

Towards Achieving Sustainable Development: Interactions between Migration and Education

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Abstract

According to the Resolution on the Global Sustainable Development Goals to be achieved by 2030, labour and intellectual capital have been identified as key drivers of socioeconomic development, leading to appropriate adjustments in migration policy and alignment with European standards. The paper aims to empirically justify the link between migration and the achievement of Sustainable Development Goals in Ukraine. The study applied the Butterworth filter and revealed fluctuations in the time series of changes in the net migration index and the indicators of achieving the Sustainable Development Goals. This makes it possible to consider the retrospective and actual data of the series, as well as to level the phase transitions in the output time series compared to the input (by using a recurrence filter). In addition, the study applies correlation analysis to identify the coincidence/discrepancy of the identified trends. The findings confirmed that the most significant countercyclical and cyclical statistical dependence with the index of net migration growth is found for unemployment (correlation coefficient – -0.75), per capita income (0.73), income inequality (-0.72), greenhouse gas emissions (-0.69), and the corruption index (-0.67). The findings allow us to conclude that the appropriate conditions and institutional support for achieving the life-quality indicators of the SDGs have not been developed. Thus, the Ukrainian government should focus on providing appropriate access to education, creating new jobs, and stimulating intellectual migration into the country.

Key words

migration, intellectual capital, inclusive, economic growth, unemployment, income gap.

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Introduction

The Agenda on Sustainable Development Goals (SDGs) requires a change in the paradigms of state policies for economic development. According to the Resolution on the Global Sustainable Development Goals to be achieved by 2030, labour and intellectual capital have been identified as key drivers of socioeconomic development, leading to appropriate adjustments in migration policy. The improvement of the education system could minimise the outflow of intellectual capital from the country. A wide range of global projects on the internationalisation of education and academic mobility, scholarship and grant programmes for students and scientists have been implemented worldwide. On the one hand, government regulatory interventions aim to promote the retention of highly productive foreign intellectual capital in the destination country, turning “educational” and “scientific” migrants into residents. On the other hand, it makes it possible to prevent the outflow of a country’s qualified labour forces. Increasing employment options abroad by means of education and professional training further stimulates long-term external migration. The migration of youth and more educated, highly skilled people has serious long-term consequences for the economic and social stability of countries.

It should be noted that Ukraine continues to lag behind the EU member states in terms of economic development, the level of well-being and, in general, in achieving the SDGs. Considering the Bertelsmann Stiftung and SDSN reports, among Visegrád countries, the Czech Republic had the highest value of SDG achievement in 2016-2019. It should be noted that Ukraine had a positive dynamic in achieving the SDGs for 2016-2019. Thus, the integrated SDG Index was 66.39 in 2016 and 72.8 in 2019. At the same time, Ukraine has the lowest value of the SDG Index among Visegrád countries. Thus, the average value of SDGs for Visegrád

countries is 75.1, with an average value of net migration growth of 1.33 (Sachs et al., 2019). Compared to EU countries, which have a policy of gradually attracting highly qualified immigrants, as well as young specialists from among foreign students, foreign migration to Ukraine is currently not a mitigating factor in the negative processes of the country’s social, economic and environmental development. In this case, it is necessary to provide the appropriate adjustment of Ukrainian migration policy and harmonisation with European standards as best practices. Thus, the paper aims to estimate the impact of education on migration in the country in the context of its impact on the achievement of the SDGs. Despite the existence of studies that analyse the impact of migration on economic, social, and environmental development for certain countries, this study studies the link between migration and SDGs in Ukraine. In addition, the paper discusses the competitiveness of the higher education systems of EU countries as an important determinant to attract new labour resources to the country and reduce their outflow abroad, with the aim of establishing mechanisms through which they influence the achievement of SDGs.

The paper is structured as follows: the introduction contains an explanation of the necessity of analysing the link between migration and SDG achievement; the literature review comprises an analysis of the theoretical landscape on the relationship between migration and SDG achievement; the methods and methodology section describes the methodology and instruments by means of which to achieve the goals of the paper; the results section carries an explanation of the findings; and finally, the concluding section features a discussion of the core results, comparison with previous research, limitations and potential further directions for investigation.

