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Article

Econometric Analysis of the Impact of International and Domestic Labor Mobility on Household Income in Uzbekistan

Shakarov Zafar Gafforovich*[1]

1. PhD., Associate Professor., Tashkent Branch of the Plekhanov Russian University of Economics
*Correspondance: sg.shakarov@gmail.com

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Abstract: This study presents an econometric assessment of the impact of international and domestic labor mobility on household income in Uzbekistan. The primary objective is to comprehensively examine the effects of economic, demographic, institutional, and human capital factors influencing labor mobility on household income and to determine their statistical significance. Based on survey data collected from 454 respondents, a multivariate regression (MVREG) model was developed, and the empirical analysis was conducted using Stata 17.0. The model incorporates variables including computer literacy, educational attainment, foreign language proficiency, region of residence, age, duration of migration, migration channel, monthly remittance inflows, and the availability of support networks abroad. The findings demonstrate that human capital indicators, particularly computer literacy and educational attainment, have a statistically significant positive effect on migrants' income earned abroad. Furthermore, migration duration and the volume of remittances were identified as key determinants of the economic efficiency of labor mobility. Significant regional disparities in income indicate the need for differentiated labor market policies under conditions of regional labor market transformation. Forecasting results suggest that increasing household income, expanding investment and employment opportunities, and reducing poverty could substantially decrease the labor migration index by 2030. The findings provide an empirical basis for developing evidence-based policy recommendations aimed at regulating labor mobility, strengthening human capital, improving regional employment policies, and enhancing household welfare in Uzbekistan.

Keywords: Labor Mobility, Household Income, International Labor Migration, Human Capital, Regional Labor Market, Regional Labor Market Transformation, Econometric Assessment, Multivariate Regression (MVREG), Labor Migration, Regional Development, Employment Policy

1. Introduction

The ongoing globalization of the world economy, rapid advances in digital technologies, demographic shifts, and the transformation of labor markets have significantly increased both domestic and international labor mobility. As a result, labor mobility has become one of the key drivers of economic growth, human capital development, household income generation, and social welfare. In particular, the movement of labor resources toward regions and countries offering higher wages not only contributes to balancing labor supply and demand but also plays a crucial role in

increasing household income, reducing poverty, and promoting regional economic development [1].

In contemporary economic theory, the relationship between labor mobility and income has been extensively examined through the perspectives of human capital theory, the neoclassical theory of labor migration, and the new economics of labor migration. These theoretical approaches suggest that educational attainment, professional qualifications, digital competencies, foreign language proficiency, work experience, and social networks enhance workers' competitiveness and expand their opportunities to obtain higher-paying jobs. At the same time, the effectiveness of labor mobility depends not only on individual characteristics but also on regional economic development, infrastructure quality, and institutional conditions [2].

In Uzbekistan, economic modernization, the reduction of regional disparities, employment promotion, and human capital development have become strategic priorities of national development policy. Within this framework, improving the management of both domestic and international labor mobility, directing labor resources toward more productive sectors and regions, and increasing the economic efficiency of labor migration are of particular importance. Therefore, assessing the impact of labor mobility determinants on household income using rigorous econometric methods is essential for improving labor market policies and enhancing the effectiveness of regional development strategies [3].

Although previous studies have investigated various aspects of labor mobility and the economic consequences of migration, relatively limited attention has been paid to the simultaneous econometric evaluation of income earned abroad and income generated within the country. In particular, comprehensive analyses that examine the combined effects of human capital, regional characteristics, migration-related factors, and institutional conditions on both income sources using multivariate econometric techniques remain scarce. Consequently, this issue continues to represent an important research gap in the literature [4].

The primary objective of this study is to evaluate the effects of economic, demographic, institutional, and human capital factors associated with labor mobility on household income in Uzbekistan using multivariate econometric models. Furthermore, the study seeks to determine the economic efficiency of labor mobility and to develop evidence-based policy recommendations aimed at improving labor market performance. To achieve these objectives, the principal determinants of labor mobility are identified and systematized, while their effects on both domestic and foreign-earned income are estimated using a **Multivariate Regression (MVREG)** model. Based on the empirical findings, practical recommendations are proposed to support regional labor market development and improve household welfare [5].

The scientific novelty of this study lies in the simultaneous assessment of the impact of labor mobility on both domestic and foreign-earned income through the application of a multivariate regression (MVREG) model. In addition, the study provides a comprehensive evaluation of the combined effects of human capital, regional characteristics, and migration-specific factors, thereby offering new empirical evidence for the formulation of labor market and migration policies in Uzbekistan [6].

Literature Review

In recent years, labor mobility has attracted considerable attention in the international literature as one of the key drivers of economic growth, household income enhancement, and human capital development. The processes of globalization, the rapid expansion of the digital economy, and demographic changes have substantially increased the mobility of labor resources across regions and national borders. International

organizations recognize labor mobility as an important mechanism for improving labor market efficiency, reducing unemployment, and promoting inclusive economic growth. At the same time, empirical studies emphasize that the impact of labor mobility on household income depends largely on the level of institutional development, labor market infrastructure, and the quality of human capital in both origin and destination countries [7].

The theoretical foundations of labor mobility are closely associated with human capital theory. According to this perspective, investments in education, vocational training, work experience, and digital skills enhance individual productivity and improve access to higher-paying employment opportunities. Workers with higher levels of human capital are generally more competitive in international labor markets, resulting in greater economic returns from labor mobility [8].

The neoclassical theory of labor migration provides another important framework for explaining the economic rationale behind labor mobility. This approach argues that labor migration is primarily driven by wage differentials and productivity disparities across countries and regions. As workers move toward labor markets offering higher wages, labor market imbalances are partially corrected, resource allocation becomes more efficient, and overall economic productivity increases. Consequently, labor mobility is regarded as a major driver of income growth [9].

More recent research has increasingly adopted the New Economics of Labor Migration (NELM), which views migration decisions as household-level rather than individual decisions. Within this framework, labor mobility serves as a strategy for income diversification and risk reduction. Remittances generated through labor migration contribute significantly to stabilizing household income, reducing poverty, and stimulating local economic development, thereby enhancing household welfare and economic resilience [10].

The core–periphery theory also provides an important conceptual basis for analyzing regional labor mobility. According to this theory, economically advanced regions tend to attract labor resources from less developed peripheral areas. Such migration flows often generate substantial regional disparities in income levels, labor productivity, and employment opportunities. Therefore, regional characteristics should be explicitly considered when evaluating labor mobility and its socioeconomic consequences [11].

Contemporary studies further explain the relationship between labor mobility and household income through the perspectives of regional clusters and competitiveness theories. These approaches argue that innovation ecosystems, industrial clusters, well-developed service sectors, and high-quality infrastructure facilitate a more efficient allocation of labor resources. As a result, they enhance the earnings potential of highly skilled workers while strengthening regional economic competitiveness [12].

