# “Human capital, migration, and financial flows as drivers of post-crisis economic performance”


| | |
|---|---|
| **AUTHORS** | Olha Yeremenko<br>Zhanat Khishauyeva<br>Liqun Wei<br>Nataliya Stoyanets<br>Hlib Turoliev<br>Vladyslav Lavrukhin<br>Dmytro Kovalenko |



| | |
|---|---|
| **ARTICLE INFO** | Olha Yeremenko, Zhanat Khishauyeva, Liqun Wei, Nataliya Stoyanets, Hlib Turoliev, Vladyslav Lavrukhin and Dmytro Kovalenko (2025). Human capital, migration, and financial flows as drivers of post-crisis economic performance. *Knowledge and Performance Management*, *9*(2), 273-293. doi:10.21511/kpm.09(2).2025.19 |
| **DOI** | http://dx.doi.org/10.21511/kpm.09(2).2025.19 |
| **RELEASED ON** | Friday, 05 December 2025 |
| **RECEIVED ON** | Sunday, 26 October 2025 |
| **ACCEPTED ON** | Tuesday, 02 December 2025 |





| | |
|---|---|
| **JOURNAL** | "Knowledge and Performance Management" |
| **ISSN PRINT** | 2543-5507 |
| **ISSN ONLINE** | 2616-3829 |
| **PUBLISHER** | LLC “Consulting Publishing Company “Business Perspectives” |
| **FOUNDER** | Sp. z o.o. Kozmenko Science Publishing |

| NUMBER OF REFERENCES | NUMBER OF FIGURES | NUMBER OF TABLES |
|---|---|---|
| 61 | 10 | 3 |

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

**Type of the article:** Research Article

**Received on:** 26th of October, 2025
**Accepted on:** 2nd of December, 2025
**Published on:** 5th of December, 2025



Olha Yeremenko, Ph.D. Student, Sumy State University, Ukraine.

Zhanat Khishauyeva, Ph.D., Associate Professor, Department of Accounting and Audit, Buketov Karaganda National Research University, Republic of Kazakhstan. (Corresponding author)

Liqun Wei, Lecturer, School of Continuing Education of Bengbu University of China, China; Ph.D. Student, Sumy National Agrarian University, Ukraine.

Nataliya Stoyanets, Dr. in Economics, Professor of the Management Department named after Professor L. Mykhailova, Sumy National Agrarian University, Ukraine.

Hlib Turoliev, Ph.D. in International Economics, Associate Professor, Department of Finance, Kyiv National Economic University, Ukraine.

Vladyslav Lavrukhin, Ph.D. in Public Administration, Associate Professor, Department of Finance named after Viktor Fedosov, Kyiv National Economic University named after Vadym Hetman, Ukraine.

Dmytro Kovalenko, Ph.D. in Economics, Associate Professor of the Management Department, Faculty of Economics and Management, Kyiv National University of Technologies and Design, Ukraine.



**Conflict of interest statement:**
Author(s) reported no conflict of interest

**Olha Yeremenko** (Ukraine), **Zhanat Khishauyeva** (Republic of Kazakhstan), **Liqun Wei** (China, Ukraine), **Nataliya Stoyanets** (Ukraine), **Hlib Turoliev** (Ukraine), **Vladyslav Lavrukhin** (Ukraine), **Dmytro Kovalenko** (Ukraine)

# HUMAN CAPITAL, MIGRATION, AND FINANCIAL FLOWS AS DRIVERS OF POST-CRISIS ECONOMIC PERFORMANCE

## Abstract

The global recovery from recent economic, health, and geopolitical crises, including the COVID-19 pandemic and the Russia–Ukraine war, increasingly depends on how economies mobilize human capital, migration, and financial flows. This article examines how human capital and its reallocation through migration and remittances, under different institutional conditions and economic system types, relate to configurations of human capital, net migration, political stability, and remittances that support sustained post-crisis economic recovery. Using a panel of 73 economies from 2010 to 2023, the empirical strategy combines descriptive rankings, multiple linear regression (MLR), and decision-tree classification, with an 80/20 split of the sample, primarily drawing on the WDI. Descriptive patterns highlight large asymmetries in both migration and growth: some advanced and emerging economies combine sizeable net migration inflows with robust GDP growth, whereas conflict-affected and fragile states, including the Syrian Arab Republic, Yemen, and Ukraine, experience substantial net outflows alongside persistent output losses. However, regression results indicate that differences in human capital primarily drive cross-country variation in post-crisis growth: HCI is the only statistically significant predictor, while net migration, political stability, and remittances display small and insignificant linear effects ($R^2 \approx 0.15$; adjusted $R^2 \approx 0.10$; $n = 73$). Decision tree classification reveals complex, non-linear relationships between migration, human capital, financial flows, and economic recovery, with outcomes concentrated in economies that combine higher skills and sizable remittances with stable institutions, effectively converting them into productive human capital.

**Keywords** global migration, economic resilience, post-crisis recovery, human capital, remittances, economic systems, decision tree analysis, higher education, financial resources

**JEL Classification** F22, O15, O57, J61

## INTRODUCTION

Human capital – the stock of knowledge, skills, education, health, and experience embodied in people – is the fundamental intangible asset underlying productivity, innovation, and long-term growth. In the knowledge-based economy, managing this human capital, its formation, and its use is central to organizational and macroeconomic performance, particularly under conditions of crisis and recovery (Becker, 1964). Cross-border migration and migration-related financial flows (remittances) are key mechanisms through which human capital is reallocated and financed across countries: they redistribute skills and experience, and provide resources that can be invested in education, health, and entrepreneurial capabilities in origin and destination economies (Azizi, 2018). Global recovery from the overlapping shocks, especially the COVID-19 pandemic, geopolitical tensions, the war in Ukraine and the cost-of-living crisis is resilient but uneven, with weaker medium-term

growth and widening gaps between advanced and developing economies as many low- and middle-income countries face eroded fiscal buffers, high debt and the risk of falling further behind in jobs and income convergence (IMF, 2024). Higher unemployment, significant job gaps, informality, and skills mismatches characterize labor markets. In contrast, 167.7 million migrant workers, about 4.7% of the global labor force, are increasingly crucial in filling shortages in care, agriculture, and construction, yet face higher unemployment and more precarious conditions than non-migrants (ILO, 2024a, 2024b).

The crisis has also severely damaged global human capital: COVID-19 has eroded health, skills and education on a massive scale, with 10-30% of cross-country GDP per capita differences attributable to human-capital gaps and learning poverty in low- and middle-income countries rising to around 70% in 2022, implying potential losses of about 10% in future average annual earnings for current student cohorts without remedial action (World Bank, 2020, 2022). These setbacks deepen inequality and constrain the productivity of current and future workers, including migrants whose skills often bridge labor market gaps but whose qualifications and competencies may be underrecognized.

Financial flows, particularly remittances, form a third critical pillar of post-crisis adjustment: despite uncertainty, remittances to low- and middle-income countries have continued to grow and are projected to increase by 2.3% in 2024 and 2.8% in 2025, reaching about US$690 billion and often exceeding official development assistance and, in some cases, foreign direct investment (Ratha et al., 2024). These inflows help stabilize current accounts, smooth consumption in vulnerable households, and finance education and health investments that rebuild human capital, especially in countries hardest hit by debt stress, food insecurity, and climate shocks (Ratha et al., 2024).

At the same time, the Russian war against Ukraine has generated one of the largest displacement and labor-mobility shocks in recent European history, with more than 6 million refugees across Europe and millions more internally displaced, reshaping labor supply, skills allocation, and human capital formation both in Ukraine and in host countries. For Ukraine, the massive destruction of productive capacity and the outflow of skilled workers pose a significant threat to long-term growth and recovery. At the same time, remittances and earnings of Ukrainian migrants in neighboring EU states have become a crucial buffer for household welfare and a potential source of finance for reconstruction, placing the country at the core of debates on how migration, human capital, and financial flows can be harnessed for post-crisis rebuilding.

Against this backdrop, the topic chosen for research is highly relevant, as it sits at the intersection of labor mobility, human capital formation, and migration-related financial flows (notably remittances), three levers that, if better aligned through policy, can transform migration from a short-term coping mechanism into a strategic engine of inclusive and sustainable post-crisis economic recovery. In this article, the term 'crisis' refers to major economic and geopolitical shocks that generate sharp slowdowns or contractions in output, such as the global financial aftershocks of the 2010s, the COVID-19 pandemic, and regional armed conflicts, including the Russia-Ukraine war. Post-crisis economic recovery is understood as the phase in which economies return to and sustain positive growth following such shocks. This article, therefore, asks how global migration, human capital, and migration-related financial flows, conditioned by institutional quality and economic system type, jointly influence economic resilience and structural change during the post-crisis recovery. By systematically examining empirical data across diverse economic contexts, the study contributes to existing knowledge by providing nuanced insights into how these three dimensions shape post-crisis economic recovery, thereby guiding policymakers in designing integrated migration, skills, and financial-flow policies that support durable growth.


http://dx.doi.org/10.21511/kpm.09(2).2025.19

# 1. LITERATURE REVIEW

Existing research views human capital as the primary intangible asset driving productivity, innovation, and organizational performance, and emphasizes the management of skills, knowledge, and learning as central to economic resilience. The COVID-19 pandemic, the full-scale Russian invasion of Ukraine, trade and geopolitical tensions, and climate-related disturbances have jointly reconfigured the trajectories of output, employment, trade, and financial stability in both advanced and emerging economies (Chater & Soussou, 2023; Dobrovolska et al., 2024; Hakobyan & Margaryan, 2025; Pozovna et al., 2025; Tsymbal & Demediuk, 2025; Zozulinskyy, 2024). Post-crisis recovery is thus framed as a multidimensional process that must simultaneously restore macroeconomic stability, safeguard financial systems, mitigate security risks, and rebuild productive capacity, rather than merely returning GDP to pre-crisis levels (Firstová & Vysochyna, 2024; Kuzior et al., 2024). Empirical work links stock-market and banking-sector responses to these shocks with wider structural vulnerabilities and opportunities, highlighting that crises may accelerate financial innovation, reshape capital flows, and alter countries' relative positions in global value chains (Chater & Soussou, 2023; Hakobyan & Margaryan, 2025; Pozovna et al., 2025).