1. Literature review

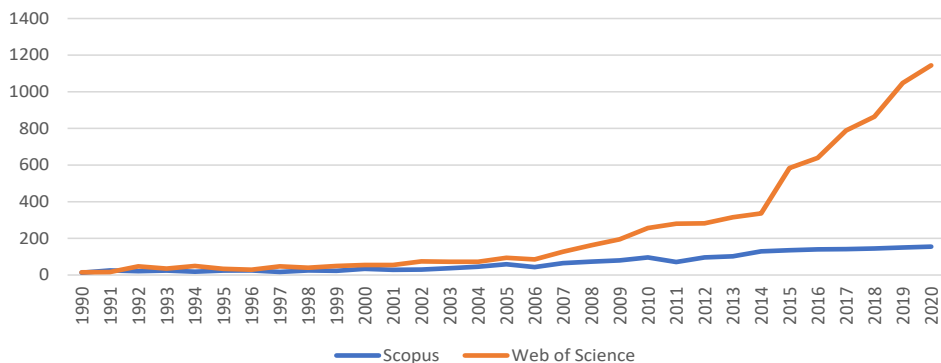
1.1. Migration and SDGs

The results of the analysis of the theoretical background on migration show that migration is a complex process that depends on a vast range of factors. In addition, most recent trends in global development show that migrants consider countries to be successful in achieving SDGs. The greater the degree of SDG achievement, the more affordable and appropriate the conditions for living and development. Thus, all dimensions that impact migrants' decisions could be merged by the following groups: economic – unemployment, average wage, inflation, etc. (Lyulyov et al., 2018; Kuzior, 2022; Didenko et al., 2021; Kwilinski et al., 2022; Moskalenko et al., 2022; Nawawi et al., 2022; Szczepańska-Woszczyzna et al., 2022); social – access to education, health and social services, social infrastructure, etc. (Shkarlet et al., 2019; Us et al., 2022; Dzwigoł, 2022; Kuzior et al., 2022; Miśkiewicz, 2021a; Szczepańska-Woszczyzna & Gatnar, 2022; Trzeciak et al., 2022; Tih et al., 2016); ecological – air pollution, waste accumulation, environmental degradation, share of renewable energies, etc. (Gavkalova et al., 2022; Kwilinski et al., 2020b; 2022a; Lyulyov et al., 2021a; 2021b; Melnychenko, 2021; Miśkiewicz, 2018; 2020; Miśkiewicz et

al., 2021; Polcyn et al., 2022; Prokopenko & Miśkiewicz, 2020; Saługa et al., 2020; 2021); political – freedom, voice and accountability, transparency, corruption, governance efficiency, rule of law, ease of doing business, etc. (Pudryk et al., 2021; Lyulyov et al., 2021b; Miskiewicz, 2022; Ziabina et al., 2023); innovation and digitalisation – access to the Internet, government digitalisation, digital infrastructure, etc. (Gallo et al., 2018; Butko et al., 2019; Kwilinski, 2019; Kwilinski & Kuzior, 2020; Miśkiewicz, 2021b; Miśkiewicz et al., 2022; Vaničková & Szczepańska-Woszczyzna, 2020).

The results of publication dynamics on migration in terms of the framework to achieve the Sustainable Development Goals confirm that publications have been rising since 2015. It should be noted that in 2015, the global Sustainable Development Goals to be achieved by 2030 were updated. As a consequence, interest in research in this area has risen among the scientific community. The number of publications has been growing every year in the Scopus and Web of Science databases. More specifically, according to Scopus, in 2016 the number of publications increased by 19% compared to 2015, in 2017 by 37%, in 2018 by 40%, in 2019 by 67% and in 2020 by 81%. The dynamics of publishing activity are shown in Figure 1.

Figure 1. Publication activity on the issue of migration in terms of the achievement of Sustainable Development Goals



Source: calculated by authors

Yeoh et al. (2005) and Holliday (2012) analysed the impact of migration on economic development. Yeoh et al. (2005) confirmed the close relationship between education and development in Asian countries. At the same time, Holliday (2012) underlined the necessity of developing a powerful lifelong education system. In addition, access to education is the core dimension in achieving the targeted indicators, as it allows labour migrants to adapt to the new economic and social conditions in the destination country. Based on a survey of employers and migrants in the United Kingdom, scholars (Findlay and McCollum, 2013; McCollum et al., 2013) highlighted the motives of labour migrants: education, well-being and income. They underlined the fact that labour migrants chose the country-destination based on the comparative analysis of appropriate capabilities of self-development and the affordability of education for children. Based on Nepalese cases, Thieme and Wyss (2005) empirically justified the thesis that labour migration is conducive to attracting financial capital, enhancing education and accumulating intellectual capital, which are the basis for the sustainable development of the country. Hackl (2018) underlined the fact that developing countries should decline migration to reduce inequalities in the framework to achieve SDGs. Mitze et al. (2008) empirically proved the statistically significant impact of regional wage differentiations and unemployment rates on migrants' behaviour within neoclassic economic theory. They applied Vector Autoregressive Models and the Generalised Method of Moments to check the research hypothesis. Considering the empirical findings, scholars underline the necessity of regulating the labour market, updating social policies and developing supporting systems for migrants. Past studies (Pudryk et al., 2021; Kwilinski et al., 2022b) apply the FMOLS technique to confirm the statistically significant impact of innovation development and

governance efficiency on net migration in Bulgaria, Croatia, Lithuania, Latvia, Poland, and Romania. Similar conclusions pertaining to the impact of innovation on migrants were confirmed by Gallo et al. (2019). In addition, the researchers highlighted the positive impact of talent management on the attractiveness of the countries to highly qualified labour. Considering the results of the abovementioned analyses, the paper aims to verify the link between migration and SDG achievement in Ukraine.

