ECONOMIC PUSH FACTORS OF MIGRATION IN UZBEKISTAN

Tolipova Noilakhon Nodir qizi.

Key words: *GDP per capita, LFPR , unemployment, inflation, the rate of tertiary education, ARDLmodel Remittances, migration*

Abstract

Globally, migration is a phenomenon influenced by social, political, cultural, environmental, health, education, and transportation considerations in addition to economic ones. It frequently occurs as a result of pull influences from more developed locations as well as push factors, such as the socioeconomic situation's . A number of researchers believe that migration is a method of improving life, improving education and the quality of health services received through material well-being. Other scientists argue that the psychological trauma of separation from parents has a negative impact on the academic performance of the child and contributes to a decrease in social intelligence and victimization of children, as well as the loss of health of the migrant. Thus, migration processes need to be scientifically researched in order to regulate pros and cons of migration at the international level. To conduct research on this issue, it becomes relevant to identify factors that affect migration in general. Economic, political, cultural, and environmental push and pull factors are influences that can either compel individuals to migrate to a new site or compel them to vacate their current residences. Push factors pertain to the nation from which a person migrates and are conditions that can cause people to leave their homes. The purpose of this work is to contribute to the process of regulating migration by identifying economic push factors of migration in Uzbekistan by using ARDL with error correction model.

Introduction

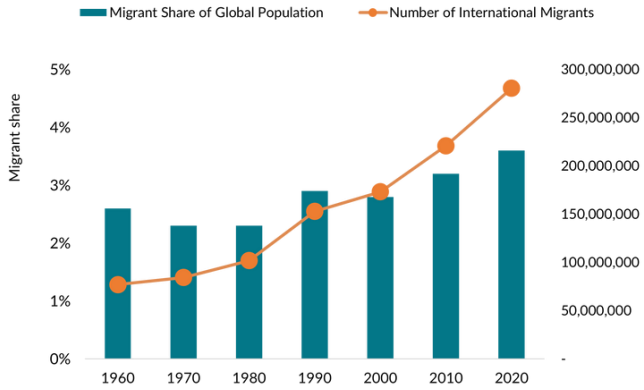
At all times humanity has strived to improve the quality of their lives. If this action could not be carried out at the place of residence, people changed their place of residence. Despite the fact that migration is one of the oldest ways of fighting against poverty, in modern society this action does not lose its relevance and remains the object of research by scientists.

Migration is the process of moving people due to a change of residence for a temporary or permanent period. Distinguish between national and international migration. A person who relocates across an international boundary, either temporarily or permanently, for a period of more than one year, from their regular domicile is referred to as an international migrant. The entire number of foreign nationals residing in a specific nation at any one moment is referred to as the international migrant population (more technically known as the international migrant stock). The amount of international migrants entering or departing a country at a certain period is described by migrant flow data, which is occasionally collected by governments and international organizations.

Migration situation worldwide

Today, millions of people leave their homes to migrate to other countries and cities. Moving for work or study is more frequent and feasible than in the past, and due to technology, it has become significantly simpler to stay in touch with family members, send remittances home and contribute in the political, economic, and cultural life of the nation of origin. As a result, during the past few decades, international migration has seen sharp increase worldwide. Stated that people do not often cross international borders in reaction to their individual interests. Events like public health emergencies, international or regional military conflicts, and economic shocks greatly influence the number of individuals who migrate.

The most recent reports confirm that there will be 280.6 million international migrants in 2020, or about 4% of the 7.8 billion people in the world. Nearly 60 million additional individuals have become international migrants, comparatively to previous decade only. Labor or family migration has contributed significantly to this growth.



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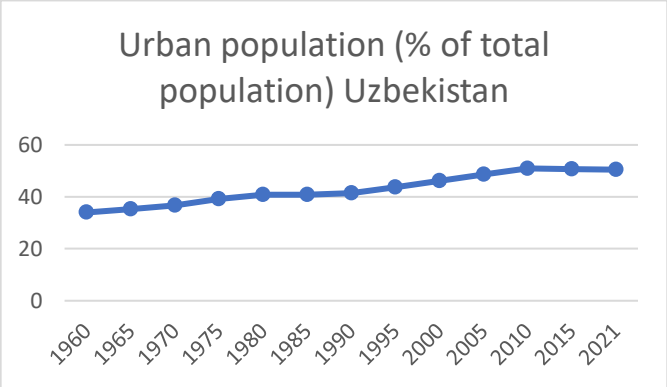
Migration is a critical issue for Uzbekistan, as a significant number of its active population is engaged in labour migration abroad. The country is also experiencing a high level of internal migration from rural to urban areas for employment and educational reasons1. The International Organization for Migration (IOM) assists and strengthens Uzbekistan's health system by enabling it to deliver migrant inclusive health services that are accessible to migrants and vulnerable populations by supporting the training of health and non-workers on the provision of migrant-sensitive health services. However the issue of migration is not deeply studied in Uzbekistan, which creates as a reason to investigate in migration issue in Uzbekistan.