A complementary strand conceptualizes recovery through the lens of resilience, emphasizing how socio-economic, health, and environmental systems absorb and adapt to shocks. Studies show that the capacity to manage health risks and population behavior critically moderates pandemic-related damage and the speed of subsequent recovery (Ahmed & Akaak, 2024; Letunovska & Boliukh, 2023; Pozovna et al., 2023). Work on national security and post-pandemic recovery emphasizes the need to optimize socio-economic, environmental, and public health determinants in an integrated manner, with attention to demographic structures and institutional quality (Firstová & Vysochyna, 2024; Shkuropadska et al., 2024). Environmental and resource-productivity perspectives add further complexity, arguing that the sustainable use of natural resources and the alignment of growth with environmental quality are preconditions for a durable recovery (Aziz et al., 2024; Giyasova et al., 2025; Kálmán et al., 2025). The link between environmental stress, migration, and security highlights how climate and ecological pressures can trigger displacement and reshape labor supply, thereby influencing recovery prospects (Didenko et al., 2021).

Within this broader resilience framework, migration emerges as both a potential risk and a crucial adjustment mechanism. Classic and contemporary analyses show that international and internal migration reshape communities, networks, and local institutions under conditions of globalization, with implications for social cohesion and labor-market performance (Binci & Giannelli, 2018; Castles, 2002). Cross-country evidence indicates that migrant diversity can enhance innovation and long-run growth, but may also generate distributional tensions if integration is weak or institutions are fragile (Bove & Elia, 2017; Huang, 2020; Tutar et al., 2024). Spatial studies that leverage large-scale mobility data highlight how migration patterns impact urban economic resilience, showing that cities' ability to attract and retain mobile populations is closely tied to their capacity to recover from economic downturns (Chen et al., 2023). At the same time, research indicates significant social and security risks associated with international labor migration when sending or transit countries lack adequate social protection, regulatory capacity, and integration policies (Didenko et al., 2021; Kuzior et al., 2020). Demographic analyses of wartime Ukraine and Central and Eastern Europe reveal that population losses, ageing, and displacement erode demographic resilience, threatening long-term growth, human capital formation, and tax bases (Posheliuzhnyi, 2025; Shkuropadska et al., 2024; Zatonatskiy et al., 2024).

The education-migration-labor-market chain has been identified as a key channel through which migration affects human-capital allocation and post-crisis adjustment. Studies of national and regional systems argue that the structuring of this chain – from educational pathways to labor-market insertion – determines whether mobility translates into skills upgrading, brain gain, and productivity improvements or into structural skills mismatches and brain drain (Barvinok et al., 2023; Mukhtarova et al., 2024). Theoretical work on socio-economic transformations in edu-

cation emphasizes the importance of preventing the forced migration of educators and students, which can result in long-lasting losses of human capital and institutional capacity, particularly in conflict-affected and fragile states (Barvinok et al., 2024; Kuzior et al., 2020). Empirical analyses of student migration potential suggest that young people's mobility intentions are shaped by perceptions of opportunity, quality of education, and institutional trust, with implications for countries' future skills base and innovation capacity (Shutaleva et al., 2022). Wartime displacement further complicates this picture: evidence from Ukraine suggests social tensions between internally displaced persons and host communities that must be managed if the human capital accumulated through crisis-induced mobility is to be harnessed for recovery rather than becoming a source of fragmentation (Oliinyk et al., 2025). Brain-gain studies using OECD data indicate that well-designed institutions and inclusive labor markets can turn skilled migration into a resilience factor, strengthening adaptive capacity during crises (Mishchuk et al., 2024).

Human capital itself is a central driver of post-crisis reconstruction, influencing productivity, innovation, and the capacity to absorb new technologies. Firm-level and sectoral studies show that strategic human resource management and investment in skills can mitigate post-COVID challenges, stabilize employment, and support organizational adaptation in sectors such as retail and logistics (Ahmed & Akaak, 2024; Wahba et al., 2025). Cross-country analyses identify labor productivity as a function of institutional, technological, and demographic factors, linking higher productivity in advanced economies to favorable employment structures and robust public health systems (Kuzior et al., 2023; Lyeonov et al., 2025b). Macro-level research suggests that human capital development is fostered by greater economic freedoms and sound institutions, which jointly facilitate investment in education and skills upgrading (Muyambri, 2025; Yehorova & Drozd, 2024). Work on human development and environmental quality further notes that growth strategies that neglect environmental sustainability may undermine long-term human-capital outcomes through health damage and ecosystem degradation (Giyasova et al., 2025). Studies of vulnerability to COVID-19 and its behavioral determinants emphasize that population health behaviors and risk perceptions are integral components of human capital that affect both crisis exposure and recovery speed (Letunovska & Boliukh, 2023).

Sector-specific and institutional analyses reinforce the notion that human capital and knowledge assets underpin resilience in critical infrastructures and industries. Recent evidence from infrastructure-intensive and financial sectors indicates that investments in training, workforce skills, and intellectual capital enhance organizational adaptability and performance under socio-economic stress, thereby supporting broader economic recovery (Mustafa et al., 2024; Wahba et al., 2025). Country-level studies of human capital development using efficiency approaches, such as data envelopment analysis, reveal substantial cross-national variation in the effectiveness with which resources are transformed into educational and skills outcomes, underscoring the importance of governance and policy frameworks (Yehorova & Drozd, 2024). Analyses of resource productivity and sustainable economic goals, together with examinations of human development–environment linkages, argue that the quality of growth and the structure of production are tightly linked to the evolution of human capital and the capacity to pursue green recovery pathways (Giyasova et al., 2025; Kálmán et al., 2025). In agriculture and rural economies, the adoption of climate-smart technologies is viewed as both a technological and human capital challenge, necessitating extension systems and knowledge diffusion that enhance smallholders' adaptive capacity and mitigate the risk of distress migration (Aziz et al., 2024).

Financial flows associated with migration, especially remittances, form a second core channel through which mobility shapes post-crisis recovery. Early and recent work documents that remittance inflows to developing countries have exhibited remarkable stability relative to other capital flows, often behaving counter-cyclically and providing insurance during downturns (Beaton et al., 2017; Neagu & Schiff, 2009; Ratha et al., 2010). Analyses of concentration and volatility, however, show that reliance on a narrow set of corridors and destination countries can increase vulnerability to external shocks, underscoring the importance of diversification and


http://dx.doi.org/10.21511/kpm.09(2).2025.19

risk management (Hosny, 2020). Micro- and macro-level evidence links remittances to macroeconomic stabilization but also to relative-price and competitiveness effects, including real exchange-rate appreciation, with potentially ambiguous implications for tradable sectors (Amuedo-Dorantes & Pozo, 2004; Bettin et al., 2014). Other studies emphasize the role of remittances in alleviating liquidity constraints and financing human capital investments in education and health, thereby strengthening long-term growth potential (Azizi, 2018; Calero et al., 2009; Saydaliyev et al., 2020). The behavior of monthly remittances around natural disasters and crises provides further evidence that these flows act as private risk-sharing mechanisms, responding swiftly to shocks and supporting recovery in affected regions (Bettin et al., 2024).

The interaction between migration-related financial flows, broader capital movements, and domestic financial systems is also central to the recovery literature. Studies of Croatia's growth experience highlight the intricate nexus of foreign direct investment, remittances, emigration, and tourism, arguing that the composition and governance of these flows matter as much as their volume for post-crisis outcomes (Nikšić Radić & Bogdan, 2024). Work on ESG investments and global migration suggests that sustainable investment patterns can influence both push and pull factors, linking responsible finance to migration decisions and development trajectories in sending and receiving countries (Zatonatskiy et al., 2024). Analyses of emerging economies show that human capital and financial development jointly condition their ability to attract FDI, which in turn expands productive capacity and facilitates technology transfer during recovery periods (Tsaurai & Aboagye Danquah, 2025). Financial-sector studies highlight that intellectual capital in banks, combined with the development of FinTech infrastructures, enhances the intermediation of remittances and other migrant-related flows, facilitating better employment matching and a more efficient allocation of savings (Mustafa et al., 2024; Privara, 2025). At the same time, research on stock-market reactions to trade wars and geopolitical shocks demonstrates how external financial disturbances can either hinder or catalyze investment opportunities, depending on domestic institutions and investor expectations (Chater & Soussou, 2023; Pozovna et al., 2025).