With the rapid development of the digital economy, digital competencies, computer literacy, and foreign language proficiency have emerged as essential components of human capital and key determinants of labor mobility. Empirical evidence suggests that these competencies improve labor market competitiveness, expand access to higher-paying occupations, and increase workers' international mobility, particularly in knowledge-intensive and technology-driven sectors [13].

In Uzbekistan, numerous studies have examined labor mobility, labor migration, employment, and human capital development. Existing research has primarily focused on labor market formation, international labor migration, household income, efficient utilization of labor resources, and regional employment policies. However, most previous studies have analyzed labor mobility from either economic or demographic perspectives, while the combined effects of human capital, regional characteristics, and migration-

related factors on household income have received relatively limited empirical attention [14].

Overall, the literature demonstrates that although the relationship between labor mobility and household income has been extensively investigated using various theoretical frameworks, most empirical studies examine domestic and foreign-earned income separately. Comprehensive analyses simultaneously evaluating the effects of human capital, regional characteristics, migration-related factors, and institutional conditions on both income sources through multivariate econometric models remain relatively scarce [15].

Against this background, the present study contributes to the literature by simultaneously estimating the effects of labor mobility determinants on both domestic and foreign-earned household income using a Multivariate Regression (MVREG) model. Furthermore, it provides a comprehensive assessment of the combined influence of human capital, regional characteristics, and migration-related factors, thereby offering evidence-based policy recommendations for improving labor market performance, enhancing regional employment policies, and increasing household welfare in Uzbekistan.

2. Methodology

This study aims to provide a comprehensive assessment of the effects of economic, demographic, institutional, and human capital factors influencing labor mobility on household income in Uzbekistan. The methodological framework is grounded in human capital theory, the neoclassical theory of labor migration, the New Economics of Labor Migration (NELM), and theories of regional economic development. These theoretical perspectives conceptualize labor mobility as a key economic mechanism shaping income dynamics and household welfare.

The empirical analysis is based on primary survey data collected from 454 respondents who had participated in domestic or international labor migration. The sample was designed to capture labor mobility characteristics, human capital indicators, and the socio-economic conditions of respondents. During the data processing stage, variables were coded and subsequently analyzed using descriptive statistics, correlation analysis, and multivariate econometric techniques.

The study employs two dependent variables: income earned abroad and income earned in Uzbekistan. The explanatory variables include computer literacy, educational attainment, foreign language proficiency, respondents' age, gender, region of residence, migration channel, duration of migration, the availability of support networks abroad, and the amount of monthly remittances. The selection of these variables is supported by the theoretical foundations of human capital and labor mobility as well as by previous empirical studies on labor migration.

To estimate the simultaneous effects of labor mobility determinants on both income measures, the study applies a Multivariate Regression (MVREG) model. Unlike the conventional Ordinary Least Squares (OLS) approach, which estimates each dependent variable separately, the MVREG framework jointly estimates multiple dependent variables while accounting for the correlation between their error terms. This approach improves estimation efficiency and provides a more comprehensive assessment of how explanatory variables simultaneously affect both domestic and foreign-earned income. Therefore, the MVREG model is considered methodologically appropriate for evaluating the economic outcomes of labor mobility.

The econometric analysis was conducted using Stata 17.0. Initially, descriptive statistics, variable distributions, and Pearson pairwise correlation coefficients were calculated to examine the characteristics of the dataset and identify potential multicollinearity. Subsequently, the statistical validity of the regression models was

evaluated using the F-statistic, the coefficient of determination (R^2), t-statistics, and p-values. The estimated coefficients were interpreted according to their magnitude, direction, and statistical significance.

The study also tested a set of research hypotheses concerning the determinants of labor mobility. In particular, hypotheses regarding the statistically significant effects of human capital indicators, migration duration, regional characteristics, and institutional conditions on household income were examined through econometric estimation. Statistical inference was performed at the 5% significance level, and hypotheses were accepted or rejected based on conventional hypothesis-testing procedures.

The proposed methodological framework enables a comprehensive evaluation of the effects of labor mobility on household income while identifying the economic significance of human capital and regional characteristics. Moreover, by simultaneously modeling two income outcomes, the MVREG approach provides a more robust assessment of the economic efficiency of labor mobility and constitutes one of the principal methodological contributions of this study.

3. Results

A reliable assessment of the impact of labor mobility on household income requires a comprehensive analysis of the interrelationships among economic, demographic, institutional, and human capital factors. Accordingly, this study considers income earned abroad and income earned within Uzbekistan as two separate outcome variables and evaluates the statistical significance of their determinants using a multivariate econometric approach. Labor mobility is conceptualized not merely as a migration process but as a complex socio-economic phenomenon that interacts with human capital, regional development, and institutional conditions [16].

To evaluate the economic outcomes of labor mobility, the study integrates theoretical perspectives with empirical evidence. Human capital theory argues that investments in education, professional skills, and digital competencies increase labor productivity and earnings. The neoclassical theory of labor migration and the New Economics of Labor Migration (NELM) explain the relationship between migration decisions and income generation. Furthermore, the core–periphery concept and regional development theories provide the theoretical foundation for examining how regional economic disparities influence the effectiveness of labor mobility [17].

Based on this theoretical framework, an econometric model was developed to test the determinants of labor mobility and their effects on household income using a Multivariate Regression (MVREG) model. The explanatory variables represent four major dimensions: human capital, demographic characteristics, regional factors, and migration-related characteristics. Testing these hypotheses makes it possible to identify the principal economic determinants of labor mobility, evaluate the mechanisms through which household income is generated, and formulate evidence-based policy recommendations for improving labor market performance.

Research Hypothesis 1 (H1)

H1: Factors influencing labor mobility—including region of residence, age, monthly remittances, gender, educational attainment, migration channel, migration duration, foreign language proficiency, computer literacy, and the availability of support networks abroad—have a statistically significant effect on migrants' income earned abroad.

Null Hypothesis ($H0_1$):

The determinants of labor mobility do not have a statistically significant effect on migrants' income earned abroad.

The first regression equation is specified as follows:

[Y_i=\beta_0+\beta_1CS_i+\beta_2REG_i+\beta_3AGE_i+\beta_4REM_i+\beta_5GEN_i+\beta_6EDU_i+\beta_7MC_i+\beta_8DUR_i+\beta_9FL_i+\beta_{10}SUP_i+\varepsilon_i]

where:

(Y) – Income earned abroad;

(CS) – Computer literacy;

(REG) – Region of residence;

(AGE) – Respondent's age;

(REM) – Monthly remittances;

(GEN) – Gender;

(EDU) – Educational attainment;

(MC) – Migration channel (method of migration);

(DUR) – Duration of employment abroad;

(FL) – Foreign language proficiency;

(SUP) – Availability of support networks abroad;

(\varepsilon) – Random error term.