Literature review

Migration situation in Uzbekistan

In Uzbekistan, in recent years, there has been a sharp internal migration due to the urbanization of the population. (Juraev, 2012) In 2000, the percentage of urban and rural population was 37.4% to 62.6%. In 2022, the urban population increased from

37.4% to 50.9%. The high unemployment rate in the rural area is forcing people to move to the cities in search of work and education. 72% of the unemployed are in the rural area. Of these, 94.5% do not have higher education. In fact, the situations even worse, since not all people apply to labor exchanges in search of work and therefore are not counted as unemployed. (THE STATE COMMITTEE OF THE REPUBLIC OF UZBEKISTAN ON STATISTICS, 2021)



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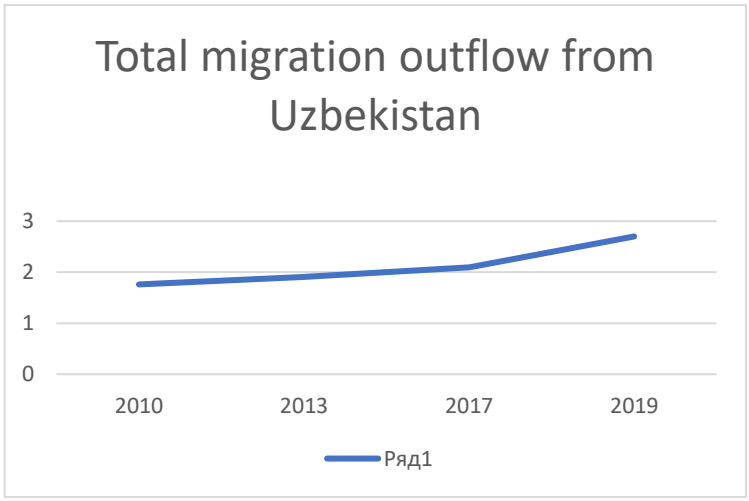
Between the lack of structural reforms to boost employment and investment, the country's real GDP growth started to slow down in 2010–2015. At this point, migrant networks had already developed abroad (particularly in Russia and Kazakhstan), greatly assisting new labor migrants in finding employment and increasing their number.

The World Bank estimates that between 2010 and 2017, there were 17.5% more migrants living abroad than there were between 2000 and 2010 (during that period, the number of migrants increased by 5.8% during a ten-year period). (Juraev, 2021)

80 to 90% of the migrant workers from other countries are men. Male labor migrants are more likely to come from rural areas than female migrants, who are more likely to come from urban areas (their higher level of education and language proficiency allows them to work in the service sector). There are much more migrants, both male and female, with families and young children.



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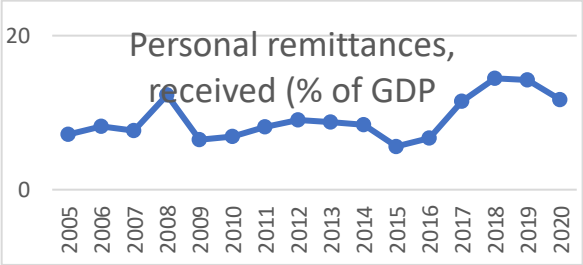
Remittances flow in to Uzbekistan

Remittances, or payments made by migrants to their relatives back home, can help people stay out of poverty, get through short-term financial or health crises, or pay for their kids' education. Remittances can be a significant source of funding for national infrastructure, health, and education programs. Remittances are greater than official development assistance and foreign direct investment combined for low- and middle-income nations. Remittances through legal ways totaled $702 billion for 2020, of which $539 billion went to low- and middle-income countries. (Juraev, 2021)

In the former USSR, Uzbekistan is both the most populous and the main source of migrant workers. The main countries for the seasonal labor movement of migrant workers from Uzbekistan are Russia and Kazakhstan. According to estimates, two million Uzbek labor migrants work in Russia. The communities and economy of Russia, Kazakhstan, and impoverished Uzbekistan are all affected by these migration patterns in complicated ways. Labor migration lessens social unrest and political instability caused by unemployment. For instance, despite travel restrictions, because of Covid-19 outbreak, Russia sent approximately 4.24 billion worth of remittances to Uzbekistan in total in 2020. (Bondarenko, 2021) Approximately 7.6% of Uzbekistan's GDP is made up of this. At $351 million, remittances from Kazakhstan comparatively

less. However, it's possible that the close border between Uzbekistan and Kazakhstan and the absence of visa requirements contributed to the informal remittance flow. The amount of overall remittances may be materially impact on the figures for officially documented remittances. (Kakhkharov and Ahunov, 2021)



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Pros and Cons of migration.