A growing body of work explicitly situates migration and financial flows within a broader sustainability and inclusiveness agenda. Bibliometric mapping of the nexus between migration, financial environments, and sustainability reveals a rapidly expanding and increasingly interdisciplinary research field that connects migration studies, finance, environmental economics, and development policy (Lyeonov et al., 2025a). Cluster-based analyses of inclusive growth in EU member states highlight the importance of designing recovery strategies that leverage migration and human capital to expand opportunities, reduce inequality, and foster social cohesion (Saher et al., 2025). Studies of macroeconomic stability, demographic resilience, and national security provide additional evidence that post-crisis trajectories depend on how societies manage the interplay of population dynamics, human capital, environmental constraints, and financial flows, especially under conditions of war and systemic uncertainty (Firstová & Vysochyna, 2024; Posheliuzhnyi, 2025; Shkuropadska et al., 2024; Tsymbal & Demediuk, 2025).

The literature suggests that global migration, human capital, and financial flows jointly underpin post-crisis economic recovery. However, their effects are contingent upon institutional quality, demographic structures, and the configuration of financial systems. Migration can enhance resilience through diversity, remittances, and brain gain, yet also generate social and security risks when poorly governed. Financial flows can stabilize and finance human capital accumulation, but may amplify vulnerabilities when highly concentrated or weakly regulated. Taken together, existing research suggests the need for integrated policy frameworks that align migration management, human capital development, and financial sector reform with inclusive and sustainable recovery objectives.

This article aims to assess how global migration, human capital, and migration-related financial flows, together with institutional conditions, shape the likelihood of successful post-crisis economic recovery across different types of economies using cross-country econometric and decision-tree analysis.

# 2. METHODS

## 2.1. Data extraction

The core explanatory variable is the human capital index, capturing the stock of skills and knowledge. Net migration and remittances are included as mechanisms that affect the level and use of human capital. At the same time, political stability represents the institutional environment in which this human capital is deployed. The model relates these drivers to average GDP growth as an indicator of post-crisis economic performance. Based on a thorough quantitative analytical framework, this study examines how migration patterns impact economic stability and development in various types of economies. Based on World Bank classifications for the period 2010–2023, the study sample comprises a balanced selection of 72 nations grouped by economic type: market, mixed, and command.

The term "post-crisis economic recovery" was used to describe country episodes in which GDP per capita growth becomes and remains positive after at least one major shock from 2010 to 2023. From the World Development Indicators database (World Bank), data on net migration, GDP growth, political stability, human capital indices, and remittances were obtained. Indicators were combined to yield average values over the noted period. Operationally, a binary indicator equal to 1 for countries whose average growth in the three years following a crisis episode (defined as a year with GDP contraction of at least 2%) is positive and exceeds 2%, and 0 otherwise was constructed. Defined as a binary marker based on average GDP growth above the 2% threshold, the dependent variable "Successful Economic Recovery".

Independent variables included Migration Mean, Political Stability Mean, Human Capital Mean, Remittances Mean, and Economy Type (command, market, mixed), a categorical variable. To ensure the completeness and correctness of the dataset, interpolation and imputation of missing values were applied. Due to the uneven distribution of binary classes (successful vs. unsuccessful economic recovery), the synthetic minority oversampling technique was employed to balance the dataset, ensuring thorough model performance.

## 2.2. Data analysis

The analytical process is structured into several logical stages:

1. Model Development and Validation

2. Model development required a Decision Tree classifier due to its efficiency with categorical data and interpretability. To assess the model's predictive accuracy, the dataset was divided into training (80%) and testing (20%) sets.

3. Evaluation of Model Performance

4. Confusion matrices, classification reports (including precision, recall, and F1-score), and overall accuracy were used to evaluate performance. Feature importance scores were used to measure the impact of every predictor.

5. Robustness analyses and sensitivity studies

6. Particularly in terms of tree depth and minimum leaf size, additional robustness tests were conducted by varying model settings. Results were compared to ensure the reliability and consistency of the findings.

Using Python libraries Pandas, Scikit-learn, and Statsmodels, as well as visualization libraries Seaborn and Matplotlib, all statistical analyses were conducted.

This systematic approach provides a robust scientific foundation for understanding the complex effects of migration patterns on economic resilience, offering valuable insights for policymakers and economic strategists.

# 3. RESULTS

Over the period 2010–2023 (the study period), Table 1 reports the 10 countries with the highest average net migration inflows (positive values) and the 10 countries with the lowest average net migration (net outflows). The data reveal substantial variation between gravitational migration hubs (e.g., the United States and Germany) and countries that experience large labor outflows (e.g.,


http://dx.doi.org/10.21511/kpm.09(2).2025.19

**Table 1.** Top 10 and bottom 10 countries by average annual net migration, 2010–2023

| No. | Country Name | Average annual net migration | No. | Country Name | Average annual net migration |
|---|---|---|---|---|---|
| TOP-10: Inflow | | | TOP-10: Outflow | | |
| 1 | United States | 1,482,398 | 1 | Pakistan | –1,301,613 |
| 2 | Germany | 446,625 | 2 | Bangladesh | –913,537 |
| 3 | Russian Federation | 343,654 | 3 | India | –422,535 |
| 4 | Canada | 297,135 | 4 | Ukraine | –402,411 |
| 5 | United Kingdom | 296,379 | 5 | Venezuela, RB | –330,242 |
| 6 | Turkiye | 237,654 | 6 | China | –298,547 |
| 7 | United Arab Emirates | 200,292 | 7 | Syrian Arab Republic | –210,230 |
| 8 | Australia | 189,987 | 8 | Brazil | –184,229 |
| 9 | Malaysia | 174,974 | 9 | Philippines | –157,448 |
| 10 | Japan | 156,632 | 10 | Mexico | –148,971 |

Pakistan and Ukraine). Between 2010 and 2023, Ukraine experienced an average annual net outflow of approximately 0.40 million people, indicating sustained outward migration.

Table 2 presents the average GDP growth rates for nations with the most significant economic progress and those with the most notable downturns over the past decade. As seen, South and Southeast Asian nations have been experiencing consistent economic development, whereas nations affected by conflicts and structural crises have seen negative or almost zero growth.

Drawing on the comparative study of Tables 1 and 2, several theories about the link between average migration and economic development in the post-crisis phase may be developed.

In nations with strong institutions, the inflow of migrants corresponds with higher GDP growth. Though not the highest, the top 10 nations with the most stable positive GDP growth (GDP Growth Mean > 2%) from the inflow of migrants are the United States, Germany, Canada, and Australia. Strong economies with sophisticated labor markets and consistent political structures can effectively incorporate immigrants into production systems. This helps to maintain innovation and stability in the economy.

Structural vulnerability is indicated by strong emigration from nations with low GDP growth. Most of the nations (Pakistan, Bangladesh, Ukraine, Venezuela, Syria) with the highest negative migration rates also often have low or perhaps negative GDP growth rates. Economic and political instability is indicated here, which prevents nations from retaining their own human capital and making up for its loss (Sirkeci et al., 2012; Ratha et al., 2023).

Rapid economic development in certain nations (China, India, Bangladesh), together with both population inflows and outflows, calls for more in-depth analysis. For instance, China is among the top 10 countries experiencing high population

**Table 2.** Top 10 and bottom 10 countries by average GDP growth rates, 2010–2023

| No. | Country Name | Average GDP growth rates (%) | No. | Country Name | Average GDP growth rates (%) |
|---|---|---|---|---|---|
| TOP-10: The highest growth | | | TOP-10: The lowest growth | | |
| 1 | Ethiopia | 8.67 | 1 | Syrian Arab Republic | –3.99 |
| 2 | Turkmenistan | 7.86 | 2 | Yemen, Rep. | –3.58 |
| 3 | China | 7.00 | 3 | Sudan | –2.52 |
| 4 | Tajikistan | 6.97 | 4 | Ukraine | –2.50 |
| 5 | Uzbekistan | 6.41 | 5 | Greece | –1.09 |
| 6 | Bangladesh | 6.29 | 6 | Italy | 0.16 |
| 7 | India | 6.22 | 7 | Finland | 0.26 |
| 8 | Lao PDR | 6.01 | 8 | Venezuela, RB | 0.43 |
| 9 | Viet Nam | 5.98 | 9 | Japan | 0.49 |
| 10 | Cambodia | 5.96 | 10 | Spain | 0.78 |

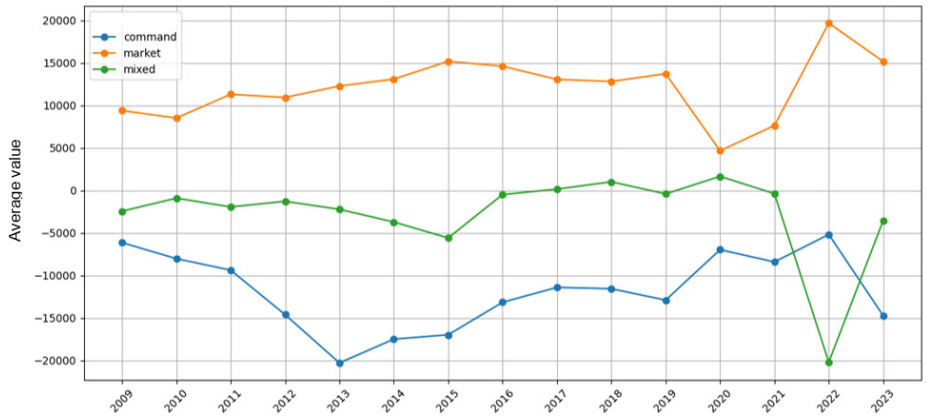



**Figure 1.** Average net migration by type of economy (2009–2023)

outflow, as well as one of the countries with high economic development. This suggests an imbalance in regional growth and possible "opportunity migration," whereby a mobile population is dissatisfied with the quality of life even in an expanding economy.

