.:	(1) Y/Lgr	(2) Y/Lgr, Agr	(3) Y/Lgr, Ind	(4) Y/Lgr, Ser
lnEmployment change	.5784764	-.316465	-.1365495	-.0447004
	(.1189044)	(.2934625)	(.1523767)	(.0257067)
Control variables:				
lnY/L	-.2831176			
	(.2612046)			
lnY/LAgr		.9024348		
		(.1414755)		
lnY/LInd			.5052608	
			(.2484703)	
lnY/LSer				.7545274

[3] Note: *** p<0.01, ** p<0.05, * p<0.1. Figures in parentheses are standard errors. Figures in squared parentheses are p-values. All coefficients are estimated by the two-stage least-squares estimator (2SLS) except for column (1) by OLS. The instruments for dependency ratios include the beginning-of-period values of population birth rates and the one-period lags of total population growth rates and dependency ratios. The partial R-squared of excluded instruments is around 70 to 90 percent in the first-stage regressions, indicating that the employed instruments are highly correlated with the endogenous variables. Chi-squared values of the Hansen J test suggest that the excluded instruments meet the over-identification condition even in the presence of heteroskedasticity. The Durbin-Wu-Hausman test suggests us rejecting the null hypothesis of exogeneity and this confirms our initial conjecture that dependency ratios are endogenous in all specifications except for that on industrial productivity growth.

*e*ISSN 1303-5150

				(.0758268)
Ln(Investment&credits)	-2.062326	2.265075	-2.303514	1.571129
	(3.055166)	(3.039977)	(3.929934)	(.3846458)
Constant	5492.083	-2618.876	8264.568	-1306.033
	(6890.629)	(5729.79)	(8981.725)	(871.4643)
Diagnostic tests:				
No. of obs.	14 regions	14 regions	14 regions	14 regions
R-squared	0.9427	0.8059	0.1930	0.9909
Durbin-Wu-Hausman test	5.81885 [0.0391]	3.22475 [0.1103]	1.27335 [0.2883]	.152307 [0.7054]
Hansen J test	2.9942988 [.06528518]	2.2756102 [.19015767]	4.500799 [.65754725]	4.0444608 [.59997783]
Basmann chi2	.042272 [0.9791]	1.90155 [0.3864]	.285723 [0.5930]	2.73249 [0.0983]

Column 3 takes the increase in the working-age population in population as an endogenous factor and examines the relationship between the increase and the increase in the number of children per mother in rural and urban areas. According to the model results, the factors have a positive correlation with each other, i.e. p-value (p = 0.73)> 0.05 according to the F-test result. According to the Durbin-Wu-Hausman test, the increase in the working-age population is an endogenous factor, with an increase in the number of children per mother in urban and rural areas with a probability of 97.1%. According to the Hansen J test result, the influencing factors are not mutually dispersed (p-0.000).

In column 4, labor productivity is taken as an endogenous factor. Its growth was positively influenced by the growth of productivity in the sectors. According to the F-test result, p-value (p = 0.49)> 0.05. According to the Durbin-Wu-Hausman test, the increase in productivity is an endogenous factor, the increase in which is positively influenced by an increase in productivity in the industries with a probability of 80.7%. According to the Hansen J test result, the influencing factors are not mutually dispersed (p = 0.061).

Table 2 assesses the impact of GDP growth on per capita productivity, working-age population, economic activity, investment and credit growth, and changes in intersectoral employment.