Scientists' opinions on the pros and cons of migration are diverse. (Seitz, 2019) A number of researchers believe that migration is a method of improving life, improving education and the quality of health services received through material well-being. Other scientists argue that the psychological trauma of separation from parents has a negative impact on the academic performance of the child and contributes to a decrease in social intelligence and victimization of children, as well as the loss of health of the migrant. (Radnitz, 2006) According to some scientists for exporting countries, the flow of remittances increases GDP growth and positively affects development. But at the same time, the brain drain has a negative impact on a country's development. (Bandey and Rather, 2013)

Brain drain in Uzbekistan

Intellectual migration is a component of this labor movement, which is defined by the entry of highly skilled specialists from a variety of professions into the labor market, including scientists, teachers, scientists, and artists. The British Royal Society initially came up with the term "brain drain" in a 1962 in research about outflow of scientists, engineers, and technicians from the United Kingdom to the United States.

(Bondarenko, 2021) The spread of intellectual migration has started to affect on receiver countries and exporter countries in various ways . A failing economy shows signs of brain drain. A number of factors contribute to it, including inadequate social security and family support, poor access to and quality of education, an unfavorable business environment and low rates of entrepreneurship, a lack of job opportunities, and significant wage gaps between countries of origin and destinations. (Kakhkharov and Ahunov, 2021)

After the fall of the Soviet Union, a labor movement boom occurred in Central Asia as a result of the economic crisis that affected the countries of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The loss of highly skilled labor was one of the effects of the economic crisis in Central Asian nations and the resulting labor migration. In the first ten years following the fall of the USSR, Central Asian countries lost a sizable proportion of highly skilled workers, researchers, scientists, and artists. At that point, labor migration started to increase and included immigrants with academic qualifications. (Kakhkharov and Ahunov, 2021) Today, Western Europe, the United States, Russia are among the leading locations for skilled worker flow from Central Asia. European countries are invited young professionals from all over the world due to demographic disbalance and the economy's requirement for educated young workers. It is necessary to establish the "circulation of minds." It is defined as a cyclical circulation of skilled labor across nations. Both sending and receiving countries may gain from this type of migration: if the movement of skilled labor results thorough bilateral exchange of labor, then it is likely that individuals will return home with developed knowledge and resources. This approach might enhance social and institutional situations, which would lead to return of specialists. In that scenario, the free exchange of ideas might be a constructive method for growing economies.

In order to successfully convert brain drain into brain circulation, it is also important to investigate in research in this sphere. Thus, migration processes need to

be scientifically researched in order to regulate them at the international level. To conduct research on this issue, it becomes relevant to identify factors that affect migration in general. (Juraev, 2012)

Factors of migration

Factors influencing the phenomenon of migration are divided into economic, demographic, social, political, religious and environmental, in particular geographical location, living conditions, labor security, living standards, wages, urbanization, language, poverty, life expectancy, access to education, social conditions. adaptations, mental features. Distinguish Push and Pull factors of migration. Push factors include factors pushing people to leave the country. Pull factors include factors that push you to choose a particular country. Therefore, Push factors force a person to make a decision about migration, then under the influence of pull factors, the migrant decides where he will go. (Bandey and Rather, 2013)

The majority of studies show that economic factors are essentially what drive migration. Low agricultural income, agricultural unemployment, and underemployment are fundamental elements in developing countries that drive migration to richer regions with more work prospects. So, the majority of migrants have moved in quest of improved economic possibilities, according to practically all research. The push factors are things that, for various reasons, cause someone to leave one area and go to another. Low productivity, unemployment, underdevelopment, unfavorable economic circumstances, a lack of opportunity for progress, the depletion of natural resources, and natural disasters are common push factors. Mechanization of some processes and the introduction of capital-intensive production methods into agriculture have reduced the need for labor in rural areas. Another significant driver for migration is the lack of other sources of income in rural areas. (Krishnakumar and Indumathi, 2014)

The net consequence of the combined migratory flows between a country and all other countries is the net migration figure for that nation. The availability of lengthy time series for practically all nations is a significant benefit of using net migration. Net migration patterns can therefore be used as a fundamental indicator to reflect changes in migration over time and between countries: However, there are drawbacks to employing (computed) net migration data. Low net migration numbers could be due to both minor inflows and outflows as well as huge inflows and outflows. The fact that administrative adjustments or the legality of clandestine migration may cause net migration trends to peak and fall rather than actual migration movements is a second drawback. When possible, estimated net migration was compared to observed net migration (immigration minus emigration).

Two problems make it challenging to apply economic theories of international migration empirically in the current study. While the theoretical issues normally apply to immigration and emigration individually, net migration data are employed first. Second, while economic circumstances have an impact on migrant flows, migration flows also have an impact on the economy.