The review of these tables justifies the development of an economic resilience model that incorporates migration, economic type, political stability, and human capital. This forms the basis of further modelling in Python, where migration is a key factor in classifying a successful economic recovery.

The discovered patterns vary greatly according to the type of economy. Even in the face of migration issues, market economies exhibit the most consistent positive GDP growth rates. In contrast, command economies remain the most susceptible to change, with mostly negative average rates. Mixed economies sit in the middle; they have great sensitivity to political shocks and external transfers but also relative flexibility. Consequently, the type of economy significantly affects one's ability to meet the demands of global migration.

Figure 1 illustrates the variation in average net migration across three categories of economies from 2009 to 2023. Market economies consistently show strong positive values; command systems, on the other hand, exhibit negative values over the period. Mixed economies with zero around indicate their instability in terms of migration processes. Global crises (COVID-19, the war in Ukraine) affecting migration patterns, that is, spikes or dips, are probably behind the anomalies in 2022–2023.

In addition, Figure 2 reveals how average migration affects average GDP increase, considering both the economy type (colors) and the degree of political stability (marker size). Although the overall weak negative correlation suggests otherwise, it is evident that nations with greater political stabil-

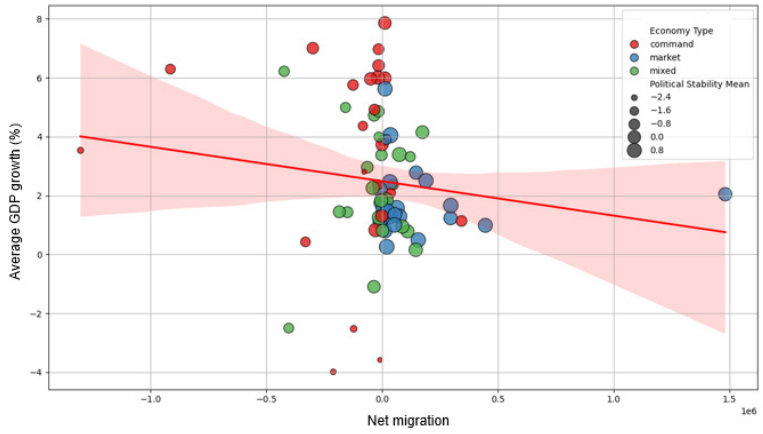



**Figure 2.** Impact of average migration and economic system type on GDP growth (2010–2023)


http://dx.doi.org/10.21511/kpm.09(2).2025.19

ity (larger markers) are more likely to experience positive development, even under high migration. Command economies (red) tend to have weak or negative growth regardless of the extent of migration; market economies (blue) are concentrated in the upper right quadrant. This lends support to the idea that the institutional quality and type of economic model primarily determine the degree to which adaptation to migration is successful.

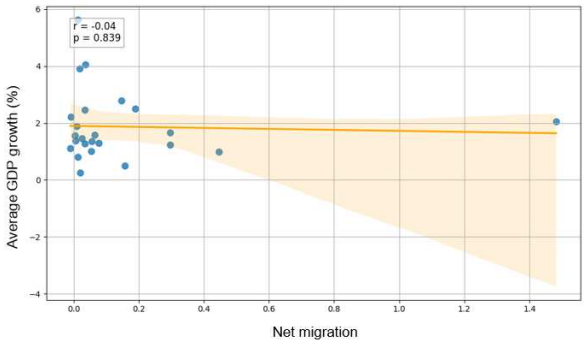
To generate Figures 3(a), 3(b), and 3(c), an aggregated regression analysis was carried out on data split according to economic types: market, mixed, and command. For each group, an examination was provided on how average GDP growth (y-axis) over the years 2010–2023 related to net migration (x-axis). The scatter plots show fitted regression lines and confidence ranges for country-level data points. The legend's Pearson correlation coefficients (r) and p-values help to gauge the strength and statistical significance of the relationship.

According to the regression study for market economies (Figure 3a), net migration and GDP growth have a very low correlation ($r = -0.04$, $p = 0.839$); hence, no major linear relationship exists. Although some nations have high rates of net migration, this factor alone does not seem to predict better economic performance within this group.

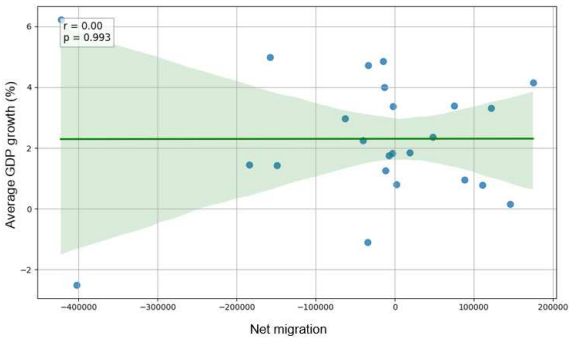
Results for mixed economies (Figure 3b) ($r = 0.00$, $p = 0.993$) further show no correlation whatsoever. These heterogeneous systems and varied policy reactions suggest that migration flows neither directly support nor impede GDP growth.

Among command economies (Figure 3c), the negative correlation ($r = -0.08$, $p = 0.695$) is also statistically insignificant. The broader confidence interval, however, indicates greater volatility and variation in results. This could result from either structural inefficiencies in these systems or low absorptive capacities in handling population inflows and outflows.

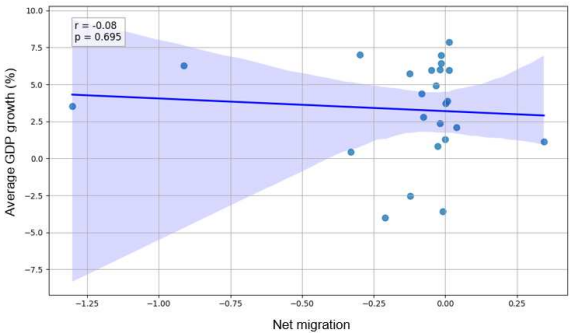
Generally speaking, these findings suggest that the impact of migration on economic development is highly context-dependent, and the type of economy is a critical moderating factor. To more accurately reflect the complexity of these dynamics, future studies should include more explanatory factors (e.g., remittances, human capital, labor market flexibility).




(a) in Market Economies




(b) in Mixed Economies




(c) in Command Economies

**Figure 3.** Impact of net migration on GDP growth (2010–2023)

**Table 3.** Results of multiple linear regression analysis on GDP growth (2010–2023)

| Variable | Coefficient | Std. Error | t-value | p-value | 95% Conf. Interval |
|---|---|---|---|---|---|
| **Intercept** | 8.3663 | 2.537 | 3.297 | 0.002 | [3.303, 13.429] |
| Migration Mean | –3.873e–07 | 9.75e–07 | –0.397 | 0.692 | [–2.33e–06, 1.56e–06] |
| Human Capital Mean | –9.0600 | 3.807 | –2.380 | 0.020 | [–16.656, –1.464] |
| Political Stability Mean | 0.7338 | 0.470 | 1.561 | 0.123 | [–0.204, 1.672] |
| Remittances Mean | 0.0584 | 0.048 | 1.225 | 0.225 | [–0.037, 0.154] |

This regression model in Table 3 was constructed to assess the combined effect of migration, human capital, political stability, and remittance inflows on average GDP growth in the period 2010–2023. The model exhibits moderate explanatory power, with an $R^2$ of 0.151, indicating that approximately 15% of the variance in GDP growth across countries can be attributed to the independent variables included.

Model summary:

- $R^2 = 0.151$, Adjusted $R^2 = 0.101$;
- F-statistic = 3.020, Prob(F) = 0.0236;
- Observations = 73;
- Durbin–Watson = 2.040.

The regression results show that the human capital index is the only statistically significant predictor of post-crisis growth. In contrast, net migration, political stability, and remittances have small and insignificant linear effects. This underscores that differences in skills and knowledge stocks, rather than migration volumes as such, are central to cross-country variation in recovery performance.

Migration Mean had a non-significant and practically zero coefficient (p = 0.692), indicating that, on average, net migration does not exhibit a distinct linear relationship with economic growth across nations. This supports the earlier graphical analyses (Figures 2-5), which showed that most correlations were uncertain or weak.

At first glance, the Human Capital Mean's statistically significant negative influence (p = 0.020) seems counterintuitive. One possible explanation is that in many nations with high human capital ratings (e.g., developed economies), GDP growth has been lower due to post-crisis stagnation, ageing populations, or diminishing returns. This outcome could indicate either restrictive features in innovation diffusion or structural limits in labor market connectivity.