Table 2:Determinants of per capita GDP growth, 2000-2021[4]

Dep. var.: Y/Ngr	**(1) OLS**	**(2) 2SLS**	**(3) 2SLS**	**(4) 2SLS**
Core population variables:		(lfp=lfprd lfpedu)	(wap = bperwinu bperwinr)	(lp=proda prodi prods)
lnY/L	.9614449	.9510579	.9610813	.9626766

[4] Note: *** p<0.01, ** p<0.05, * p<0.1. Figures in parentheses are standard errors. Figures in squared parentheses are p-values. All coefficients are estimated by the two-stage least-squares estimator (2SLS) except for those in Columns (1)-(2) by the ordinary least-squares estimator (OLS). In 2SLS, the instruments for dependency ratios include the beginning-of-period values of population birth rates and the one-period lags of total population growth rates and dependency ratios. The partial R-squared of excluded instruments is in the range of 70 to 90 percent in the first-stage regressions, indicating that the employed instruments are highly correlated with the endogenous variables. Chi-squared values of the Hansen *J* test suggest that the excluded instruments meet the over-identification condition even in the presence of heteroskedasticity. The Durbin-Wu-Hausman test suggests the rejection of the null hypothesis that dependency ratios are exogenous across all specifications.

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	(.0093564)	(.0125824)	(.0105426)	(.0083775)
LnWAPgr	1.458251	1.663156	1.465261	1.438461
	(.1646654)	(.235613)	(.1944729)	(.1450053)
lnLFP	.7261023	1.27141	.7349221	.7017717
	(.3013056)	(.551714)	(.3010656)	(.2527016)
Control variables:				
Ln(Investment&credits)	.0171226	.0125359	.0172203	.0166305
	(.0075686)	(.0081321)	(.0063866)	(.0062529)
Constant	79.04357	400.413	85.50573	62.07261
	(184.0159)	(328.2725)	(197.7237)	(156.2999)
Diagnostic tests:				
No. of obs.	14 regions	14 regions	14 regions	14 regions
R-squared	1.0000	0.9999	1.0000	1.0000
F-test for H0: WAPgr = +1	51.67 0.0000	0.61 0.5690	0.32 0.7344	0.89 0.4933
Durbin-Wu-Hausman test		.002734 [0.9594]	.001378 [0.9713]	.063451 [0.8075]
Hansen J test		1.2112545 [.0034705]	.64171069 [.0003421]	1.7729738 [.0606503]
Basmann chi2		.206533 [0.6495]	.105796 [0.7450]	1.48516 [0.4759]

According to column 1, productivity growth has a positive correlation with cross-sectoral employment change. A 1% change in employment leads to a 0.58% increase in productivity. Investments and loans are inversely related to the initial values of productivity. According to the Durbin-Wu-Hausman test, the factors are endogenous. According to the Hansen J test, the magnitudes of variation are not scattered. Columns (2), (3), and (4) examine the relationship between changes in labor productivity in each sector and changes in employment in the sector. As a result, a 1% increase in productivity in agriculture will change the employment structure by a total of 0.32% in the sectors. In industry and services, it affects employment changes by 0.14% and 0.04%, respectively.

4.2. Discussion. According to statistics, in 2022 the permanent population of the Republic of Uzbekistan will be 35,271.3 thousand people, an increase of 44.4% compared to 2000. It has grown by 19.3% in the last decade and 8.1% in the last five years. Between 1991 and 2020, the number of permanent residents increased 1.64 times or an average of 103.2 percent annually. Labor resources increased by 1.97 times or 104.5% on average annually.

In 1991, the number of able-bodied people in the population was 49.2%, and by 2020 its share reached 62.7%. It can be found that the wave of the share of adults of working age in the labor force is returning every eight years. In particular, the share of able-bodied young people in the total labor force increased from 7.6% in 1991 to 8.1% in 2013, while in the last decade it was 8.1%. The share of the urban population in the total population was 50.5%, rural population - was 49.5%. In terms of age structure, 30.3% of the permanent population is under the age of working age, 59.5% is of working age and 10.2% is older than working age.

According to international standards, Uzbekistan is a country with a young population. In 2020, the average age of the population was 28.6 years (28.0 years for men; 29.2 years for women). As a result of high birth rates over the past years, the share of able-bodied young people has been increasing, indicating a positive impact on demographic and economic growth. At the same time, in 2020 the average life

expectancy of the population was 74 years (from 1990-2020 it increased by almost 8 years). Uzbekistan has a stable population and a steady growth rate.