Jennissen (2003) looked at how economic issues affected immigration in Western European nations between 1960 and 1998. Exogenous variables like per capita income, level of education, and unemployment rate are used to explain the dependent variable (net migration). Regression analysis results revealed that the unemployment rate has a negative effect on net foreign migration. According to Jennissen, an increase in GDP per capita will result in a drop in net migration from countries that export labor and an increase in net inflow into nations that import workers. Also, he observed that educational level has a positive impact on net international migration while unemployment has a negative one.

There an estimation that higher levels of education are linked to more migration. Because they are often more adaptable, more responsive to change, and less wedded to conventional surroundings, educated people may be more prone to migrate. The risk of migrating is typically lower for educated people because they are less likely to be unemployed anywhere. If they don't obtain the money they were expecting, the educated can at least choose lesser paid positions that are open to the ignorant, but the opposite is not true. Increased incomes allow for savings, and educated people are likely to find borrowing money simpler. The educated may also be better and more knowledgeable about the opportunities in alternative regions, making them more responsive to the potential benefits of relocating. It is obvious that education directly increases information and lowers the cost of learning more. (Levy and Wadycki, 1974)

In the short term, immigrants to the UK increased supply more than demand, as demonstrated by Blanchflower (2007). A lower inflation rate and a lower natural unemployment rate also seem to be benefits of the migration flow. Longhi et al. (2008) shown that, if the likelihood is 95%, 12.4% of the 185 estimates of the effects of migration on unemployment that were studied across 13 research are significantly negative. Internal migration patterns in the recipient country may be influenced by migration from abroad.

The dual labor market theory, a distinct viewpoint, contends that pull factors in developed (i.e., migrants receiving) nations are what mostly drive international migration. In modern industrial civilizations, there may be a need for foreign labor for a number of reasons, according to Piore (1979), including general labor shortages, the requirement to fill lower-level jobs in the occupational hierarchy, and labor shortages in the secondary market of a dual labor market.

According to Barrel (2007), there is a short-term impact on both unemployment and inflation. This is because adjustment costs and the presumption that migration is

initially unexpected produce short-term changes in the equilibrium of the labor market. For Ireland and the UK, where changes in immigration from the NMS have been substantially larger than predicted in advance of EU enlargement, the latter seems to be the most reasonable assumption. The capital stock needed for these additional workers is not present in the receiving nations because it is assumed that the shock to migration was unanticipated. As a result, at the current wage, labor demand is constant. New immigrants as a result either displace current workers or lose their jobs. Increased unemployment lowers negotiated pay and, as a result, lowers average wage levels than they otherwise would have been. This in turn enables the demand for labor to increase, as well as the level of employment (the labor supply curve moves down the labor demand curve). This transient impact on unemployment in the receiving countries will eventually reverse as capital builds up and jobless rates return to their long-term equilibrium levels. Lower inflation than base is another aspect of the adjusting process. Reduced wages temporarily stifle inflation, and the monetary system will respond by lowering interest rates. Lower wages are a reflection of decreased productivity, which declines as a result of cheaper and more plentiful labor relative to capital, leading to increased hiring by businesses and an increase in employment for the same level of output. The rate of return on existing capital increases as utilisation levels increase. Household income and consumption increase as a result of the increase in employment outpacing the initial decrease in wages. Companies begin increasing their investment plans and building up their capital stock as consumption improves and capital profitability rises. Nevertheless, at first, the capital stock expands at a slower rate than total output does since investment plans take longer to adapt than consumption does. The subsequent rise in capital stock brings productivity back to a level that is similar to where it was initially or to a new steady state.

This analysis appears to contradict some studies on the relationship between migration, unemployment, and wages since it shows that unplanned migration has

short-term effects on unemployment (for a review see Blanchflower et al., 2007). Recent research on the association between changes in unemployment and an increase in NMS migration between UK local authority districts came up empty on the subject (Gilpin et al., 2006). This local observation might be the outcome of induced onward migration. Internal migration may be one of the processes by which regional labor markets respond to influxes of migrants, according to Hatton and Tani (2005). This analysis appears to contradict some studies on the relationship between migration, unemployment, and wages since it shows that unplanned migration has short-term effects on unemployment (Blanchflower et al., 2007). Recent research on the association between changes in unemployment and an increase in NMS migration between UK local authority districts came up empty on the subject (Gilpin et al., 2006). This local observation might be the outcome of induced onward migration. Internal migration may be one of the processes by which regional labor markets respond to influxes of migrants, according to Hatton and Tani (2005).

Based on the information collected, a hypothesis was drawn up that factor such as unemployment, higher education, the level of involvement of the working-age population in the labor market, GDP per capita and inflation affect the level of migration. Our research question is “Are that factor such as unemployment, higher education, the level of involvement of the working-age population in the labor market, GDP per capita and inflation, significant in the case of Uzbekistan?”. The purpose of this work is to contribute to the process of regulating migration by identifying economic push factors of migration in Uzbekistan.