Mean Political Stability shows a positive but statistically insignificant influence (p = 0.123). Stable governance generally promotes development, but the findings imply that other latent variables (e.g., corruption, conflict legacy, and institutional quality) could alter its actual impact.

Although it has a positive coefficient, the mean of remittances does not have statistical significance (p = 0.225). Although remittances are often thought to drive investment and consumption, their impact may be situational or time-delayed.

Although the model fulfils conventional diagnostic criteria (e.g., Durbin–Watson ≈ 2.0, suggesting no autocorrelation), moderate skewness and kurtosis (Jarque-Bera p = 0.0005) indicate that residuals deviate from normality, which should be considered when interpreting the results.

The separate effects of key variables, including political stability, human capital, and remittance inflows, are further examined across various types of economies to understand the underlying drivers of GDP growth. Average political stability and economic growth are shown in Figure 8 to be somewhat related. Although a minor upward trend can be observed, the variation in values, particularly for nations with mixed economies, suggests an erratic impact of political circumstances on macroeconomic performance. Interestingly, some countries with negative stability ratings still exhibited moderate to high GDP growth, suggesting the existence of compensatory processes, such as remittance dependence or reliance on natural resources.

The correlation between the human capital index and GDP growth is investigated in Figure 5.


http://dx.doi.org/10.21511/kpm.09(2).2025.19

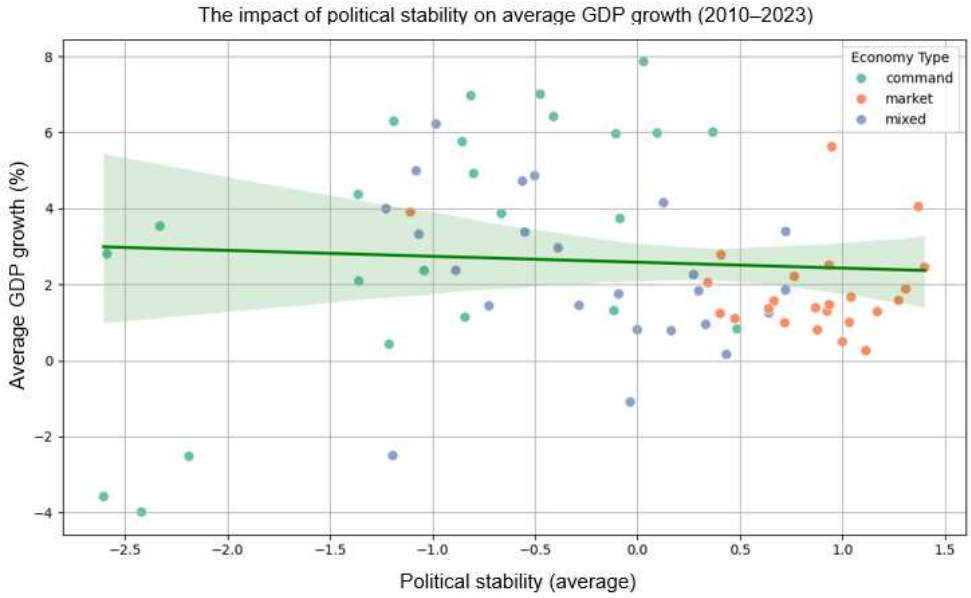



**Figure 4.** Impact of political stability on average GDP growth (2010–2023) across different types of economies

Against expectations, the trendline shows a small negative correlation. In developing and post-transition nations, where higher levels of education do not always result in productivity gains, this can be attributed to structural mismatches between educational institutions and labor market demands. Moreover, command-feature economies (red dots) appear to cluster at the lower end of the human capital spectrum yet exhibit above-average growth, possibly driven by centralized economic stimuli or targeted industrial projects.

Conversely, Figure 6 reveals a more logical positive correlation between remittances (as a percentage of GDP) and economic development. Significant remittance-inflow nations, such as Nepal, Kyrgyzstan, and El Salvador, tend to be buffered from global economic shocks by increased household consumption and local investment, thereby cushioning them. This is especially notable in command and mixed economies, which could lack varied internal capital markets. Such results fit with recent IMF evaluations of the stabilizing impact of remittances in low-income nations.

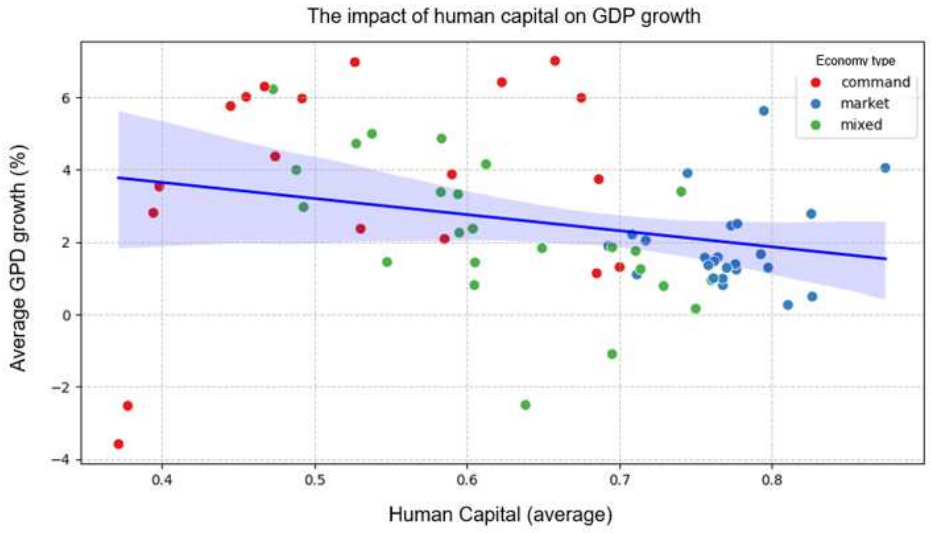



**Figure 5.** Relationship between the human capital index and average GDP growth (2010–2023) by economic model

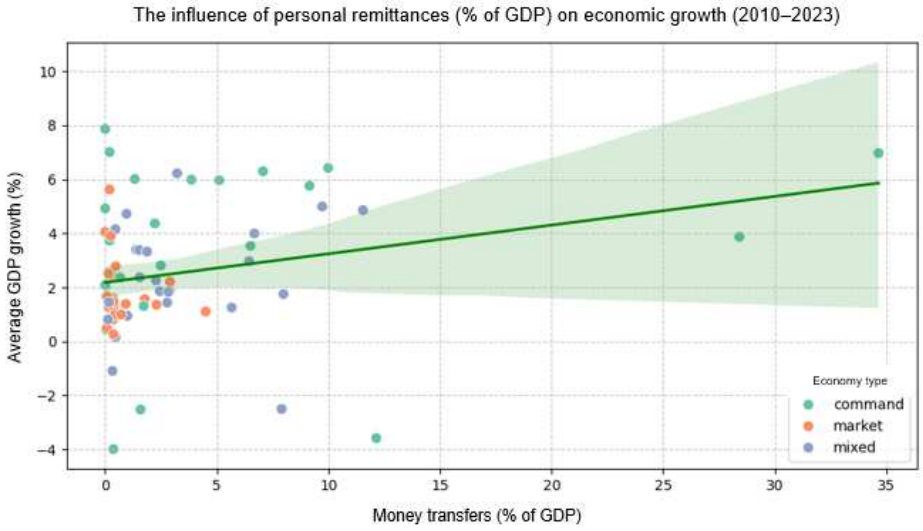



**Figure 6.** Influence of personal remittances (% of GDP) on economic growth (2010–2023), differentiated by economy type

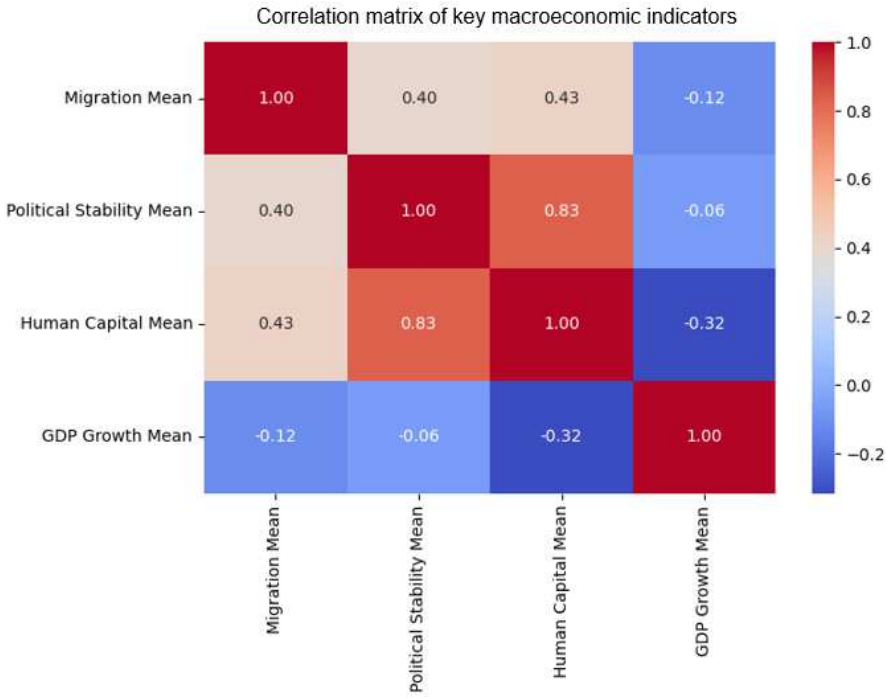



**Figure 7.** Correlation matrix of key macroeconomic indicators (migration, political stability, human capital, and GDP growth)

Finally, Figure 7 presents a correlation matrix of the principal variables, thereby strengthening the previously noted statistical relationships. Migration has a weak or insignificant relationship with GDP growth (r = –0.12). However, human capital and political stability both show a moderate positive correlation with each other (r = 0.83), yet only a weak negative association with growth. These findings support resolving multicollinearity issues in the OLS regression model and underscore the non-linear, context-dependent character of development dynamics.