Research Hypothesis 2 (H2)

H2: Factors influencing labor mobility—including region of residence, age, monthly remittances, gender, educational attainment, migration channel, migration duration, and the availability of support networks abroad—have a statistically significant effect on respondents' income earned in Uzbekistan [18].

Null Hypothesis ($H0_2$):

The determinants of labor mobility do not have a statistically significant effect on respondents' income earned in Uzbekistan.

The second regression equation is specified as follows:

[OD_i=\alpha_0+\alpha_1REG_i+\alpha_2AGE_i+\alpha_3REM_i+\alpha_4GEN_i+\alpha_5EDU_i+\alpha_6MC_i+\alpha_7DUR_i+\alpha_8SUP_i+\mu_i]

where:

(OD) – Income earned in Uzbekistan;

(\alpha_0) – Constant term;

(\alpha_1 \ldots \alpha_8) – Regression coefficients;

(\mu_i) – Random error term.

The proposed methodological framework enables a comprehensive evaluation of the economic determinants of labor mobility and their effects on both domestic and foreign-earned income. It also provides an empirical basis for assessing regional labor market transformation, reducing regional economic disparities, alleviating poverty, and promoting the efficient utilization of labor resources in line with the objectives of the Uzbekistan–2030 Strategy. Consequently, the findings contribute to the development of evidence-based recommendations for improving labor migration management, strengthening regional employment policies, and enhancing human capital development.

Additional Hypothesis 1. The Effect of Human Capital on Labor Mobility

In this study, human capital is considered one of the principal determinants of labor mobility under conditions of regional labor market transformation. Accordingly, it is hypothesized that higher levels of computer literacy, educational attainment, and foreign language proficiency enhance both the effectiveness of labor mobility and migrants' income earned abroad. This hypothesis is grounded in the Human Capital Theory developed by Schultz and Becker, which argues that investments in education and skills increase labor productivity and earnings. Therefore, the coefficients associated with these variables are expected to be positive ($\beta > 0$).

Additional Hypothesis 2. The Impact of Regional Transformation and Distance from Economic Centers

Regions differ substantially in terms of economic development, infrastructure quality, and labor market capacity. Regions located closer to major economic centers and exhibiting higher levels of economic activity are expected to provide greater labor mobility opportunities. Consequently, it is hypothesized that greater distance from economic centers is associated with lower labor mobility efficiency and lower income levels. This hypothesis is based on the Core–Periphery Theory proposed by Myrdal and Friedmann. Accordingly, respondents residing in economically advanced ("green") regions are expected to earn higher incomes than those living in relatively less-developed ("red") regions.

Additional Hypothesis 3. Regional Specialization and Income Generation

Regional economic specialization plays an important role in shaping workforce skills and migration patterns. Industrialized, service-oriented, and export-oriented regions generally develop labor resources that are more competitive in international labor markets and therefore capable of earning higher incomes abroad. Accordingly, this study hypothesizes that migrants originating from regions with higher levels of economic specialization are more likely to receive higher earnings abroad than migrants from less specialized regions. This hypothesis is supported by the theories of industrial specialization and regional clusters developed by Marshall and Porter.

Additional Hypothesis 4. The Role of Migration Infrastructure and Social Networks

Labor mobility is influenced not only by economic factors but also by institutional and social conditions. The presence of relatives, friends, or support networks abroad reduces migrants' adaptation costs and improves access to better employment opportunities. Therefore, it is hypothesized that the availability of support networks abroad and migration through formal migration channels positively affects migrants' income levels. This hypothesis is based on the New Economics of Labor Migration proposed by Stark and the International Labour Organization's principles of safe, orderly, and regular labor migration.

Additional Hypothesis 5. Labor Mobility as a Mechanism for Poverty Reduction

The final methodological hypothesis conceptualizes labor mobility as an important instrument for regional development and poverty reduction. Specifically, it is hypothesized that greater labor mobility, higher earnings abroad, and increased remittance inflows contribute to higher household income, reduce poverty, and narrow regional economic disparities. This hypothesis is consistent with the frameworks of inclusive economic growth and sustainable development promoted by the International Labour Organization (ILO), the World Bank, and the United Nations Development Programme (UNDP). Within the econometric model, the coefficients associated with monthly remittances and migration duration are expected to be positive ($\beta > 0$), reflecting the economic benefits generated through labor mobility..

Table 1. Expected Results

Variable	Expected Direction of Effect
Computer literacy	+
Educational attainment	+
Foreign language proficiency	+
Monthly remittances	+
Migration duration	+
Availability of support networks abroad	+
Formal migration channels	+
Distance from economic centers	–
Residence in less-developed ("red") regions	–
Level of regional economic specialization	+

The proposed research hypotheses strengthen the methodological contribution of this study by integrating human capital, regional transformation, migration infrastructure, and poverty reduction mechanisms into a unified conceptual framework. This integrated approach provides a comprehensive explanation of how labor mobility influences household income under conditions of regional labor market transformation.

The empirical analysis was conducted using Stata 17.0, through which several new findings regarding the determinants of labor mobility were identified. The application of the Multivariate Regression (MVREG) model was motivated by the need to estimate simultaneously the determinants of income earned abroad and income earned within Uzbekistan, two interrelated outcome variables resulting from labor mobility. Unlike the conventional Ordinary Least Squares (OLS) approach, which estimates each dependent variable separately, the MVREG framework allows the simultaneous estimation of multiple equations while accounting for the correlation between their disturbance terms. This approach improves estimation efficiency and provides a more comprehensive understanding of how common explanatory variables influence both income outcomes.

Given that this study focuses on regional labor market transformation and the enhancement of labor mobility, it is methodologically appropriate to analyze foreign-earned and domestic income as components of a unified economic system rather than as independent outcomes. Such an approach makes it possible to capture the multidimensional economic consequences of labor mobility more accurately.

The explanatory variables incorporated into the model—including computer literacy, region of residence, age, monthly remittances, gender, educational attainment, migration channel, migration duration, foreign language proficiency, and the availability of support networks abroad—were selected based on the theoretical foundations of Human Capital Theory (Becker, 1964), the Neoclassical Theory of Labor Migration (Harris & Todaro, 1970), the New Economics of Labor Migration (Stark, 1991), and the labor mobility framework developed by the International Labour Organization (ILO). This theoretical foundation enables a comprehensive assessment of the determinants of labor mobility, the evaluation of regional disparities, and the formulation of evidence-based recommendations aimed at reducing poverty and promoting productive employment in accordance with the objectives of the Uzbekistan–2030 Strategy.