Methodology

Data

To analyze push factors of migration, 30 year data of Uzbekistan were analyzed in range between 1991-2021. Time series analysis was implemented. Time series are a

significant category of temporal data items that are easily obtainable from applications in science and finance. A time series is a group of observations that have been made across time. Time series data are inherently huge in size, highly dimensional, and require continuous updating. Moreover, time series data, which is distinguished by its continuous and numerical nature, is always taken into account as a whole rather than as a single numerical field. (Fu, 2011) Data were collected with secondary data collection method from THE STATE COMMITTEE OF THE REPUBLIC OF UZBEKISTAN ON STATISTICS. As explanatory variable net migration has been used. The calculation was carried out in the STATA program. Regression on time series data has been used.

Regression analysis was done using net migration as the dependent variable and independent variables such as GDP per capita, LFPR , unemployment, inflation, and the rate of tertiary education in Uzbekistan between 1990 and 2021. To minimize multicollinearity issues, the average salary and migrant stock variables were excluded. Both variables had large correlations (> 0.60) with either GDP per capita or unemployment.

Net migration

The difference between the movement into and out of an area is commonly measured using the net migration rate and the total number of net migrants. These numbers are particularly useful since they can be approximated even in the absence of data for the particular migration streams. Net migration is described in absolute number. (Lieberson, 1980) In our dataset it is distributed in range between -69.39 and -20.37, which identified that migration outflow is much more than inflow over the whole period.

GDP per capita

GDP per capita is calculated by dividing the total gross value contributed by all producers who are residents of the economy by the mid-year population, plus any product taxes (less subsidies) that are not taken into account when valuing output. GDP data in local currency at constant prices are used to compute growth. Average incomes rise as a result of sustained economic expansion, which is also closely related to decreasing poverty. A basic measure of output value per person is provided by GDP per capita, which serves as an indirect measure of per capita income. GDP growth and GDP per capita are regarded as general indicators of economic growth. It is measured in US dollars. (The World Bank, 2023) During whole period of time, it is increased from 383.3 to 2754.

LFPR

The percentage of people aged 15 and older who are economically active, or all those who provide labor for the production of goods and services over a certain period, is known as the labor force participation rate. The pool of labor that can be used to produce products and services in an economy is known as the labor force. It includes both those who are employed and those who are looking for employment right now, as well as first-time job seekers. Yet, not everyone who works is included. Often times, unpaid employees, family members, students, and members of the military forces are not included. The number of workers changes throughout the year as seasonal workers come and go. It is measured in percentage. (The World Bank, 2023) In Uzbekistan it is fluctuated in range between 66.1 and 75%.

Unemployment rate

The unemployment rate is the proportion of employed people who are also unemployed in a given economy. Unemployed people are defined as those who are not now employed but are actively looking for job. This calculation is

Unemployed People /Total Labor Force *100.

One of the key economic indicators used to assess the strength of an economy is the unemployment rate. Throughout the business cycle, it often fluctuates, rising

during recessions and falling during booms. It is one of the metrics that investors, policymakers, and the general public pay the most attention to. It is measured in percentage. (The World Bank, 2023) Over the 30 year it changes from 1.9 to 13.3%.

Inflation rate

The rate at which prices increase over a specific time period is known as inflation. Inflation is often measured in broad terms, such as the general rise in prices or the rise in a nation's cost of living. Yet it can also be computed more precisely for some products, like food, or for services, like a haircut, for instance. In any situation, inflation refers to how much more expensive the pertinent collection of goods and/or services has grown over a predetermined time frame, most frequently a year. It is measured in percentage. (The World Bank, 2023)

Variables were checked for normality by using Sharipo Wilk test. A goodness-of-fit test is essentially what the Shapiro-Wilk test is. It assesses how well the sample data fit a normal distribution, in other words. It accomplishes this by standardizing and arranging the sample. After this sorting and standardization process, the sample values would be evenly spaced quantile values of the standard normal distribution if the sample data exactly fit a normal distribution. In essence, the Shapiro-Wilk test statistic evaluates how closely the ordered and standardized sample quantiles match the normative standard quantiles. A value of 0 to 1, with 1 denoting a perfect match, will be accepted by the statistic. As results shows, all variables were not normally distributed.

Descriptive Statistics

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
year	31	2006	9.092	1991	2021
netmigration	31	-38.439	14.595	-69.39	-20.37
unemploymentrate	31	7.068	2.941	1.9	13.3

tertiaryeducationr~e	31	12.29	3.485	8	21
laborforceparticip~e	31	69.716	2.475	66.1	75
GDPpercapita	31	1217.748	796.523	383.3	2754
inflation	31	136.639	305.614	8.9	1238.6

Shapiro Wilk W test for normal data

Variable	*Obs*	*W*	*V*	*z*	*Prob>z*
netmigration	31	0.924	2.489	1.890	0.029
unemployme~e	31	0.916	2.724	2.076	0.019
tertiaryed~e	31	0.929	2.329	1.751	0.040
laborforce~e	31	0.924	2.482	1.883	0.030
GDPpercapita	31	0.837	5.318	3.462	0.000
inflation	31	0.452	17.852	5.971	0.000