These visualizations, taken together, highlight the intricacy of migration-induced economic change, in which the effect of human capital and sociopolitical elements varies markedly under different economic systems. However, remittances appear


http://dx.doi.org/10.21511/kpm.09(2).2025.19

to be a fairly stable predictor of development; the variable's impact on migration and education suggests the necessity of more sophisticated policy instruments tailored to institutional frameworks.

Knowing that human capital and remittances correlate most strongly with economic performance, policymakers in various systems should deftly customize migration policies to maximize these indices.

Due to their open economic frameworks and flexible labor markets, nations with market economies usually show great adaptability. These economies can take advantage of migration flows by drawing in qualified candidates who fill important job shortages, therefore promoting innovation and, via remittance flows, boosting local demand. However, if local employees perceive unfair competition from migrants, excessive reliance on migration could exacerbate socioeconomic inequality or distort the employment market. Therefore, to preserve social cohesion and sustainable development, policymakers should carefully balance liberal immigration policies with strong labor protection measures and investment in local skill development.

Through greater state control over economic activities in command economies, this enables the focused distribution of migrant labor into priority sectors. Structured methods like these can facilitate technological advancements and rapid infrastructural development in the near term. Still, strict government controls could restrict migrants' business activities and full economic incorporation, thereby impeding long-term innovation and fostering reliance on ongoing state support. Effective policies here would involve easing bureaucratic restrictions, promoting entrepreneurial activities among migrants, and incentivizing localized development to diversify economic outputs sustainably.

Mixed economies, which combine market and command system features, benefit from their capacity to adopt flexible, hybrid policy responses to migration. They can deliberately direct migration into regions of economic scarcity, therefore fostering private sector dynamism and guaranteeing fair resource distribution. Still, the natural complexity of governance and policymaking in mixed economies may lead to conflicting applications and regulatory uncertainty. Therefore, policymakers should aim for open, logical migration policies that combine private sector demands with social goals, so that migration properly strengthens economic resilience without jeopardizing domestic stability.

Understanding these subtle interactions lets nations from different economic backgrounds implement scientifically supported migration policies. Nations can successfully utilize migration as a driver of long-term economic resilience and sustainable structural transformation during post-crisis recovery phases by strategically leveraging human resources and remittance inflows, and meticulously examining their unique economic environments.

The decision tree classification model was applied to further investigate the intricate interplay between migration patterns and economic rebound. This analytical method was selected because of its interpretability and capacity to capture nonlinear relationships, thereby enabling us to analyze the complex processes underlying the varied nations' GDP recovery, whether successful or poor. Furthermore, highlighting the hierarchy and interactions of important variables, such as Human Capital, Political Stability, Net Migration, and Remittances, the use of a decision tree offers visual clarity.

Figure 8 illustrates the precise structure of decision tree classification, clearly highlighting at each node, based on specific threshold values, how choices are made. Evolving as the most significant factor at the very apex, the Human Capital Mean establishes a threshold of 0.68. Countries falling below this threshold almost certainly have different prospects for successful economic recovery than those exceeding it. This first split highlights the crucial role of human capital development in determining a country's economic path. On the following branches, the model examines the subtleties of political stability more specifically and indicates a crucial secondary influence. In nations with more human capital, lower political stability thresholds significantly reduce the probability of recovery, thereby highlighting the combined effect of societal cohesion and governance quality.

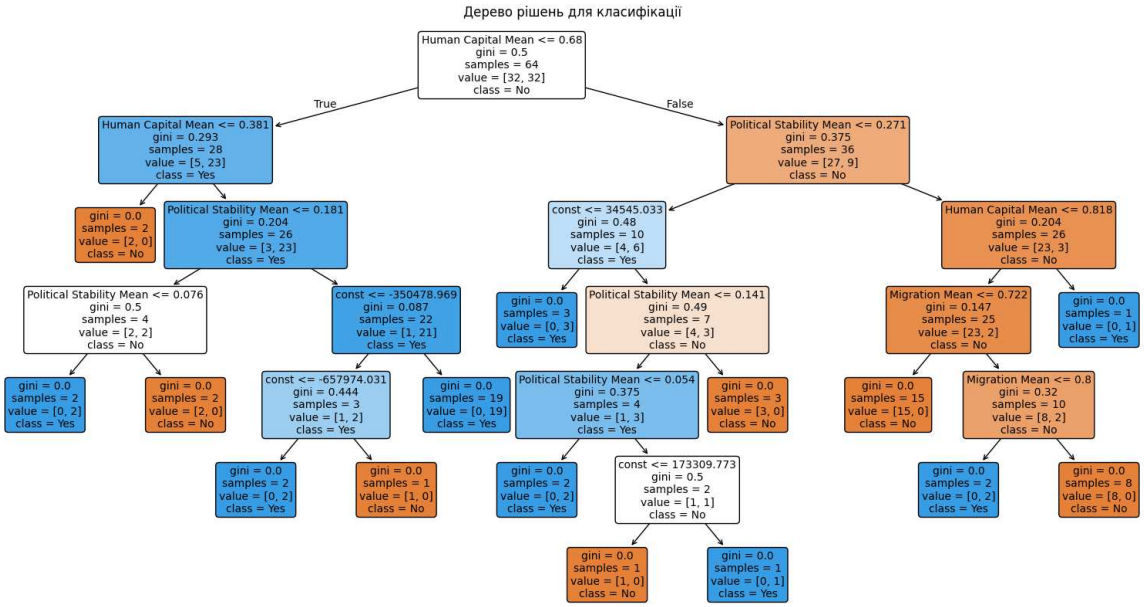



**Figure 8.** Decision tree for classifying successful economic recovery based on key migration-related indicators

The tree's lower branches help us understand conditional connections between Migration Mean and Remittances by exposing them. Especially, the effects of migration manifest differently depending on earlier circumstances, including political stability and human capital. In fields marked by moderate to high human capital and political stability, migration elements seem to have less impact. Conversely, sectors with instability or lower human capital see migration becoming a key factor that significantly affects country classification. Figure 8 provides a nuanced perspective, indicating that the influence of migration on economic recovery is sensitive to the environment and typically acts as a compensatory mechanism, particularly when other favorable elements are scarce.

Overall, Figure 8 not only confirms the initial theoretical ideas on the interaction between human capital, political stability, and migration patterns but also provides a sophisticated framework for policy development. Decision-makers should, therefore, view these results as evidence that improving human capital and ensuring political stability provide a vital foundation upon which migration and remittance inflows can sustainably support post-crisis recovery.

Figure 9 illustrates the relative significance of each factor used in the classification model. Human Capital Mean stands out clearly as the most powerful influence, representing roughly 46% of the total importance. The mean of remittances follows as the second most important predictor, accounting for approximately 29% of the variation in the results. Although still significant, migration mean and political stability mean have comparatively lesser roles, each contributing roughly 13% and 12%, respectively. Interestingly, the created decision tree model found no significant contributions from the variables representing market and mixed economies. This result implies that, within the analytical structure, the economic type alone has no significant impact on the independent success or failure of GDP recovery. Rather, more general socioeconomic elements, such as human capital and remittance inflows, greatly eclipse simple economic system classifications.