The descriptive statistics of the coded variables provide important insights into the demographic and human capital characteristics of the respondents. Female respondents

accounted for 18.5% of the sample, indicating that male participation in labor migration remains substantially higher. The average value of the educational attainment variable was 0.978, suggesting that most respondents possessed at least a bachelor's degree or another form of higher education. Furthermore, the mean values for foreign language proficiency (1.101) and computer literacy (0.934) indicate relatively high levels of human capital among the respondents. These findings support the hypothesis that investments in education, digital competencies, and language skills constitute important determinants of labor mobility and contribute positively to migrants' income-generating capacity.

Overall, the descriptive evidence provides preliminary support for the theoretical assumptions underlying the econometric model. The relatively high levels of education, digital literacy, and language proficiency observed among respondents suggest that human capital plays a critical role in facilitating successful labor mobility and improving household income. These findings establish a strong empirical foundation for the subsequent multivariate regression analysis, which examines the statistical significance and magnitude of the relationships between labor mobility determinants and income outcomes.

Table 2. Description of the Variables Recoded for Analysis in Stata 17.0

Variable	0	1	2
Gender	Male	Female	—
Educational attainment	College	Bachelor's degree	Higher education (Master's/Doctoral)
Migration channel	Individual migration	Migration Agency (TMMA)	Private employment agency
Migration duration	3–12 months	More than 1 year	More than 3 years
Foreign language proficiency	Low	Intermediate	High
Computer literacy	Low	Intermediate	High
Support network abroad	Not available	Available	—

The mean value for the migration channel variable was 0.868, indicating that the majority of respondents obtained employment abroad either independently or through institutional support mechanisms. Meanwhile, the availability of support networks abroad had a mean value of 0.326, implying that only 32.6% of respondents had access to assistance from relatives or acquaintances in the destination country. This finding suggests that, under conditions of regional labor market transformation, greater emphasis should be placed on strengthening information services, foreign language training, and institutional support mechanisms to facilitate migrants' successful integration into international labor markets.

The results presented in Table 3 describe the socioeconomic characteristics of respondents participating in labor migration and labor mobility. The survey included 454 respondents, whose average income earned abroad amounted to 762.1 units, compared with an average domestic income of 633.5 units. Thus, foreign-earned income exceeded domestic income by 128.6 units, representing an increase of approximately 20.3%. These findings provide preliminary evidence that international labor mobility generates substantial income gains for migrant households and contributes positively to household

welfare. Such differences further support the hypothesis that labor migration serves as an important mechanism for improving household income and enhancing economic well-being.

Table 3. Descriptive Statistical Analysis of the Study Variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
Income earned abroad	454	762.115	267.390	200	1000
Income earned in Uzbekistan	454	633.480	507.452	200	1400
Computer literacy	454	0.934	0.797	0	2
Region of residence	454	8.590	4.488	1	14
Age	454	33.304	5.113	25	50
Monthly remittances	452	1,597.345	1,115.022	0	3,000
Gender	454	0.185	0.389	0	1
Educational attainment	454	0.978	0.718	0	2
Migration channel	454	0.868	0.540	0	2
Migration duration	454	1.004	0.719	0	2
Foreign language proficiency	454	1.101	0.640	0	2
Availability of support networks abroad	454	0.326	0.469	0	1

These findings confirm that economic incentives constitute a major driving force behind the international mobility of labor resources. The average age of the respondents was 33.3 years, indicating that labor migration is primarily undertaken by individuals of economically active working age. The average value of monthly remittances amounted to 1,597.3 units, suggesting that citizens employed abroad make a substantial contribution to both household income and the national economy through remittance transfers. Furthermore, the mean value of the region of residence variable (8.59) indicates that the survey sample adequately represents respondents from different regions of Uzbekistan, thereby enhancing the geographical representativeness of the empirical analysis.

Figure 1 presents the diagnostic distribution of the migration channel variable. As illustrated by the histogram, the majority of observations are concentrated in Category 1, whereas Categories 0 and 2 account for a relatively smaller proportion of the sample. The Normal Quantile–Quantile (Q–Q) plot further shows that the observations do not closely follow the reference line and instead exhibit a stepwise pattern. This finding indicates that the migration channel variable does not follow a normal distribution. Such a distribution is expected because the variable is categorical (ordinal) rather than continuous. Consequently, the observed non-normality does not constitute a methodological concern for the estimation procedure employed in this study, as the MVREG model does not require categorical explanatory variables to satisfy the normality assumption. The variable can therefore be appropriately incorporated into the econometric model using its coded categorical values.