In the Republic of Uzbekistan in 2020, 81.1% of those employed in the economy worked in the non-governmental sector, and 18.9% in the public sector.[5] In 2015-2020, Uzbekistan averaged 26.9% in agriculture, forestry, and fisheries, and 13.5% in industry. The share of the employed population in agriculture decreased from 27.6% to 26.9% (-1%) in 2015-2020, and the share of the employed population in the service sector also decreased, but the share of employment in emerging services increased.

In the analysis of industrial employment in 2015-2020, mining and quarrying by 6%, electricity, gas, steam, and air conditioning by 4.6% (employment in metal ore mining decreased by a maximum of 6%), water supply; sewerage, waste collection, and disposal decreased by 0.2%. The employment rate in the manufacturing industry increased by 10.8% (the highest in the production of textiles, clothing, leather, and related products - by 4.2%. coke and oil refining products decreased from 2.2% to 1.6% and in the remaining areas a steady growth rate of employment was observed).

Table 3 analyzes changes in the ratio of the urban and rural population in the total population of the Republic of Uzbekistan in 2000-2021, changes in urban and rural marriages, and changes in the number of children per mother. The proportion of the urban and rural population in the total population of the country during the period under review increased by 0.13 and 2.76, respectively.

Table 3:Changes in urban and rural dependency ratios, 2000-2021

Country and its regions	Urban Total Dependency Ratio	Rural Total Dependency Ratio	Urban Marriage Dependency Ratio	Rural Marriage Dependency Ratio	Urban Fertility rate (b/w)	Rural Fertility rate (b/w)
Uzbekistan	0,13	2,76	1,42	-5,27	0,518	0,200
Provincial level, 2000-2021						
Karakalpakstan Rep.	0,008	-0,008	0,759	-6,542	-0,135	-0,321
Andijan	0,222	-0,222	2,120	-4,765	0,901	-0,118
Bukhara	0,057	-0,057	2,410	-7,106	0,662	0,106
Jizzakh	0,166	-0,166	2,818	-4,922	0,889	-0,253
Qashqadaryo	0,175	-0,175	1,394	-5,981	0,509	0,378
Navoiy	0,086	-0,086	1,291	-6,612	0,600	0,450
Namangan	0,272	-0,272	1,939	-5,362	0,705	0,449
Samarqand	0,098	-0,098	-3,692	22,568	0,687	0,281
Surxondaryo	0,164	-0,164	5,224	-5,250	0,797	0,107
Sirdaryo	0,105	-0,105	3,688	-5,276	0,429	0,180
Tashkent	0,090	-0,090	1,275	-4,551	0,125	0,359
Fergana	0,272	-0,272	1,914	-5,301	0,294	0,713
Xorazm	0,093	-0,093	-0,143	-6,548	0,499	-0,275
Tashkent city.	0,000	-	1,690	-	0,414	-

According to the results of the analysis, the socioeconomic processes in the country are changing rapidly. At the same time, employment and its attitude to earnings are changing radically, and the

[5]Uzbekistan in numbers. Tashkent- 2018. Annual statistical collection

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importance of the expected permanent income in the composition of the factors influencing the balance of supply and demand in the labor market and the motivation for additional income is growing.

In addition to the fact that the main source of income of labor resources in the workplace is wages, there is a growing activity in various virtual services, e-finance operations on the way to earn extra income. In particular, such activity can be seen in the inflow of bitcoin, cryptocurrency transactions, the formation of revenues through transactions in electronic online pockets.

When analyzed by regions, the level of urbanization has increased. The highest urbanization was in Fergana (0.272), Namangan (0.272), Andijan (0.222), Kashkadarya (0.175), and Jizzakh (0.166) regions. Analyzing the number of marriages, the number of marriages between urban residents (1.42) has changed significantly compared to rural marriages (-5.27), ie urban marriages have increased and rural marriages have decreased.

The main reasons for this are the positive changes in the level of urbanization of the country, ie the granting of urban and rural status to rural areas and the medical culture of the rural population, positive lifestyle changes, and positive changes in living conditions in rural areas. Marriages also affected the distribution of the number of children per mother in urban and rural areas. The number of children per mother varied by 0.518 in urban areas and by 0.200 in rural areas.