1.2. Education and Migration

The analysis of the theoretical background on the links between education and migration allows us to conclude that countries that have better results in attaining the SDGs also have higher-quality educational systems, which allows them to attract more intellectual capital to the country. On the other hand, less developed countries should accumulate forces to make available and attract new highly qualified labour resources from developed countries. In addition, it allows them to promote the achievement of the SDGs. Ka & Xiao (2016) stated that the intensification of global competition for intellectual capital and the low quality of education and scientific research in higher education institutions in China provoke an increase in student emigration to obtain higher education abroad. Consequently, it leads to the outflow of intellectual capital and limits the Chinese achievement of the SDGs. It should be noted that China has already activated the internationalisation of higher education, improving the education system through the implementation of best global practices, in particular encouraging the development of transnational higher education to change the structure of higher education. Beine et al. (2003) investigated the relationship between migrants' education and human development for 50 countries, confirming the restriction of economic growth for countries with a high intellectual

capital migration rate (if exceeding 20%) and/or the outflow of people with higher education (if exceeding 5%). However, Welch & Zhen (2008) showed that researcher emigration provokes positive and negative effects alike for the origin and destination countries. Thus, the emigration of highly qualified labour ensures the relationship between China and the destination country. Miyagiwa (1991) confirmed the hypothesis that the brain drain increases the education and income for the destination country of migrants. At the same time, the transfer of technologies and knowledge because of circular migration increases labour productivity and education quality in the country. Rao (1979) analysed the brain drain among students from Australia, the USA, Canada and France. Based on a comparison analysis, Rao (1979) shows that students from different countries have similar options and capabilities for future employment despite differences in countries of origin, social status, and experience. He determined that 98% of students who are studying as part of scholarship programmes return to their countries of origin after graduation. In addition, he emphasised that Australian support programmes for young scientists are the most effective. Haupt and Janeba (2009) proved that the brain drain has a statistically significant impact on the distribution of income between skilled and unskilled workers. Consequently, it leads to increasing income gaps in countries, which is controversial in the context of the SDGs. In the beginning, the decrease in migration expenditure is the catalyst for the growth of net incomes among skilled and unskilled workers. Later, however, it provokes a decrease in the net incomes of all households. At the same time, the level and quality of education of labour resources is a decisive dimension in the context of income differentiation. Odhiambo (2013) investigated the reasons and motives for the outflow of intellectual capital from Kenya, determining that the government

needs to take advantage of the experience of emigrants who have returned to the country. In addition, scientists should emphasise the spread of educational programmes for the retraining of re-emigrants. Hornstein & Taylor (2018) analysed migration in Croatia, which has been activated after the integration of that nation into the EU. They systemised the direction for limiting the migration of intellectual capital from the country. As such, reforming the education system and providing employment for young people could stop the outflow of intellectual capital. In addition, they highlighted the necessity of intensifying non-formal education, particularly life-long education. Ionescu & Polgreen (2009) confirmed the statistically significant positive relationship between public spending on education and the emigration of American youth between states. The findings confirmed that investment in higher education could attract students to the country/state. If the government does not benefit from increasing the financing of higher education, then there is a positive relationship between state spending in this area and the emigration of students after completing their studies. However, this relationship could be transformed into an inverse one, because government spending on the development of education will ensure the expected effects (increasing intellectual capital in the country, ensuring the conduct of scientific research, development of innovative technologies, etc.). Djajic et al. (2019) confirmed the causal relationship between government spending on education and the intentions of young people to work abroad. Justman & Thisse (1997) confirmed the hypothesis that mobility of intellectual capital has a negative effect on government expenditure on education. Consequently, it provokes a decline in investment in intellectual capital development. Djajic et al. (2012) identified that government subsidies for education in the countries of origin, as well as the establishment of restrictions on