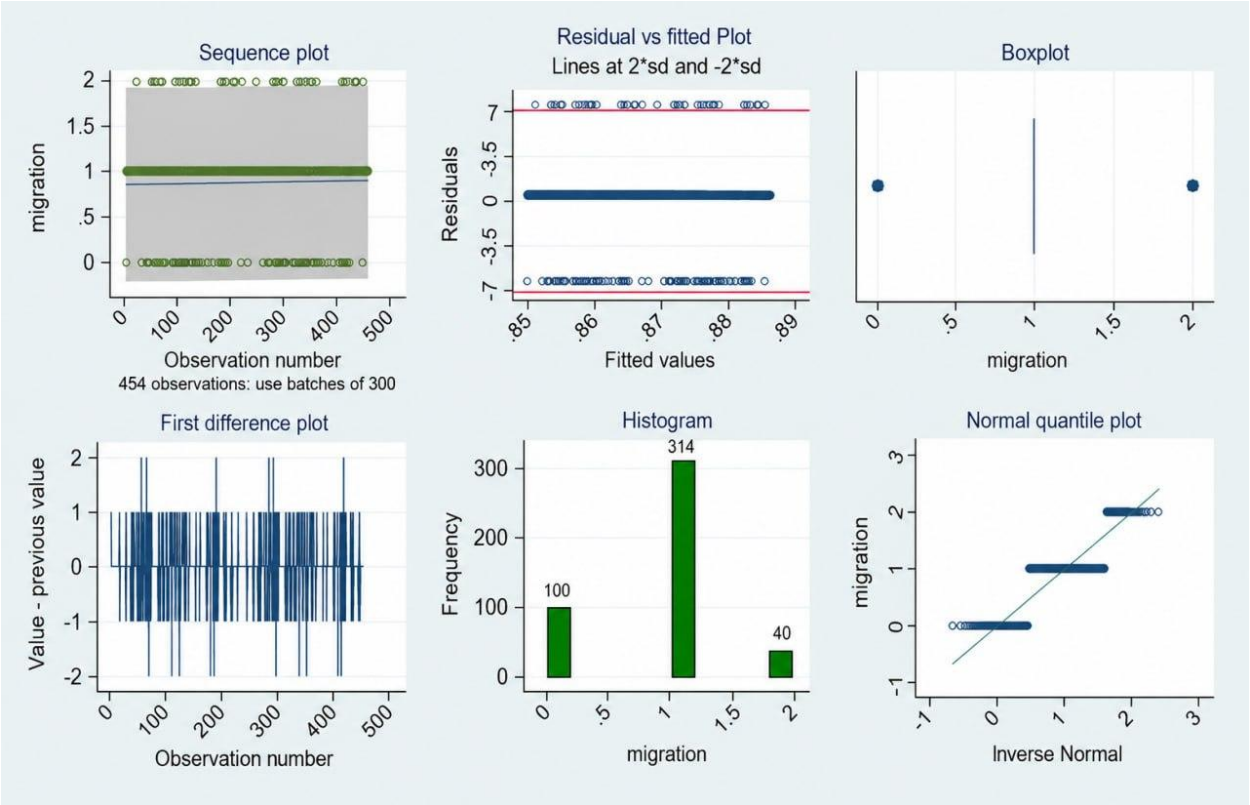


Figure 1. Diagnostic Graphs of the Distribution of the Migration Channel Variable

This finding is expected because the migration channel variable is not continuous but rather a categorical variable with three categories (0 = Individual migration, 1 = Migration Agency (TMMA), and 2 = Private employment agency). The boxplot also demonstrates that observations are concentrated at only a few discrete values, reflecting the categorical nature of the variable. Consequently, the assumption of normality is not satisfied for this variable. Therefore, from a methodological perspective, econometric models designed for categorical dependent variables—such as logit, probit, or multinomial logit models—would generally be more appropriate than the conventional Ordinary Least Squares (OLS) regression when the migration channel itself is specified as the dependent variable. In the present study, however, the migration channel serves as an explanatory variable within the MVREG framework, and its categorical coding does not violate the assumptions of the estimated model.

The pairwise correlation analysis provides important insights into the relationships among the factors influencing labor mobility. In particular, income earned abroad exhibits a positive and statistically significant correlation with computer literacy ($r = 0.208$, $p < 0.01$), monthly remittances ($r = 0.191$, $p < 0.01$), and educational attainment ($r = 0.253$, $p < 0.01$). These findings indicate that individuals possessing higher levels of human capital are more likely to obtain higher earnings in international labor markets, thereby supporting the predictions of Human Capital Theory.

Conversely, a weak but statistically significant negative correlation was observed between income earned abroad and income earned within Uzbekistan ($r = –0.149$, $p < 0.10$). This result suggests that individuals with relatively lower domestic earnings are more likely to participate in international labor migration in search of better economic opportunities. Furthermore, the relatively strong positive correlation between educational attainment and computer literacy ($r = 0.286$, $p < 0.01$) confirms the close relationship between educational achievement and digital competencies in the contemporary labor market. These findings further emphasize the complementary role of education and digital

skills in enhancing labor market competitiveness and increasing the economic returns to labor mobility.

Table 4. Pearson Pairwise Correlation Analysis Results

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Income Earned Abroad	1.000							
(2) Uzb_income	-0.149*	1.000						
	(0.001)							
(3) Comp_literacy	0.208*	-0.095*	1.000					
	(0.000)	(0.043)						
(4) Region	-0.055	-0.046	-0.006	1.000				
	(0.243)	(0.331)	(0.903)					
(5) Age	-0.024	0.075	-0.087	0.069	1.000			
	(0.603)	(0.112)	(0.064)	(0.144)				
(6) Monthly_remittances	0.191*	-0.066	-0.014	-0.145*	-0.083	1.000		
	(0.000)	(0.163)	(0.764)	(0.002)	(0.077)			
(7) Gender	-0.026	0.157*	-0.025	0.327*	0.069	-0.283*	1.000	
	(0.583)	(0.001)	(0.602)	(0.000)	(0.140)	(0.000)		
(8) Educational_attainment	0.253*	-0.168*	0.286*	0.109*	-0.118*	-0.011	0.109*	1.000
	(0.000)	(0.000)	(0.000)	(0.020)	(0.012)	(0.814)	(0.020)	
(9) Migration_channel	0.008	-0.013	0.031	-0.181*	-0.065	0.076	-0.030	0.015
	(0.864)	(0.785)	(0.511)	(0.000)	(0.164)	(0.105)	(0.517)	(0.746)
(10) Availability of Support Networks Abroad	-0.014	-0.109*	-0.066	0.168*	-0.045	0.037	0.201*	0.008
	(0.767)	(0.020)	(0.159)	(0.000)	(0.338)	(0.429)	(0.000)	(0.861)

*** *p<0.01*, ** *p<0.05*, * *p<0.1*

According to the correlation analysis, a statistically significant negative relationship was found between the migration channel and region of residence ($r = –0.181$, $p < 0.01$), indicating that regional characteristics influence migrants' choice of migration channels. Furthermore, the availability of support networks abroad was positively correlated with both region of residence ($r = 0.168$, $p < 0.01$) and gender ($r = 0.201$, $p < 0.01$). In addition, the negative correlation between gender and monthly remittances ($r = –0.283$, $p < 0.01$) suggests that there are significant differences between male and female migrants in the amount of remittances sent to their households (Table 5).

To examine the determinants of labor mobility, a multivariate regression (MVREG) model was estimated for two dependent variables: income earned abroad and income earned in Uzbekistan. In general form, the estimated models can be expressed as follows:

For the first model, the coefficient of determination was $R^2 = 0.3112$, indicating that 31.1% of the variation in income earned abroad is explained by the explanatory variables included in the model. For the second model, the coefficient of determination was $R^2 =$

0.1793, implying that 17.9% of the variation in income earned in Uzbekistan is explained by the selected explanatory variables. Although the explanatory power differs between the two equations, both models provide meaningful evidence regarding the determinants of household income.

The F-statistics for both regression models were highly significant ($p < 0.001$), confirming that the models are jointly statistically significant and provide an adequate overall fit to the observed data. These results indicate that the selected economic, demographic, institutional, and human capital variables jointly explain a substantial proportion of the variation in household income and therefore provide a reliable empirical basis for evaluating the economic effects of labor mobility in Uzbekistan.