In terms of regions, the number of marriages in the city increased by an average of 2.2 in all regions except Samarkand (-3.7) and Khorezm (0.1). In the analysis of rural areas, the number of marriages in the Samarkand region alone increased by 22.6, while in all other regions it decreased by an average of 5.7.

By region, the number of children per mother decreased in urban areas of the Republic of Karakalpakstan (-0.14). In all other urban areas, the average increased by 0.57. In rural areas, it decreased in the Republic of Karakalpakstan (-0.32) and Khorezm (-0.28), Jizzakh (-0.26), and Andijan (-0.12). In other regions, the average increased by 0.33.

Per capita GDP, labor productivity, economic employment, and changes in employment in the sectors were analyzed by region (Table 4). Between 2000 and 2021, GDP per capita changed positively by 21.1%. It increased by 0.48 in 2000-2005, by 2.21 in 2005-2010, and by 18.4 in 2010-2021. In terms of regions, the highest change in 2000-2021 was in Navoi (58.4), Tashkent (45.0), Tashkent (27.5), and Bukhara (19.8) regions.

Table 4: Decomposition of average per capita GDP growth over the indicted period, (%)

Country and its regions	**Real GDP per capita (Y/N)**	**Real GDP per worker (Y/L)**	**Labour force participation (L/WA)**	**WAP ratio (WA/N)**	**Sectoral employment change on Productivity**
Ўзбекистон					
2000-2021	21,123	55,135	-0,026	0,046	9,493
2000-2005	0,478	1,199	-0,015	0,049	-
2005-2010	2,207	5,226	-1,322	0,050	-
2010-2021	18,437	48,709	0,004	-0,053	-
Provincial level, 2000-2021					
Karakalpakstan Rep.	13,573	36,885	0,020	0,051	-11,812
Andijan	13,625	35,429	-0,034	0,036	19,933
Bukhara	19,751	48,811	-0,064	0,040	1,653
Jizzakh	16,468	43,418	0,066	0,064	-2,026

*e*ISSN 1303-5150

Qashqadaryo	13,033	37,107	-0,056	0,074	-5,283
Navoiy	58,374	148,161	-0,076	0,038	77,328
Namangan	11,935	31,389	0,049	0,057	2,999
Samarqand	13,517	37,611	-0,040	0,056	38,734
Surxondaryo	11,129	30,245	-0,027	0,079	-6,587
Sirdaryo	17,968	46,566	-0,079	0,064	-22,481
Tashkent	27,455	69,390	-0,014	0,033	13,998
Fergana	12,250	32,308	-0,066	0,048	-14,623
Xorazm	14,100	37,239	-0,009	0,055	-39,559
Tashkent city.	45,030	97,577	0,020	-0,024	-48,997

Labor productivity in the Republic of Uzbekistan (GDP per capita employed in 2000-2021) increased by 55.1%. In terms of regions, the highest change was observed in Navoi (148.2), Tashkent (97.6), and Tashkent region (69.4). The employment rate of the working-age population in the country has increased by 0.004 over the last decade and decreased by 0.026 from 2000-2021.

By region, the working age population increased by 0.046 between 2000 and 2021, while the employment rate decreased by an average of 0.038 in most regions. According to the analysis of changes in employment in rural and non-rural sectors, intersectoral employment increased by 9.50. By regions, changes in intersectoral employment were observed in Navoi (77.3), Samarkand (38.7), and Andijan (19.9) regions.

Table 5 examines the changes in labor productivity and cross-sectoral employment over the years. The level of employment in the most productive sectors of the economy has increased. In particular, in 2015-2020, productivity increased by 43.9 percent in agriculture, 148.6 percent in industry, and 69.9 percent in services although employment in agriculture decreased by 2.8, while employment change in industry and services increased by 2.3 and 2.9, respectively.