cross-border migration, could restrict the outflow of intellectual capital. Stark & Wang (2002) justified the mechanisms of exchange and optimal combination of subsidies for migration and education both in the countries of origin and destination. Along with the brain drain issue, Pires (2015) investigated the issue of “brain waste”, defining it as the loss of competencies by highly qualified labour resources during their emigration as a result of their competencies not being needed in the labour market of the destination country. Pires (2015) concluded that migration reduces incentives for young people to obtain an education and improve their skills in the origin countries. In the destination country, the growth of immigrants leads to an influx of unskilled labour. At the same time, subsidies for students ensure the growth of intellectual capital in the country of origin. It has been proven that an effective state educational policy and equal access to education for both residents and immigrants contributes to the transnational transfer of knowledge, best practices and the latest technologies. Based on the case of Nigeria, Akindipe (2020) confirmed the hypothesis on the relationship between the state funding of education, the number of strikes by teachers of HEIs and the number of emigrants whose goal is to study. Chadha et al. (2016) confirmed the hypothesis that quality of education has a statistically significant impact on emigrants of highly skilled labour resources in India. Scholars have underlined the fact that the Indian government has introduced a vast range of educational programmes to attract intellectual capital to the country, such as Educate in India; Make in India; Digital India, Skill India; Start-up India; Stand-up India; and Swatch Bharat. Torrissi & Pernagallo (2020) applied a probit model to determine the nature and strength of the influence of the job satisfaction of scientific employees on their intention to emigrate, emphasising the need to increase the competitiveness of higher

education in Italy by reformatting the organisational management of HEIs. Baruch et al. (2007) listed the core reasons that entice youth to stay in their country of origin: self-development, quality of education, and support from the diaspora. Prior studies (Baruch et al., 2007; Torrissi & Pernagallo, 2020; Akindipe, 2020) have identified statistically significant factors influencing international students’ decision to stay and work in Taiwan after graduation, namely subjective factors, experience and level of satisfaction with the quality of education at the HEIs, and unemployment in the country. Based on empirical results (Baruch et al., 2007; Torrissi & Pernagallo, 2020; Akindipe, 2020), scientists have confirmed that unemployment in a country is one of the most influential factors that encourages highly qualified immigrants to stay in the country. At the same time, the experience and satisfaction with the quality of education at an HEI does not have a statistically significant effect on the intentions to stay in the country among immigrants after completing education. Considering the abovementioned factors, this study tests the following hypothesis:

Hypothesis: The competitiveness of the national system of higher education is an important determinant that affects the attraction of new labour resources in the country and the reduction of their outflow abroad.

2. Methodology

The study analyses the link between migration and SDG achievement in Ukraine for 2000-2021. Migration is estimated by the index of net migration growth, which is calculated by experts from the International Organisation for Migration. The achievement of SDGs is explained by relevant subindexes of the SDG index (Sachs et al., 2021). The core SDG indicators are shown in Table 1.

Table 1. The subindexes of the SDG Index selected for investigation

Sustainable Development Goals	The indicator of achievement of the relevant SDGs	
SDG1. Poverty alleviation, SDG10. Reducing inequality	P	poverty risk
	In	income inequality
SDG3. Strong health and well-being	L	lifetime
	Ex	household expenditures
SDG4. Quality education	Edh	higher education enrolment ratio
	Eds	enrolment ratio in secondary education
	Edsc	rate of coverage of preschool education
SDG5. Gender equality	Fem	share of women in top management
SDG8. Decent work and economic growth	Un	unemployment rate
	GNI	income per capita
SDG9. Industry, innovation and infrastructure	Exrd	government spending on research and development
SDG13. Mitigation of the consequences of climate change	GHG	greenhouse gas emissions
SDG16. Peace, justice and strong institutions	CC	corruption index
SDG17. Partnership for sustainable development	Imp	imports from developing countries

Source: calculated by authors

Each SDG has its own features and extrema for different levels that are not comparable. Consequently, it limits the relevant interpretation of the achievement of SDGs. In this case, it is necessary to filter the data of

the investigation. Thus, the study applies the Hodrick-Prescott and Butterworth filters (Hodrick and Prescott, 1997; Butterworth, 1930; Gomez, 2001) to categorise time series data:

$$y_t = \tau_t + c_t \quad (1)$$

where τ_t is the trend factor and is the cyclical factor.

Considering the methodology at the first stage, the trend factor is calculated as follows:

$$\tau_t = y_t + c_t \quad (2)$$

In the second stage, the study applies regression analysis to check the coincidence/noncoincidence of the changes in the net migration flow in Ukraine and the trends of key indicators of SDG achievement.

The study applies clustering to range the European countries within the integral level of competitiveness of higher education systems, which evaluates the quantitative and

qualitative characteristics and internationalisation of HEIs:

- number of people studying at HEIs as a share of the total population;
- quality of HEIs according to the Global Competitive Index;
- the index of the quality of education according to the Human Development Index;
- the number of foreigners studying at HEIs as a share of the total number of students.