Table 5. Results of the Multivariate Regression Model

Equation	Obs	Parms	RMSE	"R-sq"	F	P>F
Income abroad	452	25	228.1743	0.3112	8.037905	0.0000
Income in Uzbekistan	452	25	473.4223	0.1793	3.887712	0.0000

	Coefficient	Std.err.	t	P>t	[95%conf.interval]	
Income abroad						
Comp_literacy	52.869	15.019	3.520	0.000	23.349	82.390
Region						
Bukara	-24.944	64.916	-0.380	0.701	-152.538	102.650
Fergana	-74.756	59.511	-1.260	0.210	-191.726	42.215
Jizzakh	-158.229	58.348	-2.710	0.007	-272.913	-43.545
Namangan	-106.774	52.728	-2.020	0.043	-210.412	-3.135
Navoi	37.603	104.151	0.360	0.718	-167.110	242.316
Kashqadarya	-255.065	68.612	-3.720	0.000	-389.923	-120.206
Koraqalpk	-74.489	170.743	-0.440	0.663	-410.089	261.112
SamarKand	-250.361	51.198	-4.890	0.000	-350.993	-149.730
Sirdarya	-7.972	61.989	-0.130	0.898	-129.813	113.868
Surkhandarya	-338.150	73.775	-4.580	0.000	-483.157	-193.142
Tashkent	-38.726	46.453	-0.830	0.405	-130.031	52.579
Xorezm	-159.186	58.444	-2.720	0.007	-274.060	-44.312
Age	-1.524	2.271	-0.670	0.503	-5.989	2.940
Remit_monthy	0.049	0.011	4.540	0.000	0.028	0.070
1.gender	-27.849	33.183	-0.840	0.402	-93.072	37.374
edu_lvl	63.509	16.741	3.790	0.000	30.605	96.414
migr						
1	-54.733	29.228	-1.870	0.062	-112.182	2.716
2	-54.582	46.306	-1.180	0.239	-145.597	36.433
dur.						
1	166.112	28.211	5.890	0.000	110.662	221.561

2	53.436	33.056	1.620	0.107	-11.537	118.409
Lang_prof.						
1	30.375	32.523	0.930	0.351	-33.549	94.299
2	-49.393	38.861	-1.270	0.204	-125.776	26.989
1. Support_abroad	-4.791	25.007	-0.190	0.848	-53.943	44.362
_cons	672.370	95.101	7.070	0.000	485.445	859.295
Income in Uzbekistan						
Comp_literacy	-52.316	31.162	-1.680	0.094	-113.566	8.933
Region						
Bukara	15.221	134.689	0.110	0.910	-249.515	279.957
Fergana	17.146	123.475	0.140	0.890	-225.547	259.840
Jizzakh	320.985	121.061	2.650	0.008	83.035	558.936
Namangan	239.774	109.402	2.190	0.029	24.741	454.806
Navoi	-297.255	216.096	-1.380	0.170	-722.000	127.489
Kashqadarya	-67.540	142.357	-0.470	0.635	-347.348	212.269
Koraqalpk	764.229	354.261	2.160	0.032	67.916	1460.542
SamarKand	-111.074	106.227	-1.050	0.296	-319.867	97.719
Sirdarya	113.941	128.616	0.890	0.376	-138.858	366.740
Surkhandarya	255.052	153.071	1.670	0.096	-45.814	555.918
Tashkent	-38.264	96.382	-0.400	0.692	-227.706	151.178
Xorezm	4.679	121.262	0.040	0.969	-233.665	243.023
Age	-0.404	4.713	-0.090	0.932	-9.668	8.859
Remit_monthy	-0.018	0.022	-0.820	0.413	-0.062	0.026
1.gender	310.801	68.850	4.510	0.000	175.474	446.128
edu_lvl	-118.709	34.734	-3.420	0.001	-186.981	-50.438
migr						
1	-77.732	60.643	-1.280	0.201	-196.929	41.465
2	-13.423	96.076	-0.140	0.889	-202.264	175.417
dur.						
1	177.478	58.533	3.030	0.003	62.430	292.527
2	110.166	68.585	1.610	0.109	-24.642	244.973
Lang_prof.						
1	17.367	67.479	0.260	0.797	-115.264	149.999
2	46.867	80.630	0.580	0.561	-111.615	205.348
1. Support_abroad	-145.860	51.885	-2.810	0.005	-247.843	-43.877
_cons	716.869	197.319	3.630	0.000	329.032	1104.706

$$Income\ abroad = 672.370 + 52.869 Comp_lit - 1.524 Age + 0.049 Remit_monthly + 63.509 Edu_lvl + \sum \beta_k Region + \sum \gamma_j Other_factors + \varepsilon_i$$

$$Income\ in\ Uzbekistan = 716.869 - 52.316 Comp_lit - 0.404 Age - 0.018 Remit_monthly - 118.709 Edu_lvl + \sum \beta_k Region + \sum \gamma_j Other_factors + \varepsilon_i$$

The regression results indicate that computer literacy and educational attainment are significant determinants of income earned abroad. Specifically, a one-unit increase in computer literacy is associated with an average increase of 52.9 units in foreign-earned income ($\beta = 52.869$, $p < 0.001$). Similarly, a one-level increase in educational attainment raises foreign income by approximately 63.5 units ($\beta = 63.509$, $p < 0.001$). These findings provide strong empirical support for Human Capital Theory, suggesting that migrants with higher levels of education and digital competencies are more competitive in international labor markets and are therefore more likely to obtain higher-paying jobs. Furthermore, monthly remittances exert a positive and statistically significant effect on foreign-earned income, with each additional unit of remittances corresponding to an average increase of 0.049 units in income ($\beta = 0.049$, $p < 0.001$). Likewise, respondents with more than one year of migration experience earn, on average, 166.1 units more than those in the reference category ($\beta = 166.112$, $p < 0.001$), indicating that longer migration experience enhances migrants' earning potential through improved labor market integration and accumulated work experience.

Regional characteristics also have a substantial influence on income earned abroad. Using Andijan Region as the reference category, respondents from Kashkadarya ($\beta = -255.065$, $p < 0.001$), Samarkand ($\beta = -250.361$, $p < 0.001$), Surkhandarya ($\beta = -338.150$, $p < 0.001$), Jizzakh ($\beta = -158.229$, $p = 0.007$), Namangan ($\beta = -106.774$, $p = 0.043$), and Khorezm ($\beta = -159.186$, $p = 0.007$) reported significantly lower foreign earnings than migrants from the reference region. These regional disparities may reflect differences in economic development, access to international labor markets, migration networks, and the skill composition of the labor force across regions. By contrast, age, gender, foreign language proficiency, and the availability of support networks abroad did not exhibit statistically significant effects on foreign-earned income.