Own source

Model selection

On the basis of an observable record of a stochastic process, we must typically make some simplifying (and presumably fair) assumptions about that structure in order to draw statistical conclusions about that structure. The assumption of stationarity is the most crucial of these. The fundamental tenet of stationarity is that the probability principles that control a process' behavior remain constant across time. The process is essentially in statistical equilibrium. To be more precise, a process Yt is considered strictly stationary if the joint distribution of is the same as the joint distribution of Yt 1 - k, Yt 2 - k,... Yt n - k for all options for time points t1, t2,..., tn, and all options for

time lag k. As the Y's are (marginally) identically distributed, the (univariate) distribution of Yt at n = 1 is the same as that of Yt k for all t and k. The mean function remains constant throughout time as a result of the fact that E(Yt) = E(Yt-k) for all t and k. In addition, the variance is constant throughout time since Var(Yt) = Var(Yt-k) for all t and k. (Nkoro and Kelvin Uko, 2016)

We are able to run a number of tests, including the Augmented Dickey-Fuller, Phillips-Perron, and KPSS. The ADF (Augmented Dickey-Fuller) test is a statistical significance test that provides findings for hypothesis tests that include both null and alternative hypotheses. As a result, we will obtain a p-value from which to determine the time series' stationary or non-stationary status. After processing ADF in stata, following results were estimated. Variables net migration, unemployment rate, labor force participation rate, GDP per capita and inflation rate are stationary at level 1, However variable tertiary education rate is stationary at level 2. (Menegaki, 2019)

Dickey Fuller test for unit root

Variable	*Obs*	*Test statistic Z(t)*	*Critical value 1%*	*Critical value 5%*	*Critical value 10%*	*p-value for Z(t)*
D.netmigration	29	-4.462	-3.723	-2.989	-2.625	0.0002
D.unemployment~e	29	-3.048	-3.723	-2.989	-2.625	0.0307
D.tertiaryeduc~e	29	-1.679	-3.723	-2.989	-2.625	0.4421
D2.tertiaryedu~e	28	-8.902	-3.730	-2.992	-2.626	0.0000
D.laborforcepa~	29	-4.529	-3.723	-2.989	-2.625	0.0002
D.GDPpercapita	29	-3.053	-3.723	-2.989	-2.625	0.0302
D.inflation	29	-4.669	-3.723	-2.989	-2.625	0.0001

Own source

Thus, only after differentiating, our variables are stationary. Hence, employing differenced variables in regressions implies losing information on the equilibrium relationship between the variables under study or relevant long-term features. This means that we must come up with a method of keeping the variables' essential long-term information. Taking conclusions from Pesaran, Shin, and Smith (2001); Pesaran and Pesaran (1997), who claim that the ARDL and Bounds test would be the effective method of estimate if the results of the dataset's stationary test reveal that the variables are stationary in difference.

Engle and Granger created one of the most often used techniques that needs variables to be integrated of order one (1987). This strategy comprises of a two-step process. One non-stationary series is regressed on another in the first step as a test of cointegration, and the residuals are checked for stationarity. The two non-stationary series are said to be cointegrated if they establish a reliable linear relationship. The Representation Theorem states that an error correction representation exists if the variables are cointegrated. The next stage is to estimate the error correction model, which pinpoints both the system's short-run dynamics and its long-term linkages. In multivariate systems, the method created by Johansen (1988, 1991) and Johansen and Juselius (1990) is more effective. In comparison to these other approaches, the ARDL methodology has some advantages. First off, the series being used need not be I(1) (Pesaran and Pesaran, 1997). Second, more effective cointegration relationships can be found even with small samples (Ghatak and Siddiki, 2001). The ARDL technique, according to Laurenceson and Chai (2003), solves the issues brought on by non-stationary time series data. As an illustration, non-stationary time series data produce erroneous regression coefficients that are biased towards zero (Stock and Watson, 2003).

ARDL MODEL

The ARDL method involves three steps .

Step1

Checking for cointegration relationship is the initial step. Cointegration can be used to model time series while preserving their long-run information. The cointegration test looks at how time series can be linked so that equilibrium forces prevent them from drifting too far apart, even though they may be individually non-stationary and drift significantly from equilibrium. To put it another way, cointegration entails a particular stationary linear combination of variables that are individually non-stationary but integrated to an order, I (d). (Nkoro and Kelvin Uko, 2016)

It is feasible to recover the important long-term details of the relationship between the variables under consideration that were lost during differencing thanks to cointegration. In other words, it incorporates short- and long-term dynamics and equilibrium. This is the cornerstone for getting accurate model estimates, which is what powers meaningful forecasts and policy execution. The recommended stage for representing empirically significant interactions of DSP is cointegration. Cointegration analyzes long-term relationships between integrated variables and paramters the relationship between the variables under consideration to create an error correction model (ECM). The long-term association between series with various integration orders is determined using the ARDL cointegration technique (Pesaran and Shin, 1999, and Pesaran et al. 2001). The reparameterized result provides the long- and short-term relationships of the variables under consideration.