This makes it possible to verify the hypothesis that the competitiveness of the national system of higher education affects the attraction of new labour resources in the country and the reduction of their outflow abroad.

$$f(x) = \left(\frac{1}{(2\pi)^{\frac{q}{2}} |\Sigma|^{\frac{1}{2}}} \right) * \exp \left\{ -\frac{1}{2} * (x - \mu)^T * \Sigma^{-1} (x - \mu) \right\} \quad (3)$$

where μ – vector of mathematical expectations of parameters x ; $|\Sigma|$ – covariance matrix of the vector of mathematical expectations of parameters x ; $|\Sigma|$ – the determinant of the covariance matrix; T – transposition operator; $\sigma^2 = (x - \mu)^T \times \Sigma^{-1} (x - \mu)$ – Mahalanobis distance.

The abovementioned algorithm eliminates the problem of the existence of latent

To cluster the countries, the study uses algorithms for calculating expected estimates of statistical model parameters and maximising the logarithmic function of the likelihood of its statistical distributions:

1. determination of the expected value of the parameters' distribution of the competitiveness of HEIs and the corresponding value of the logarithmic likelihood function;
2. maximisation of the log-likelihood function by means of the appropriate replacement of distribution parameters;
3. algorithm actions until the increment of the log-likelihood function at some iteration becomes less than the given value:

variables and the incompleteness of data pertaining to the model parameters.

In the next stage, the study applies logit and probit models to estimate the probability of the net migration flow in the countries of the respective clusters exceeding its volume in the base cluster (the first one) and the probability of a change in the intensity of migration processes for each cluster:

$$Mig_i^* = \beta_i X_i + u_i \quad (4)$$

$$\begin{cases} Mig_i = 0, & \text{if } Mig_i^* < 0, \\ Mig_i = 1, & \text{if } Mig_i^* \geq 0 \end{cases} \quad (5)$$

where Mig_i^* – net migration flow in the country over the past five years; X_i – competitiveness of HEIs in the i -country of each cluster; β_i – estimated coefficient of the model; u_i – stochastic model error; Coef. – estimated coefficient; Prob. – statistical significance.

The research sample consisted of 33 European countries (Bulgaria, Croatia, Italy, Hungary, Malta, Portugal, Romania, Slovakia, Serbia, Ukraine, Germany, France, Great Britain, Belgium, the Czech Republic, Denmark, Estonia, Ireland, Latvia, Lithuania, Austria, Poland, Slovenia, Finland, Sweden,

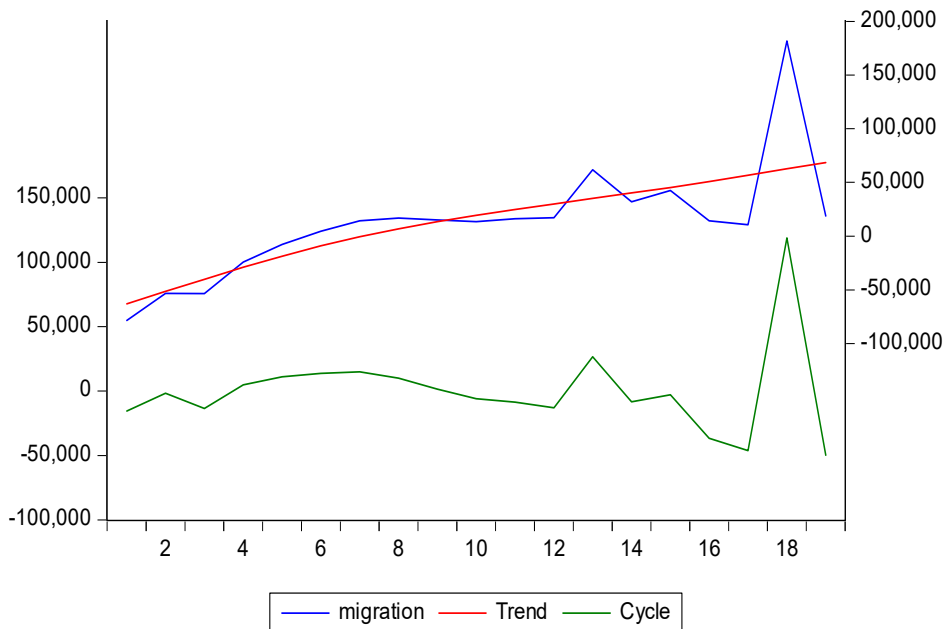
Iceland, Norway, Switzerland, Greece, Spain, Cyprus, Luxembourg, Turkey) and Ukraine. The study period is given as 2010 to 2020 due to the limited data of the parameters for the assessment of the competitiveness of higher education systems.

3. Research results

3.1. Assessment of Migration impact on SDGs

Considering the abovementioned methodology, the Hodrick-Prescott and Butterworth filters are applied to verify the inflection in time series data for the net migration flow index. The results of the Hodrick-Prescott and Butterworth filters are shown in Figures 2 and 3, respectively.