Focusing on Figure 10, a thorough side-by-side comparison of the actual and projected results generated by the model is evident. The graph helps to clarify how well the model represents the actual trends of economic recovery categorization across surveyed observations. Generally speaking, the model shows good alignment with real outcomes and captures the main variations and trends. It is also evident, though, that in some situations, especially at the extreme ends of fast changes between recovery and non-recovery outcomes, the model


http://dx.doi.org/10.21511/kpm.09(2).2025.19

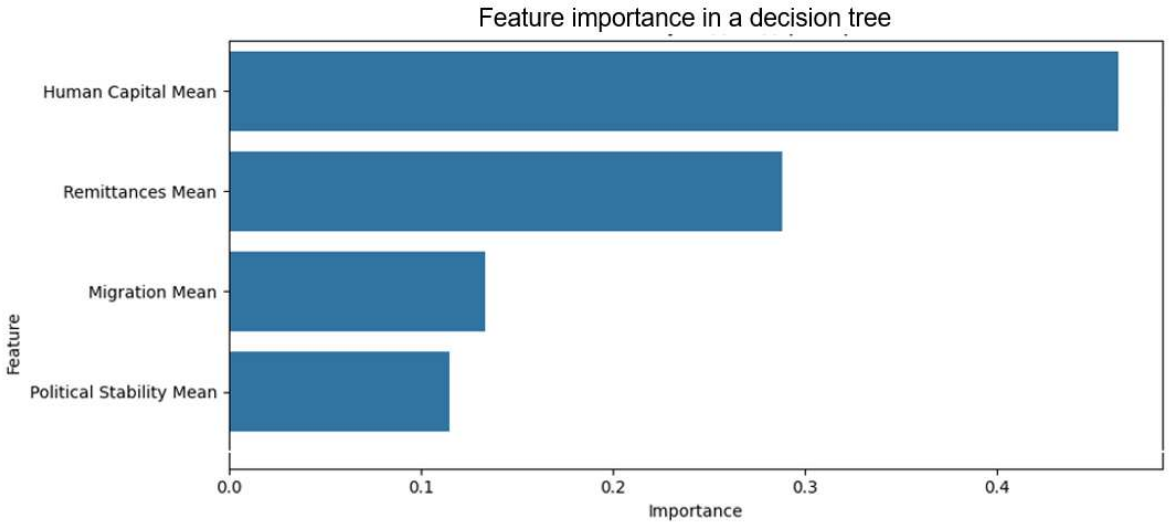



**Figure 9.** Feature importance in a decision tree classification model

slightly adjusts these variations to reflect a more conservative predictive position. Though there are slight differences, the model's overall predictive power is strong, indicating that the selected attributes and approach successfully capture the underlying economic processes.

Combined, Figures 9 and 10 strengthen earlier analytical results by verifying the pivotal role of remittances and human capital in promoting post-crisis economic resilience. At the same time, these results provide policymakers with useful practical advice: investments targeting human capital infrastructure, improving skill development, and leveraging migrant remittances may present efficient levers to promote better economic recovery outcomes, regardless of the underlying economic system.

Decision-tree classification reinforces this pattern: the most important splits are based on human capital and remittances, rather than on raw migration volumes or the type of economic system. Successful recovery nodes are consistently associated with higher human capital and remittance inflows combined with at least moderate political stability.

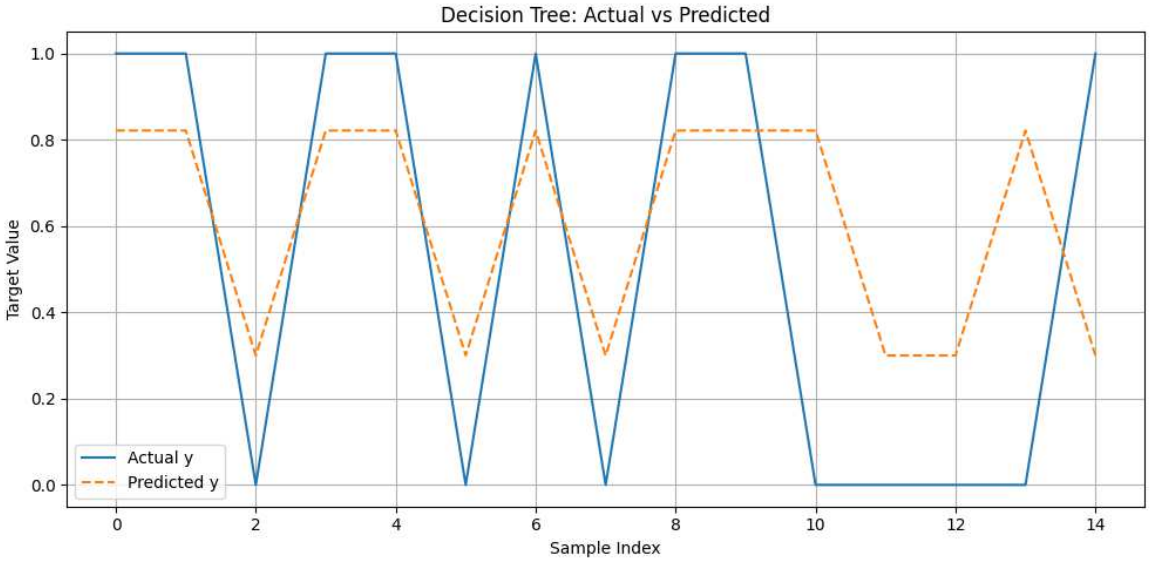



**Figure 10.** Comparison of actual and predicted values for the target variable (GDP recovery) in the decision tree model

# 4. DISCUSSION

The results indicate a nuanced, non-linear relationship between migration, human capital, financial flows, and post-crisis recovery, partly confirming but also qualifying earlier findings. Large net inflows in countries such as the United States and Germany coincide with solid, though not exceptional, growth. At the same time, fast-growing economies like Ethiopia, Turkmenistan, and China exhibit different migration patterns alongside strong economic performance. This supports the view that migration and diversity foster long-run growth mainly when backed by supportive institutions and structures, rather than serving as an automatic engine of expansion (Bove & Elia, 2017; Castles, 2002; Huang, 2020; Chen et al., 2023; Tutar et al., 2024). At the same time, the negative growth paths of conflict-affected, fragile states such as Syria, Yemen, and Ukraine show how security shocks, institutional collapse and demographic losses can outweigh potential benefits from migration or human capital, confirming evidence on security, resilience and wartime economies (Didenko et al., 2021; Dobrovolska et al., 2024; Firstová & Vysochyna, 2024; Posheliuzhnyi, 2025; Tsymbal & Demediuk, 2025; Zozulinskyy, 2024).

The weak explanatory power of the linear model and the negative human-capital coefficient indicate that simple linear specifications cannot adequately reflect how skills, migration, and institutions shape recovery, even though human capital is widely recognized and empirically supported as a core driver of productivity and resilience through its links with labor productivity, health, and institutional quality (Ahmed & Akaak, 2024; Giyasova et al., 2025; Kuzior et al., 2023; Lyeonov et al., 2025; Muyambri, 2025; Yehorova & Drozd, 2024). The negative coefficient is best seen as a product of non-linearities, interactions, and threshold effects, not as evidence that human capital hinders recovery. This aligns with research showing that its developmental impact depends on labor-market integration, institutional quality, and exposure to shocks such as pandemics and wars, which can produce underemployment, "brain waste" or skilled emigration even in well-educated societies (Barvinok et al., 2024; Kuzior et al., 2020; Letunovska & Boliukh, 2023; Mishchuk et al., 2024; Oliinyk et al., 2025; Shkuropadska et al., 2024).

The decision-tree analysis complements the linear results by showing that, once non-linear interactions are allowed for, human capital and remittances emerge as strong predictors of successful recovery. Sustained post-crisis growth is associated with higher human capital, sizeable remittance inflows, and at least moderate political stability. In contrast, low skills and limited remittances tend to coincide with unsuccessful recovery even when migration is high, echoing evidence that resilience depends on how the education-migration-labor-market chain and institutional quality convert mobility into "brain circulation" rather than skills loss, particularly in Central and Eastern Europe and conflict-affected countries (Ahmed & Akaak, 2024; Aziz et al., 2024; Firstová & Vysochyna, 2024; Giyasova et al., 2025; Kálmán et al., 2025; Wahba et al., 2025).

The findings on remittances broadly confirm earlier work but in a more qualified way: previous studies show that they are relatively stable, often counter-cyclical insurance flows that smooth consumption, ease liquidity constraints and finance education and health, yet may also induce exchange-rate appreciation and competitiveness pressures, while this article finds only a modest, insignificant linear effect on growth but a strong role in successful recovery paths when combined with higher human capital, political stability, sound financial intermediation and opportunities for productive investment in skills, entrepreneurship and local infrastructure (Amuedo-Dorantes & Pozo, 2004; Azizi, 2018; Beaton et al., 2017; Bettin, et al., 2014, 2024; Calero et al., 2009; Mustafa et al., 2024; Neagu & Schiff, 2009; Nikšić Radić & Bogdan, 2024; Privara, 2025; Ratha et al., 2010; Saydaliyev et al., 2020; Tsaurai & Aboagye Danquah, 2025; Zatonatskiy et al., 2024). At the same time, classifying economies as market, mixed or command systems does not emerge here as a dominant determinant of recovery once migration, human capital, remittances and stability are included, supporting the view that institutional quality, macroeconomic stability, social policy and sustainability strategies – and their specific configurations, matter more for resilience than formal regime labels (Firstová & Vysochyna, 2024; Giyasova et al., 2025; Kálmán et al., 2025; Kuzior et al., 2024; Letunovska & Boliukh, 2023; Lyeonov et al., 2025; Saher et al., 2025). Finally, the coexistence of high-growth, high-migration perform-


http://dx.doi.org/10.21511/kpm.09(2).2025.19

ers and low-growth, high-emigration countries in the sample underscores the ambivalent role of migration in post-crisis recovery: it can alleviate labor shortages, enhance diversity and channel remittances and knowledge where infrastructure and FinTech support productive use of inflows, yet persistent mass emigration from states with weak institutions, high social risks and war-related insecurity signals structural vulnerability and erosion of human capital, as illustrated by Ukraine and other displacement-affected contexts (Beaton et al., 2017; Didenko et al., 2021; Kuzior et al., 2020; Oliinyk et al., 2025; Posheliuzhnyi, 2025; Tsymbal & Demediuk, 2025; Wahba et al., 2024).