We construct the following regressions.

$$\Delta Net\ migr_t = a_{0indp} + \sum_{i=1}^{n} b_{1indpr}\Delta\ Unempl_{t-i} + \sum_{i=1}^{n} b_{2indpr}\Delta\ Teduc_{t-i} + \sum_{i=1}^{n} b_{3indpr}\Delta\ LFPR_{t-i} + \sum_{i=1}^{n} b_{4indpr}\Delta\ GDPpc_{t-i} + \sum_{i=1}^{n} b_{5indpr}\Delta\ infl_{t-i} + \lambda_{1indp}Unempl_{t-i} + \lambda_{2indp}Teduc_{t-i} + \lambda_{3indp}LFPR_{t-i} + \lambda_{4indp}GDPpc_{t-i} + \lambda_{5indp}infl_{t-i} + \varepsilon_t$$

The underlying ARDL model's parameters b1, b2, b3, b4, and b5 represent the short run coefficients, and s represents the corresponding long run multipliers. In the case of "no cointegration," the null hypothesis is λ1=λ2=λ3= λ4=λ5=0. By computing the generic F-statistics and comparing them with the critical values, the assumptions are put to the test Pesaran and Pesaran (1997) and Pesaran et al., (2001). The results of Cointegration test shows the existing of 6 cointegration relationship. Null hypnotizes rejected.

Johansen tests for cointegration

Trend: constant Number of obs = 29

Sample: 1993 - 2021 Lags = 2

MAXIMUM RANK	PARMS	LL	EIGENVALUE	TRACE STATISTIC	5% CRITICAL VALUE
0	42	-590.99465	-	134.6102	94.15

1	53	-572.65151	0.71777	97.9240	68.52
2	62	-555.81609	0.68685	64.2531	47.21
3	69	-543.38899	0.57558	39.3989	29.68
4	74	-533.3279	0.50036	19.2768	15.41
5	77	-527.69657	0.32184	8.0141	3.76
6	78	-523.68952	0.24145	-	-

Own source

Step 2: Choosing the Appropriate Lag Length for the ARDL Model/ Estimation of the Long Run Estimates of the Selected ARDL Model

As we desire Gaussian error terms, it is crucial to determine the proper lag duration for each of the ARDL model's underlying variables. The ideal lag length (k) must be determined using appropriate model order selection criteria, such as the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), or Hannan-Quinn

Criterion, in order to choose the right long-run model (HQC). With the variables in their levels (nondifferenced data) form, the ARDL model should be estimated. The variables' lags should be switched, and the model should then be reestimated and compared. (Nkoro and Kelvin Uko, 2016)

Model selection criteria: The model that performs most effectively has the smallest AIC, SBC estimates, or modest standard errors. The long run coefficients are derived from the best-performing estimates.

SBIC results first lag, however AIC and HQIC indicates lag 3 . It is tried to run ARDL with error term model, with both chosen lags. Model with lag 1 performs better in case of significance of adjustment.

Selection-order criteria

Sample: 1995 - 2021 Number of obs = 27

|lag	*LL*	*LR*	*df*	*p*	*FPE*	*AIC*	*HQIC*	*SBIC*
0	-625.979	-	-	-	8.6e+12	46.8133	46.8989	47.1012
1	-458.043	335.87	36	0.000	5.3e+08	37.0402	37.6396	39.0559*
2	-416.464	83.156	36	0.000	5.5e+08	36.627	37.7401	40.3705
3	-355.173	122.58*	36	0.000	3.9e+08	34.7536*	36.3805*	40.2249
4	-	-	36	-	-4.0e-53*	-	-	-

Own source

Step 3: Reparameterization of ARDL Model into Error Correction Model

We risk getting false findings when non-stationary variables are regressed in a model. Since most data exhibit DSP, one technique to solve this is to difference the data in order to attain stationarity of the variables. In this situation, the erroneous equation issue may be solved and the regression model's parameter estimates may be accurate. We can only determine the short-term association between the variables using the regression equation. It provides no details regarding the long-term behavior of the model's parameters. The notion of cointegration and the ECM are crucial to solving this issue because researchers are primarily interested in long-run correlations between the variables under study. We now have both long-run and short-run information incorporated by ECM specification. (Menegaki, 2019)

Results

In light of this, the error correction mechanism is effective, and the error correction factor adjusts the short-term imbalances by 90% Also noticed that the coefficient is statistically significant under 0.01% significance level and negative. This definition fits how quickly equilibrium is reached after a disruption, in the long-run equilibrium relationship. The rate at which variables return to equilibrium is implied by a negative and substantial error correction term. A comparatively large ecm coefficient denotes a quicker adjustment process. In general, net migration is described by selected independent variables by 40%. In Short run, all variables perform insignificantly, however in long run all variables become statistically significant, except of inflation rate. It is indicated that inflation rate is not a push factor in case of Uzbekistan. This demonstrates that the variables have a cointegration relationship and the short-run variations eventually reach equilibrium in the long run.