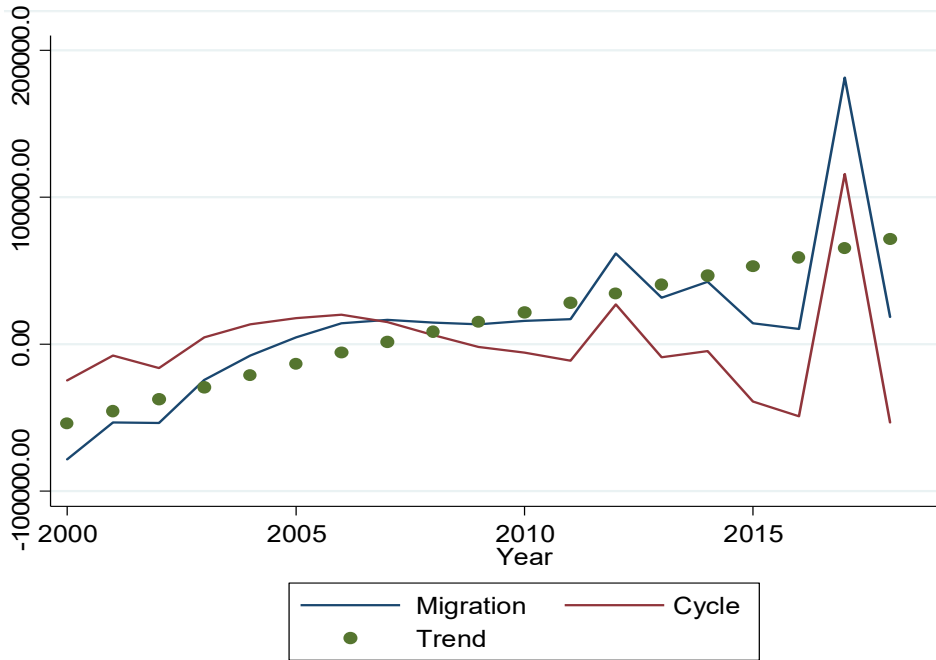
Figure 2. Fluctuations in the time series of net migration growth, according to the Hodrick-Prescott filter



Note: Trend – the trend component of the time series of net migration growth index; Cycle – the cyclical component of the time series of net migration growth index; migration – net migration growth index

Source: own elaboration

Figure 3. Fluctuations in the time series of net migration growth, according to the Butterworth filter



Note: Trend – the trend component of the time series of net migration growth index; Cycle – the cyclical component of the time series of net migration growth index; migration – net migration growth index

Source: own elaboration

The findings in Figures 2 and 3 confirm the high level of accuracy of the obtained results according to the Butterworth filter. This allows the researchers to consider the retrospective and actual data series and eliminate the phase transitions in the output time series compared to the input time series due to the use of a recurrent filter.

At the next stage, the study applies correlation analysis to verify the coincidence/noncoincidence of the changes in the net migration flow index in Ukraine and the trends of key indicators of SDG achievement (Table 2).

Table 2. The empirical results of the analysis of coincidence/noncoincidence of the changes in the net migration flow in Ukraine and the trends of key indicators of SDG achievement

Sustainable Development Goals	Symbols	Corel	Pr	V*
SDG1. Poverty alleviation, SDG10. Reducing inequality	P	-0.43	0.00*	-
	In	-0.72	0.00*	→
SDG3. Strong health and well-being	L	0.39	0.03	
	Ex	-0.34	0.06**	↗
SDG4. Quality education	Edh	0.56	0.00*	↗
	Eds	0.43	0.00*	↗
SDG5. Gender equality	Edsc	0.53	0.04**	↗
	Fem	-0.45	0.44	↗
SDG8. Decent work and economic growth	Un	-0.75	0.00*	↗
	GNI	0.73	0.00*	↗
SDG9. Industry, innovation and infrastructure	Exrd	0.58	0.00*	-
SDG13. Mitigation of the consequences of climate change	GHG	-0.69	0.00*	↗
SDG16. Peace, justice and strong institutions	CC	-0.67	0.00*	↗
SDG17. Partnership for sustainable development	Imp	0.45	0.67	↗

Notes: V* – the dynamics of achieving the Sustainable Development Goals according to the analytical report Sustainable Development Report 2021; Corel – the correlation coefficient of net migration growth index and the indicator of SGD achievement; – SDG achieved or highly likely to be completed by 2030; ↗ – the positive dynamic in terms of SDG achievement; → – stagnation, no progress toward SDG achievement; ↓ – negative dynamics in terms of SDG achievement; Pr – statistical significance at the level of 1% (*), 5%(**)

Source: calculated by authors

The most significant anticyclonic and cyclical statistical dependence with the net migration growth index was found for the unemployment rate (correlation coefficient – 0.75, statistical significance at the 1% level), income per capita (0.73, statistical significance at the 1% level), income inequality (-0.72, statistical significance at the 1% level), greenhouse gas emissions (-0.69, statistical significance at the 1% level), and the corruption index (-0.67, statistical significance at the 1% level). At the same time, the correlation coefficient is below 0.5 for the following indicators: quality education; partnership for sustainable development; gender equality; strong health and well-being; and

poverty risk. This means that Ukraine has not developed suitable conditions and institutional support for achieving the life-quality indicators of the SDGs.