Table 5:Decomposition of average annual productivity growth

Percentage contributions to the growth of real GDP per worker from:								
Country and its regions	**Productivity growth within sectors**				**Sectoral employment changes**			
National level	**Agriculture**	**Industry**	**Services**	**Total**	**Agriculture**	**Industry**	**Services**	**Total**
2013-2014	3,65	6,91	18,33	28,88	3,7	2,0	1,7	7,4
2014-2015	4,48	6,80	5,19	16,47	2,1	1,9	1,6	5,5
2015-2020	43,86	148,60	69,93	262,39	-2,8	2,3	2,9	2,4
Provincial level, 2013-2021								
Karakalpakstan Rep.	8,09	74,53	7,61	90,23	-1,8	-0,1	2,7	0,8
Andijan	20,93	98,12	16,42	135,47	-0,3	0,6	-0,6	-0,3
Bukhara	15,76	67,75	15,17	98,69	2,6	-0,6	0,8	2,8
Jizzakh	9,92	25,93	9,60	45,45	-5,3	0	-0,5	-5,8
Qashqadaryo	19,45	81,49	15,28	116,22	-3	-2,6	-0,9	-6,5

*e*ISSN 1303-5150

Navoiy	11,24	119,07	10,68	140,99	-0,5	0,1	0,3	-0,1
Namangan	14,23	39,82	13,43	67,48	1,6	-0,5	-1,3	-0,2
Samarqand	22,75	62,40	19,07	104,23	-0,6	0,1	-0,6	-1,1
Surxondaryo	11,20	33,67	13,68	58,56	-2,3	-0,2	-0,5	-3
Sirdaryo	3,65	30,70	6,47	40,82	-1,6	1,4	-0,1	-0,3
Tashkent	17,99	131,18	26,37	175,54	-0,2	3	0,1	2,9
Fergana	16,65	46,35	20,04	83,05	-1,3	1,9	-0,3	0,3
Xorazm	10,25	52,62	11,11	73,97	-1,2	0,3	-0,9	-1,8
Tashkent city.	0,00	127,46	94,66	222,11	-0,3	2,4	1,6	3,7

When analyzed by regions, labor productivity in each region increased in the industrial sector, and in most of these regions, the population engaged in agriculture decreased. The average industrial productivity of the regions increased by 70.9, while employment in agriculture decreased by an average of 1.1. Data on the variables and their sources are given in Appendices A-B.

5. Conclusions. As a result of the analysis of changes in the age structure of the population in Uzbekistan and its employment structure by sectors of the economy, the following conclusions can be drawn. The transformation of rural areas into urban areas, changes in rural lifestyles, and the improvement of infrastructure in rural areas are affecting demographic trends and employment.

GDP growth per capita is directly related to indicators such as labor productivity, the level of economic activity of labor resources, education, skills, and health of the working-age population. The growth of labor productivity was positively influenced by the growth of productivity in the sectors. Increased productivity in agriculture will make it possible to free up excess labor resources and redistribute them for maintenance. As a result, employment in services will increase.

A 1% change in employment leads to a 0.58% increase in productivity. 1% increase in productivity in agriculture In which sectors will change the employment structure by a total of 0.32%. In industry and services, it affects employment changes by 0.14% and 0.04%, respectively. The level of employment in the sector of the economy, which has increased productivity, has increased.

When analyzed by region, labor productivity in each region increased higher in the industrial sector, and in most of these regions, the agricultural population decreased. The migration of the population engaged in agriculture to the agro-industrial sector based on agricultural clustering is encouraged. A 1% increase in economic activity will lead to a 1.45% increase in GDP per capita. The increase in employment and the number of graduates in STEM (scientific and technical design, engineering, and math) will increase the level of economic activity.

An increase in the share of the working-age population in the total population by 1% will lead to an increase in GDP per capita by 1.46%. An increase in the number of children per working mother in urban and rural areas has a positive impact on the growth of the working-age population with a probability of 97.1%.