In long run, Unemployment rate becomes a significant push factor of migration in Uzbekistan. Unemployment has negative effect on net migration, with -2.34 coefficient. Our result also supported by Jennissen (2003) finding, who find out that the unemployment rate has a negative effect on net foreign migration. Levy and

Wadycki (1974) and Jennissen (2003) explained a positive relation of higher education on migration. This phenomenon indicated in our findings. 1unit change in tertiary education rate, leads to 2.1645 times increase in net migration. Visa versa, Labor force participation rate effects negatively with -5.8275 coefficient and 0.01 significance level. By supporting Jennissen's last observation that an increase in GDP per capita will result in a drop in net migration from countries that export labor and an increase in net inflow into nations that import workers, we estimated that GDP per capita is a positively effected push factor of migration in case of Uzbekistan. It effects by 0.0192 at 0.01 significance rate.

ARDL with error correction model

Number of obs = 30

R-squared = 0.6228

Adj R-squared = 0.3923

Root MSE = 6.8300

Variables	Coefficient	t-stat
ADJ.		-3,73***
Netmigration L	-.8950	(.2399)
LR		
Unemployment rate	-2.3439	-2.84**
		(.8241)
Tertiary education rate	2.1645	1.98*

		(1.092)
Labor force participation rate	-5.8275	-4.15*** (1.404)
GDP per capita	.0192	3.68*** (.0052)
Inflation	.0095	-.1.05 (.0090)
SR	.2827	0.17
Unemployment rate		(1.623)
D1.		
Tertiary education rate	-1.8261	-1.10
D1.		(1.665)
Labor force participation rate	-1.1543	-0.58 (2.007)
D1.		

GDP per capita	-.0037	-0.42
D1.		(.0087)
Inflation	-.0021	-0.31
D1.		(.0068)

Standard errors in parentheses

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

Own source

Finally, we discuss the performance of the ARDL model . We use a variety of diagnostic tests to achieve this. Diagnostic tests check the model's homoscedasticity and existence of autocorrelation . The Durbin-Watson test, which is used to find the presence of autocorrelation in the regression's residuals, is one method.

The following hypotheses are used in the Durbin-Watson test:

H0 (null hypothesis): The residuals are not correlated.

HA :the residuals are autocorrelated.

Based on our results we fail to reject H0. There is no autocorrelation.

D.Watson

Durbin–Watson d-statistic (24, 28) = 2.828747

Another serious problem which may occur is heteroskedasticity problem. When the standard deviations of a predicted variable are not constant over a range of

independent variable values or when they are compared to earlier time periods, this is known as heteroskedasticity in statistics. When residual errors are inspected visually for heteroskedasticity, they have a tendency to fan out with time. The estat imtest command, which contains a test for heteroskedasticity and normality, can be used to execute the Cameron-Trivedi decomposition of the IM-test after regression. In order to perform this test, homoskedasticity is assumed as null hypothesis. Heteroskedasticity is considered to be present if the p-value in the is less than 0.05, (the null hypothesis is rejected). Due to our results, we accept null hypothesis. There is no heteroscedasticity problem in our model.

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	28.00	27	0.4110
Skewness	1.93	23	1.0000
Kurtosis	3.64	1	0.0563
Total	33.57	51	0.9717

Own source

Conclusion

Migration has emerged as one of the key elements of Uzbekistan's social and economic development since the early 1990s. The first step in this process was the departure of non-Uzbek nationals from Uzbekistan for permanent residence in their own countries and the countries of their parents (particularly Russians, Ukrainians, and Belarusians). Just 424086 individuals, or around 3 percent of the nation's total

population, left Uzbekistan in 1992, according to official statistics data. Nonetheless, the dynamics of non-Uzbek emigration, which started in large numbers after 1991, continued to slow down as more people traveled overseas for business or temporary employment. Almost 702 thousand individuals left the country in 2010 to work abroad. Based on our study, migration outflow in Uzbekistan is triggered by such economic factors as GDP per capita, LFPR , unemployment, and the rate of tertiary education. The ARDL and Bounds test would be the effective method of estimate if the results of the dataset's stationary test reveal that the variables are stationary in difference.

In the short run, all variables perform insignificantly, but in the long run, all variables except inflation rate—become statistically significant. According to the evidence, Uzbekistan's inflation rate is not a driving force. The fact that the short-run variations eventually attain equilibrium over time shows that the variables have a cointegration connection.

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