A different pattern emerges in the model explaining income earned in Uzbekistan. Gender is a significant determinant of domestic earnings, with female respondents earning, on average, 310.8 units more than the reference category ($\beta = 310.801$, $p < 0.001$). In contrast, educational attainment is negatively associated with domestic income; a one-level increase in education reduces domestic earnings by approximately 118.7 units ($\beta = -118.709$, $p = 0.001$). This finding may indicate that highly educated individuals are more likely to seek employment in international labor markets because domestic employment opportunities do not adequately compensate their qualifications. In addition, the availability of support networks abroad reduces domestic income by approximately 145.9 units ($\beta = -145.860$, $p = 0.005$), suggesting that individuals with stronger migration networks are less dependent on the domestic labor market due to greater access to employment opportunities abroad. Regional analysis further reveals that respondents from Jizzakh ($\beta = 320.985$, $p = 0.008$), Namangan ($\beta = 239.774$, $p = 0.029$), and the Republic of Karakalpakstan ($\beta = 764.229$, $p = 0.032$) reported significantly higher domestic incomes than those in the reference region.

The empirical findings demonstrate substantial regional disparities in both labor mobility and income levels across Uzbekistan. In several regions, migrants earn significantly lower incomes abroad than those from the reference region, which may be attributed to differences in regional infrastructure, access to labor market information, migration networks, and local labor market conditions. These results underscore the importance of implementing differentiated regional labor market policies. In line with the

objectives of the Uzbekistan–2030 Strategy, strengthening both internal and international labor mobility, directing labor resources toward regions with higher labor demand, and improving regional employment programs are essential for reducing regional economic disparities. Such measures would contribute to more efficient utilization of labor resources and help alleviate regional poverty.

Finally, labor migration should be viewed not only as an economic phenomenon but also as an important issue of social protection and human rights. Although the empirical results indicate that migrants employed abroad earn substantially higher incomes, ensuring adequate labor rights, social insurance coverage, and legal protection for migrant workers remains a critical policy priority. Therefore, expanding legal advisory services for migrant workers, ensuring the legality and transparency of employment contracts, strengthening migrant support centers within diplomatic missions, and promoting compliance with international labor standards are essential measures for improving the welfare and protection of Uzbek migrant workers abroad.

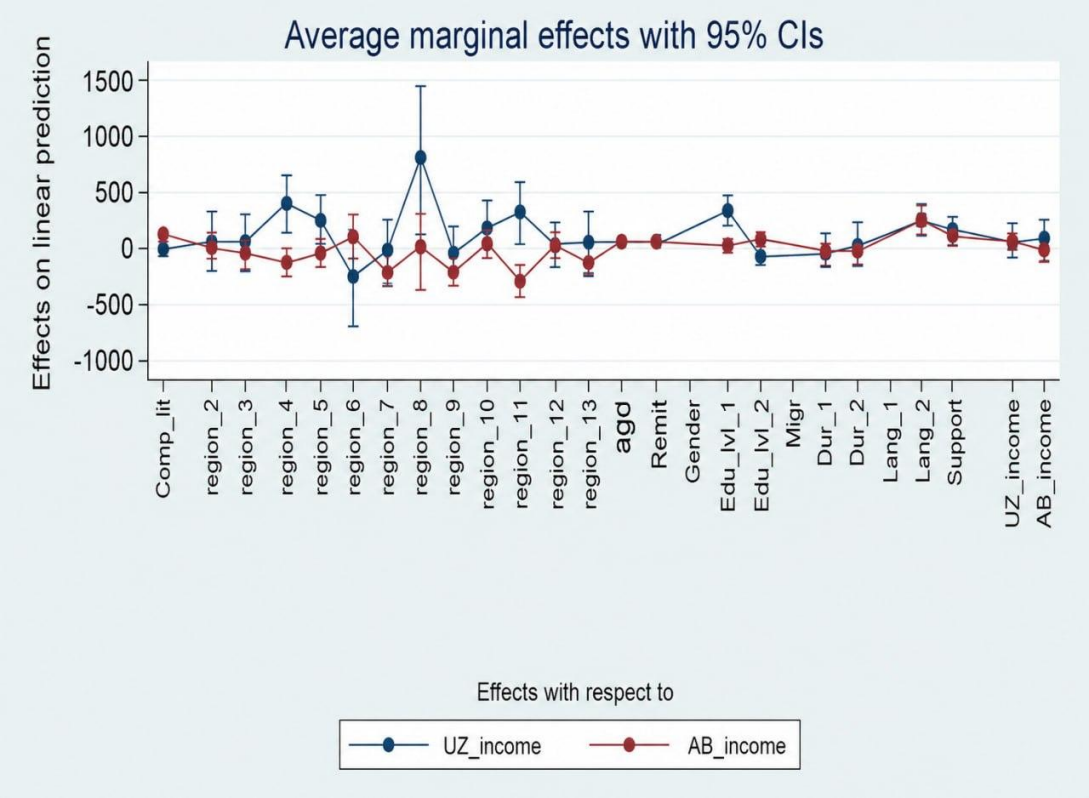


Figure 2. Average Marginal Effects of the Factors Influencing Labor Mobility

The average marginal effects and the regional distribution analysis demonstrate that regional characteristics play a crucial role in shaping labor mobility and income formation. As illustrated in Figure 2, the magnitude of the estimated marginal effects varies considerably across regions. In particular, the Republic of Karakalpakstan (Region 8) and several other regions exhibit relatively wide confidence intervals, which are primarily attributable to the limited number of observations available for these regions. According to the regional distribution of respondents, the largest share of the sample originates from Tashkent City and Tashkent Region (31.72%), followed by Samarkand Region (11.45%) and Namangan Region (9.69%). By contrast, Navoi Region (1.32%) and the Republic of Karakalpakstan (0.44%) are underrepresented, suggesting that future studies should increase the number of observations from these regions to improve the robustness and representativeness of empirical estimates.

The regression analysis provides partial support for the proposed hypotheses regarding the relationship between human capital and labor mobility. In the model explaining income earned abroad, both computer literacy ($\beta = 52.869$, $p < 0.001$) and educational attainment ($\beta = 63.509$, $p < 0.001$) exert positive and statistically significant effects, thereby confirming Hypothesis H1, which is grounded in Human Capital Theory. Similarly, respondents with more than one year of migration experience earned, on average, 166.1 units more than those in the reference category ($\beta = 166.112$, $p < 0.001$), supporting the proposition that work experience and successful adaptation to foreign labor markets enhance migrants' earning capacity. Furthermore, the positive effect of monthly remittances ($\beta = 0.049$, $p < 0.001$) supports the hypothesis that labor mobility contributes to greater economic well-being by increasing household income. The finding that respondents from Jizzakh, Namangan, Kashkadarya, Samarkand, Surkhandarya, and Khorezm earned significantly lower incomes abroad than those from the reference region also provides partial support for the core–periphery hypothesis, suggesting that regional disparities influence the economic outcomes of labor mobility.