Based on the results of the above analysis, the following should be done to achieve industrialization of the regions, ensuring economic growth and increasing productivity:

- ensuring the training of skilled workers in the activities of emerging sectors of the economy under market needs. The creation of jobs under the innovative ecosystem of the region;
- ensuring employment in new forms of employment through the expansion of intersectoral innovations and access to the global value chain to increase investment;
- encourage the involvement of the private sector in the training process to increase the effectiveness and efficiency of reforms.

*e*ISSN 1303-5150

- successful implementation of innovation diffusion in the process of ind

Acknowledgments.

The Faculty of Economics of the National University of Uzbekistan named after Mirzo Ulugbek conducted this study to scientifically determine the changes in the structure of employment in the economy and the priority sectors in promoting employment. The research team would like to thank all the expert participants for their active participation in the process of improving the research methodology and collecting and analyzing statistical data. The research team is especially grateful to the international group of experts, partner organizations, and international research institutes.

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Appendix A. Dynamics of economic and social indicators of Uzbekistan, 2000-2021.

Year	GDP at constant prices, bln. sum	Population, thous. people	Urban population, thous. people	Rural population, thous. people	Urban Fertility rate (births/woman)	Rural Fertility rate (births/woman)	Labore resources, thous. people	Economic active population, thous, people	Number of people employed in the economy, thousand people	Number of people employed in the R&D, thousand people	Higher education graduates (Edu)	Foreign investment and credit, bln. sum
2000	1 890,45	24487,7	9165,5	15322,2	2,188	2,903	12469	9018,4	8983	36,8	31568	172,37
2005	9 097,05	26021,3	9441,9	16579,4	2,188	2,903	14453,2	10224	10196,3	34,1	57845	369,60
2010	57 086,45	28001,4	14425,9	13575,5	2,081	2,619	16726	12286,6	11628,4	35,6	76379	306,20
2015	159 067,87	31022,5	15748	15274,5	2,23	2,749	18276,1	13767,7	13058,3	36,8	66290	1447,76
2016	185 912,21	31575,3	15963,9	15611,4	2,264	2,644	18488,9	14022,4	13298,4	37	64133	2863,94
2017	214 609,91	32120,5	16250,8	15869,7	2,212	2,623	18666,3	14357,3	13520,3	36,8	67448	4058,08
2018	253 644,59	32656,7	16532,7	16124	2,41	2,794	18829,6	14641,7	13273,1	37,2	70325	4340,84
2019	316 246,50	33255,5	16532,7	16124	2,593	2,976	18949	14876,4	13541,1	31,1	70793	3853,79
2020	364 050,30	33905,2	16532,7	16124	2,706	3,103	19158,2	14797,4	13236,4	30,3	83905	4653,31
2021	460 524,99	34558,9	16532,7	16124	2,706	3,103	19158,2	15000,5	13236,4	30,7	100000	5532,72

*e*ISSN 1303-5150

Appendix B. Variable definitions and descriptive statistics (2000-2021 yy)

Variable	Mean	Std. Dev.	Min.	Max.	Definition
Y/Ngr	20,59	14,08	11,13	58,37	Per capita real GDP growth rate
Y/Lgr	52,30	33,02	30,25	148,16	Per worker real GDP growth rate
Y/Lgr, Agr	13,01	6,51	0.01	22,75	Per worker real Agricultural GDP growth rate
Y/Lgr, Ind	70,79	36,19	25,93	131,18	Per worker real Industrial GDP growth rate
Y/Lgr, Ser	19,97	22,13	6,47	94,66	Per worker real Service sector GDP growth rate
UFerti(birt/women)	0,51	0,29	-0,14	0,90	Population birth rate: %
RFerti(birt/women)	0,16	0,32	-0,32	0,71	Population birth rate: %
WAPgr	0,48	0,03	-0,02	0,08	Growth of the working-age population
LFPgr	-0,02	0,05	-0,08	0,07	Growth of labour participation ratio
S	0,85	0,01	-0,08	0,07	Change in sectoral employment: %
N	719,37	355,11	218,70	1277,40	The total population in a province: thous. persons
Investment&credits	7,67	0,53	6,81	8,93	Investment and credits, billn. sum

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