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THE IMPACT OF CLIMATE AND SOCIO-DEMOGRAPHIC CHANGES ON EMPLOYMENT: THE CASE OF CENTRAL ASIA

Abstract. Climate change may have a significant impact on the labor market by causing disproportionate damage to marginal labor returns across sectors. However, this potentially significant channel through which climate change may affect social welfare has received insufficient attention.

Keywords. Renewable Energy, Climate Change, Socio-Demographic Change, Green Transformation, Central Asia, Employment Structure

ВЛИЯНИЕ КЛИМАТИЧЕСКИХ И СОЦИАЛЬНО-ДЕМОГРАФИЧЕСКИХ ИЗМЕНЕНИЙ НА ЗАНЯТОСТЬ: ПРИМЕР ЦЕНТРАЛЬНОЙ АЗИИ

Аннотация. Изменение климата может оказать существенное влияние на рынок труда, нанося непропорциональный ущерб маржинальной отдаче труда во всех секторах. Однако этому потенциально значимому каналу, через который изменение климата может повлиять на социальное благосостояние, уделяется недостаточно внимания.

Ключевые слова. Возобновляемая энергия, Изменение климата, Социально-демографические изменения, Зеленая трансформация, Центральная Азия, Структура занятости

1. Introduction. The rise in air temperature in Central Asia is twice the global average, the number of extremely hot days has doubled, and a third of the glaciers have melted. Soil degradation, regular dust and sandstorms, water scarcity, air pollution, loss of biodiversity, sharp decline in agricultural productivity, and many other factors have a negative impact on the quality of life for population and labor productivity in the region.

According to the Paris Agreement, countries aim to ensure that global warming does not exceed 1.5^0 C and increase socio-economic benefits. According to research by the International Renewable Energy Agency, the return on investment in the renewable energy industry is projected to increase GDP by 2.5 percent by 2050 and increase global employment by 0.2 percent compared to employment in traditional business activities [1]. The Global Cooling Pledge for COP 28 includes 66 national government signatories committed to working together with the aim of reducing cooling-related emissions across all sectors by at least 68 per cent globally relative to 2022 levels by 2050.[1] Based on the results of the study of the impact of climate change on employment in the case of Central Asia, it was found that the volume of CO_2 that causes climate change, the reduction of its amount per capita, the increase in the consumption of renewable energy, the composition of employment, and the amount of GDP per capita increase the tension.

2. Study site. In an efficient economy, there is the task of efficient use of resources and the task of increasing the well-being of society, including not only meeting the material needs of society but also the task of increasing the standard and quality of life in general.

3. Methods. To estimate the contribution of climate change to employment in 5 Central Asian countries' economies, we employ an econometric approach with panel data. Equation (1), which represents the empirical model to be estimated, has the following form: where i is certain country index and t is adequate timeline. The multifactor regression equation was used in the research method.

$$Ln(EMPL)_{it}=\beta_0+\beta_1 \ln(N)_{it} +\beta_2 \ln(HGHpercapita)_{it} +\beta_3 \ln(GDPpercapita)_{it} + \varepsilon_{it} \quad (1)$$

The dependent variable $Ln(EMPL)_{it}$ is expressed by the logarithm of employment. Among the explanatory variables, it is of particular interest the variable CO_2 emission per capita, measured by the logarithm (lnHGHpercapita). In addition, given their relevance as explanatory factors in this relationship, we also control for the effect of GDP per capita, expressed in its logarithm form (lnGDPpercapita), and

[1] https://unfccc.int/sites/default/files/resource/Summary_GCA_COP28.pdf

population $\ln(N)_{it}$ which measures the extent to which an economy relies upon allocation labor resources to use its human resources. The coefficient β_t is a country-specific effect that captures time-invariant observed country characteristics, and ε_{it} is the error term.

We make use of a balanced panel dataset composed of 5 Central Asian countries in the period between 1990 and 2023, where data are available for all the variables and countries. This is a panel of countries with similarities.

4. Results.

This section presents and discusses the results of the estimation model to test the observed positive relationship between renewable energy expansion (REN) and employment (EMPL). The 2SLS regression model was used in table 4. Population and per capita CO_2 emissions were taken as endogenous factors.

. An increase in CO_2 per capita affects population size, life expectancy, the number of children per mother, and the growth of GDP per capita.

Table 4.

Correlation between CO_2 emissions, demographic and socio-economic factors, 1990-2023

2SLS Variation difference:	**(1)** Employment in agriculture	**(2)** Employment in Industry	**(3)** Employment in Service
Demographic factors (P= Rural Population; Life expectation; Fertility (births per woman))			
ln(N)	2.11e-11	-5.29e-10	2.12e-11
	4.70e-11	3.23e-10	4.60e-11
Ecological factor (CO2=REC per capita)			
ln(HGHpercapita)	.000026	-.0001488	.000027
	.0002094	.0006723	.0002047
Socio-economic factors			
ln(GDP per capita)	-3.94e-07	-4.68e-07	-3.94e-07
	3.58e-07	5.13e-07	3.50e-07
Diagnostic tests:			

Number of obs	158	158	158
R-squared	Within-0.9700	Between-0.8700	Overall-0.9800
F-test for hypothesis H0	107.02 [0.0000]	56.92 [0.0000]	52.03 [0.0000]
Durbin-Wu-Hausman test	3.28 [0.1942]	4.81 [0.4401]	4.75 [0.4466]
Hansen J test	.61467943 [.26459927]]	.20559914 [.0976922]	.30149821 [.260282]
Breusch-Pagan / Cook-Weisberg test for heteroscedasticity	1.32746 [0.5149]	1.84 [0.1748]	4.78 [0.0288]

To determine which model specification is the most appropriate, the standard F-test for fixed effects was conducted. Results validate the null hypothesis that the pooled 2SLS model is more adequate than the fixed effects model. The results of our empirical study reveal robust evidence of a positive and statistically significant effect from REC on employment in agriculture and service sectors through the Central Asian economy.

5. Discussion.

The main and dominant element of climate warming is CO_2. From 2020 to 2060, China formulated the goal of making the country carbon neutral. Technological innovation increases the use of renewable energy and increases the efficiency of coal, oil, and natural gas use [2].

The role of green technology innovation and ICT employment in China's intensification of decarbonization was studied by Hongye Sun [3]. The research clarified that a green economy, investing in technologies, and increasing the use of ICTs, will reduce the spread of harmful substances into the environment. The importance of the cooperation of countries, the power of information diffusion, and the introduction of technological innovations will increase. To do this, it has adopted a low-carbon strategy for transition to a green economy and development at a high level.

6. Conclusions. The volume of waste, the increase in toxic substances in the air, in densely populated areas, sharply affects the health of the population and increases the quasi-exogenous death rate. The main cause of climate change is the increase of CO_2 in the air. Climate change, including global warming, has contributed to the decline in agricultural employment in Central Asian countries. Increasing climate change shocks the energy system, and various uncertainties arise.

The increase in the consumption of renewable electricity in Central Asian countries from 1990-2023 had a positive effect on the reduction of CO_2 per capita. The rate of decrease in the share of employment in agriculture among the population of Central Asian countries with high population growth is somewhat lower. There is a correlation between an increase in life expectancy at birth, a decrease in the number of births per woman during the fertile period, and an increase in GDP per capita.

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