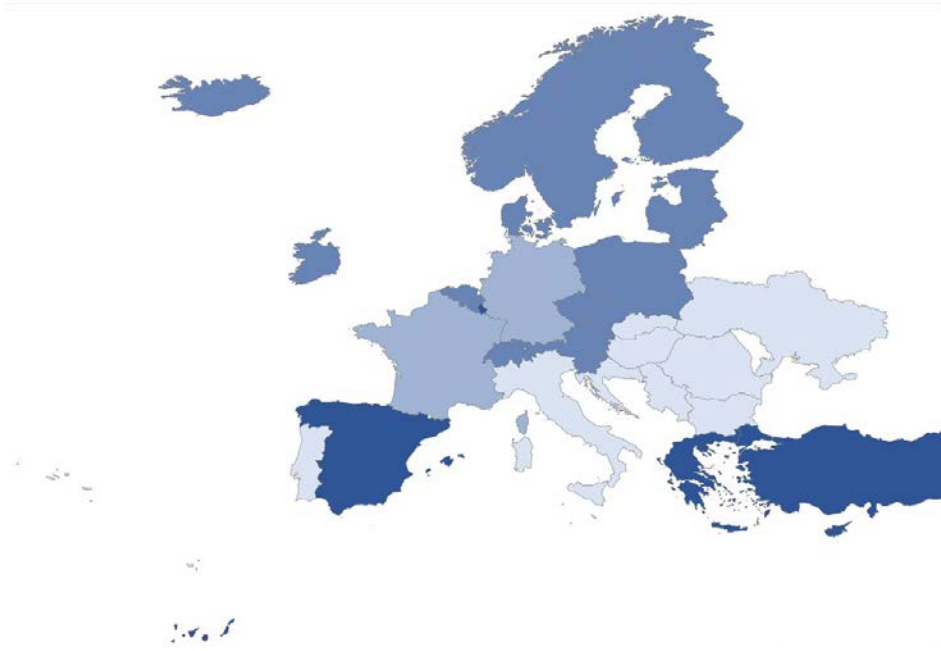
3.2. Assessment of the influence of the national system of higher education on attracting new labour resources to the country and reducing their outflow abroad

The results of the clustering of countries depending on the competitiveness of national higher education systems are shown in Figure 4. The first cluster includes 10 European countries, in which there is a change in conceptual approaches to the

management of the higher education system in the direction of the transition from state control to institutional autonomy. However,

the speed, mechanisms of reform and models of government financing of higher education differ in each country of the cluster.

Figure 4. The clustering of countries depends on the competitiveness of national higher education systems



Cluster	Country (probability of joining the cluster)
1 (light blue)	Bulgaria (1.00*), Croatia (0.96*), Italy (0.96*), Hungary (0.99*), Malta (0.95**), Portugal (0.97*), Romania (1.00*), Slovakia (0.98*), Serbia (1.00*), Ukraine (0.94**)
2 (blue)	Germany (1.00*), France (1.00*), Great Britain (1.00*)
3 (dark blue)	Belgium (1.00*); Czech Republic (0.98*), Denmark (1.00), Estonia (1.00*), Ireland (1.00*), Latvia (0.99*), Lithuania (1.00), Austria (1.00*), Poland (0.89), Slovenia (1.00*), Finland (1.00*), Sweden (1.00*), Iceland (1.00*), Norway (1.00*), Switzerland (1.00*)
4 (navy blue)	Greece (1.00*), Spain (0.96*), Cyprus (1.00*), Luxembourg (1.00*), Turkey (1.00*)

Source: own elaboration

The second cluster merges the following countries: Germany, France, and Great Britain. The key elements of their educational policy are broad opportunities for state financing of educational and scientific reforms of higher education, institutional autonomy of higher education institutions to manage funds, highly developed

university management, strong interaction of the academic environment with the business sector, the high quality of scientific research and the potential of scientific and pedagogical workers. The countries from the third cluster (15 EU countries) actively implement reforms in higher education and increase the number of private

education institutions. The fourth cluster focuses on the development of higher education through key performance indicators, and the distribution of state financial resources depends on the progress towards achieving these targets.