Nevertheless, several hypotheses were not fully supported by the empirical evidence. In particular, foreign language proficiency, migration channel, and the availability of support networks abroad did not have statistically significant effects on income earned abroad ($p > 0.05$). Consequently, the hypothesis that migration infrastructure and social networks directly increase migrants' earnings was not confirmed in the estimated model. In contrast, the model explaining income earned in Uzbekistan identified gender ($\beta = 310.801$, $p < 0.001$), migration experience ($\beta = 177.479$, $p = 0.003$), and several regional variables (Jizzakh, Namangan, and the Republic of Karakalpakstan) as statistically significant determinants of domestic income. Moreover, the negative coefficient associated with educational attainment ($\beta = -118.709$, $p = 0.001$) suggests that highly qualified individuals are more likely to participate in international rather than domestic labor markets. Overall, the regression results confirm that human capital, migration experience, and regional characteristics constitute the principal determinants of labor mobility and income, whereas the hypothesized effects of foreign language proficiency and support networks abroad were not statistically validated.

The analysis of average marginal effects further demonstrates that differences in regional labor market development, employment opportunities, and migration infrastructure have a direct influence on income formation. These findings highlight the importance of reducing regional disparities, facilitating the free movement of labor resources, and strengthening labor mobility as key policy priorities under the Uzbekistan–2030 Strategy. Such measures are expected to improve labor market efficiency, enhance household welfare, and promote more balanced regional economic development.

The forecasting scenarios incorporated into the analysis assume the following macroeconomic outcomes by 2030:

1. A reduction in the poverty rate to approximately 1.0%;
2. A decline in the unemployment rate to 4.5%;
3. Sustained growth in real wages;
4. Continued expansion of investment activity; and
5. An increase in the number of newly created jobs.

Table 6. Forecast of the Labor Migration Index (2025=100)

Yil	Indeks
2025	100,0 (this year’s condition)
2026	94,6
2027	87,9
2028	80,3

2029	72,8
2030	63,5

According to the forecasting results, the labor migration index is projected to decline by 36.5% by 2030 compared with its 2025 level. This projected reduction is expected to be driven primarily by sustained growth in household income and a decline in the poverty rate to approximately 1.0%.

The econometric analysis identified wages, poverty, and unemployment as the principal determinants of labor migration. The estimated model explains approximately 87.3% of the variation in labor migration, indicating a high degree of explanatory power and strong overall statistical significance.

The forecasting results further suggest that increasing household incomes, expanding investment activity, creating new employment opportunities, and reducing the poverty rate to 1.0% by 2030 could reduce the volume of external labor migration by approximately 36–37%. Such a transformation would facilitate the transition of labor migration from a necessity-driven economic survival strategy toward a highly skilled, opportunity-driven, and voluntary form of labor mobility

4. Conclusion

This study comprehensively assessed the effects of economic, demographic, institutional, and human capital factors on household income through an econometric analysis of labor mobility. The outcomes of labor mobility were examined simultaneously for income earned abroad and income earned in Uzbekistan, enabling the identification of the principal determinants influencing both income sources. Consequently, labor mobility was conceptualized not merely as a migration process but as a multidimensional socioeconomic phenomenon closely linked to human capital development, regional development, and economic welfare.

The results of the Multivariate Regression (MVREG) model confirmed that human capital constitutes one of the most important determinants of the economic returns to labor mobility. In particular, the statistically significant positive effects of computer literacy and educational attainment demonstrate that individuals possessing stronger educational backgrounds and digital competencies are more likely to obtain higher earnings in international labor markets. These findings provide further empirical support for Human Capital Theory and underscore the strategic importance of education and digital skills in enhancing labor market competitiveness.

The empirical analysis also revealed that migration experience and remittance inflows positively influence the economic outcomes of labor mobility. Migrants with longer work experience abroad tend to earn higher incomes due to improved labor market integration, accumulated professional experience, and greater productivity. Moreover, remittances constitute an important source of household income, supporting consumption, improving living standards, and contributing to overall household welfare.

The study further demonstrates that regional characteristics play a significant role in shaping household income. The relatively lower foreign earnings observed in several regions can be attributed to regional disparities in labor force qualifications, infrastructure, access to labor market information, and employment opportunities. These findings indicate that regional labor market policies should be designed with careful consideration of each region's economic potential and labor force characteristics.

At the same time, several theoretical hypotheses were not fully supported by the empirical evidence. Specifically, foreign language proficiency and the availability of support networks abroad did not exert statistically significant effects on foreign-earned

income. This finding suggests that migrants' earnings depend not only on individual characteristics but also on additional factors, including labor market conditions in destination countries, occupational demand, employment conditions, and the institutional environment.

One of the principal scientific contributions of this research lies in the application of a Multivariate Regression (MVREG) model that simultaneously evaluates the effects of explanatory variables on both foreign and domestic income. This methodological approach makes it possible to analyze the economic determinants of labor mobility comprehensively, compare their impacts across multiple outcome variables, and provide a stronger empirical foundation for labor market policy formulation. Accordingly, the study contributes both methodological innovation and practical policy relevance.

Based on the empirical findings, the following policy recommendations are proposed:

a. Strengthen human capital development by improving the quality of education in digital competencies, information technologies, and foreign languages;
b. Expand short-term vocational education and retraining programs targeting occupations with high demand in international labor markets;
c. Develop professional certification systems and internationally recognized skills assessment mechanisms in regions characterized by high labor migration;
d. Broaden formal labor migration channels, improve the effectiveness of private employment agencies, and enhance legal, informational, and consulting services for migrant workers;
e. Reduce the economic drivers of forced labor migration by attracting investment, promoting high value-added industries, and creating new employment opportunities in regions with relatively low labor mobility;
f. Establish a unified digital monitoring system for labor mobility and strengthen the integration of administrative databases across government institutions.

The forecasting analysis indicates that gradually increasing household incomes, expanding employment opportunities, attracting investment, and reducing poverty can substantially decrease the scale of external labor migration over time. Such developments would facilitate the transition from necessity-driven migration toward highly skilled, competitive, and opportunity-based labor mobility.

Overall, the findings demonstrate that effective labor mobility management requires close coordination among employment policy, human capital development, regional economic policy, and household income strategies. Promoting efficient labor mobility, reducing regional economic disparities, and increasing investment in human capital will contribute to improving household welfare while supporting the achievement of the strategic objectives established under Uzbekistan–2030.

Future research should employ panel data techniques, examine the dynamic evolution of labor mobility over time, conduct cross-country comparative analyses, and utilize artificial intelligence (AI) and Big Data technologies to improve labor market forecasting. These approaches would further strengthen the methodological foundations of labor mobility research and support more evidence-based policy development.

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