The results of the assessment of the probability of the net migration flow in the countries of the respective clusters exceeding its volume in the base cluster (the first one), as well as the probability of a change in the intensity of migration processes for each cluster, are shown in Table 3.

Table 3. Assessment of the probability of exceeding the base net migration flow and changes in the intensity of migration processes for each cluster

Cluster	Logit-model		Probit-model	
	Coef.	Prob.	Coef.	Prob.
<i>Probability of Mig in the relevant cluster exceeding Mig of the first cluster</i>				
2	2.891	0.074	1.712	0.064
3	0.811	0.512	0.439	0.501
4	0.811	0.598	0.439	0.599
<i>Probability of further changes Mig</i>				
1	0,101	0.292	0.101	0.292
2	0.667	0.014	0.667	0.014
3	0.234	0.053	0.234	0.053
4	0.221	0.264	0.221	0.264

Source: calculated by authors

The findings (Table 3) show that the forecast probability of growth in net migration flow is highest in countries from the second cluster (66.7%) and sufficient in countries from the third cluster (23.4%), while for countries from the first and fourth clusters, the probability of such growth is not statistically significant. In addition, the Ukrainian model of higher education does not contribute to the attraction of highly productive intellectual capital from abroad, but, on the contrary, brings about an increase in the risk of “intellectual labour emigration” (the so-called brain drain). The probability of the net migration flow in Germany, France, and Great Britain exceeding its value for Ukraine (and other countries in the second cluster) is maximised with a value of 2.89 (logit model) and 1.71 (probit model). In

addition, for Ukraine, there is no probability (prob. = 0.292) that the net migration flow will change in the future as a result of promising changes in the higher education system. On the other hand, in the countries from the second and third clusters, this probability is somewhat high.

Conclusions

The abovementioned results allow the authors to identify the anticyclonic and cyclical statistical dependence between the net migration growth index and indicators of SDG achievement. Thus, the net migration growth index has a statistically significant negative correlation with the unemployment rate, income inequality, greenhouse gas emissions, and the corruption index.

However, the statistically significant positive correlation is with income per capita. Considering the empirical findings on the coincidence/noncoincidence of the net migration flow index in Ukraine and the trends of key indicators of SDG achievement, the following policy implications could be developed:

1. renewal of agreements on cooperation with destination countries of Ukrainian migrants to legalise their temporary employment and guarantee them social and pension security. Implementation of measures to increase the financial literacy of migrants, including through the use of online technologies;
2. synchronisation of the databases of the State Migration Service of Ukraine with the electronic health care system (eHealth) to ensure timely medical assistance and ensure the implementation of the programme of medical guarantees for migrants. Consolidation at the legislative level of limits and time horizons for offering compensation to migrants as a result of damage to their property and health;
3. implementation of a cooperative model of institutional partnership between authorities and other business entities of the non-state sector to enhance formal and informal education. Updating the legal basis for the development of the life-long education system, and recognition of the results of informal education of migrants;
4. adoption of targeted programmes with co-financing projects of non-governmental, non-commercial or private organisations for legal and psychological support of female migrants who face violence and become victims of human trafficking;
5. implementing a points-based migration system depending on competencies (knowledge of a foreign language, level of education, seniority, work experience, etc.) for each of the groups of labour emigrants (highly qualified and skilled workers, students, temporary migrants) similar to the Canadian, Australian, or United Kingdom systems, etc., as well as offering a job search service according to their skills profile;
6. developing a working group to regulate issues of return migration among intellectual capital. Implementation of the practice of holding job fairs in the main destination countries to stimulate the return of domestic migrants to the country. Introduction of state scholarship programmes, including co-financing with non-governmental and international organisations, to activate educational and scientific immigration;
7. reducing corruption and increasing trust in state institutions by creating an information portal on the basis of the government website for migrants' support in the matters of employment, social and legal protection, economic and financial assistance, health care, entrepreneurship, etc.
8. development of legislation based on financial assistance (including state lending) to emigrants when starting their own businesses and the creation of investment funds to support their start-up projects, provided they are implemented in Ukraine. It is necessary to provide an online data exchange between Ukraine and partner countries to manage migration.

Despite the valuable findings, this study has several limitations. Thus, it is necessary to extend the horizon of the investigation and the number of countries analysed. This will allow Ukraine to be compared with other countries on the path to achieving SDGs. In addition, the study considers the linear linkages between selected variables. However, Ukrainian development is unstable and contradictory, which provokes a nonlinear relationship. Moreover, SDG

achievement requires the collaboration of all stakeholders and an increase in institutional quality. Thus, it is necessary to consider not only corruption but also state transparency, accountability, level of trust, freedom, etc.

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