## CONCLUSION

This article examined how human capital and its reallocation through global migration and migration-related financial flows, in interaction with institutional conditions and economic system types, shape the prospects of successful post-crisis economic recovery. Using the World Development Indicators for more than 70 countries from 2010 to 2023, the study combined cross-country descriptive analysis, multiple linear regression, and a decision-tree classifier to link net migration, human capital, political stability, and remittances to a binary outcome of "successful recovery."

Empirically, the results highlight strong asymmetries in both migration and growth: some economies such as the United States and Germany attract large average net inflows (around 1.5 million and 0.4 million persons per year respectively), while countries including Pakistan, Bangladesh and Ukraine experience sizeable net outflows, and growth outcomes range from average rates above 7-8% in Ethiopia, Turkmenistan, China and Tajikistan to persistently negative values in conflict-affected states such as the Syrian Arab Republic, Yemen and Ukraine. The linear regression explains only a modest share of cross-country growth variation ($R^2 \approx 0.15$), with human capital being the only statistically significant predictor. In contrast, net migration, political stability, and remittances show small and insignificant linear effects, suggesting the presence of non-linear and threshold relationships. Decision-tree results confirm that higher human capital and remittance inflows, combined with at least moderate political stability, are more strongly associated with successful recovery than raw migration volumes or simple market–mixed–command system classifications, underscoring that recovery depends less on migration per se than on how migrant-related skills and financial flows are transformed into productive and inclusive human capital within supportive institutions.

From a policy perspective, these findings suggest the need for integrated strategies that jointly manage migration, human capital development, and financial-flow intermediation as interconnected levers of resilience. Governments in migrant-sending and receiving countries should reduce distress migration, support "brain circulation," and strengthen the social and economic integration of migrants so that their skills are effectively utilized. At the same time, lowering the cost of remittances, broadening access to inclusive financial instruments, and investing in education, public health, and institutional quality can help channel migrant-related resources into long-term development, especially in war-affected and demographically vulnerable states such as Ukraine. Recovery strategies that treat migration, human capital, and financial flows as part of a common resilience architecture, rather than isolated policy silos, are more likely to deliver sustainable and inclusive post-crisis growth.

## AUTHOR CONTRIBUTIONS

Conceptualization: Olha Yeremenko, Zhanat Khishauyeva, Liqun Wei, Nataliya Stoyanets, Hlib Turoliev, Vladyslav Lavrukhin, Dmytro Kovalenko.
Data curation: Olha Yeremenko, Liqun Wei.
Formal analysis: Olha Yeremenko, Zhanat Khishauyeva.
Funding acquisition: Dmytro Kovalenko.

Investigation: Olha Yeremenko.
Methodology: Olha Yeremenko.
Project administration: Nataliya Stoyanets, Hlib Turoliev.
Resources: Dmytro Kovalenko.
Software: Olha Yeremenko, Nataliya Stoyanets, Vladyslav Lavrukhin.
Supervision: Zhanat Khishauyeva, Vladyslav Lavrukhin.
Validation: Olha Yeremenko, Hlib Turoliev, Dmytro Kovalenko.
Visualization: Olha Yeremenko, Hlib Turoliev.
Writing – original draft: Olha Yeremenko, Zhanat Khishauyeva, Liqun Wei, Nataliya Stoyanets, Hlib Turoliev, Vladyslav Lavrukhin, Dmytro Kovalenko.
Writing – review & editing: Olha Yeremenko, Zhanat Khishauyeva, Liqun Wei, Nataliya Stoyanets, Hlib Turoliev, Vladyslav Lavrukhin, Dmytro Kovalenko.

## ACKNOWLEDGMENTS

The research was carried out with funds from the budget of the Ministry of Education and Science of Ukraine on the topic of the research project "Modeling educational transformations in wartime to preserve the intellectual capital and innovative potential of Ukraine" (0123U100114).

## REFERENCES

1. Ahmed, M. N., & Akaak, A. S. (2024). Integrated Role of Human Resource Management in Mitigating the Post-COVID-19 Challenges in Retail. *Business Ethics and Leadership, 8*(1), 1-14. https://doi.org/10.61093/bel.8(1).1-14.2024
2. Amuedo-Dorantes, C., & Pozo, S. (2004). Workers' Remittances and the Real Exchange Rate: A Paradox of Gifts. *World Development, 32*(8), 1407-1417. https://doi.org/10.1016/j.worlddev.2004.02.004
3. Aziz, M. A., Ayob, N. H., Ayob, N. A., Ahmad, Y., & Abdulsomad, K. (2024). Factors influencing farmer adoption of climate-smart agriculture technologies: Evidence from Malaysia. *Human Technology, 20*(1), 70-92. https://doi.org/10.14254/1795-6889.2024.20-1.4
4. Azizi, S. (2018). The Impacts of Workers' Remittances on Human Capital and Labor Supply in Developing Countries. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3223850
5. Barvinok, V. Y., Artyukhova, N. O., Marci, A., Polishchuk, I. R., & Vasylieva, T. A. (2023). Structuring "education - migration - labour market" chain. *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, 6,* 149-155. https://doi.org/10.33271/nvngu/2023-6/149
6. Barvinok, V., Shcherbachenko, V., & Onopriyenko, K. (2024). Theoretical patterns of socio-economic transformations to prevent forced migration of educators and students, and workforce losses. *Actual Problems in Economics, 282,* 14-23. Retrieved from https://eco-science.net/wp-content/uploads/2024/12/12.24._topic_Veronika-Barvinok-Viktoria-Shcherbachenko-Kateryna-Onopriyenko-14-23.pdf
7. Beaton, K., Cerovic, S., Galdamez, M., Hadzi-Vaskov, M., Loyola, F., Koczan, Z., Lissovolik, B., Martijn, J., Ustyugova, Y., & Wong, J. (2017). Migration and Remittances in Latin America and the Caribbean: Engines of Growth and Macroeconomic Stabilizers? *IMF Working Papers, 17*(144), 1. https://doi.org/10.5089/9781484303641.001
8. Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. University of Chicago Press. Retrieved from https://www.nber.org/system/files/chapters/c3730/c3730.pdf
9. Bettin, G., Jallow, A., & Zazzaro, A. (2024). Responding to natural disasters: What do monthly remittance data tell us? *Journal of Development Economics, 174,* 103413. https://doi.org/10.1016/j.jdeveco.2024.103413
10. Bettin, G., Presbitero, A. F., & Spatafora, N. (2014). *Remittances and Vulnerability in Developing Countries* (Working Paper No. 2014/013). IMF. https://doi.org/10.1596/1813-9450-6812
11. Binci, M., & Giannelli, G. C. (2018). Internal versus International Migration. *International Migration Review, 52*(1), 43-65. https://doi.org/10.1111/imre.12267
12. Bove, V., & Elia, L. (2017). Migration, Diversity, and Economic Growth. *World Development, 89,* 227-239. https://doi.org/10.1016/j.worlddev.2016.08.012
13. Calero, C., Bedi, A. S., & Sparrow, R. (2009). Remittances, Liquidity Constraints and Human Capital Investments in Ecuador. *World Development, 37*(6), 1143-1154. https://doi.org/10.1016/j.worlddev.2008.10.006


http://dx.doi.org/10.21511/kpm.09(2).2025.19

14. Castles, S. (2002). Migration and Community Formation under Conditions of Globalization. *International Migration Review, 36*(4), 1143-1168. https://doi.org/10.1111/j.1747-7379.2002.tb00121.x

15. Chater, M., & Soussou, K. (2023). Impact of COVID-19 Pandemic and Russo-Ukrainian War on Tunisian Stock Exchange Performance and Volatility. *Financial Markets, Institutions and Risks, 7*(4), 74-87. https://doi.org/10.61093/fmir.7(4).74-87.2023

16. Chen, Y., Li, K., & Zhou, Q. (2023). Spatial differentiation of urban economic resilience and its influencing factors: evidence from Baidu migration big data. *Technological and Economic Development of Economy, 29*(2), 353-381. https://doi.org/10.3846/tede.2023.17869

17. Didenko, I., Volik, K., Vasylieva, T., Lyeonov, S., & Antoniuk, N. (2021). Environmental migration and country security: Theoretical analysis and empirical research. *E3S Web of Conferences*, *234*, 00010. https://doi.org/10.1051/e3sconf/202123400010

18. Dobrovolska, O., Kolotilina, O., & Ostapenko, M. (2024). Forecasting Macroeconomic Dynamics in Ukraine: The Impact of a Full-Scale War. *SocioEconomic Challenges, 8*(3), 211-237. https://doi.org/10.61093/sec.8(3).211-237.2024

19. Firstová, J., & Vysochyna, A. (2024). Optimisation of socio-economic, environmental and public health determinants of national security for post-pandemic recovery. *Health Economics and Management Review, 5*(1), 67-79. https://doi.org/10.61093/hem.2024.1-05

20. Giyasova, Z., Guliyeva, S., Azizova, R., Smiech, L., & Nabiyeva, I. (2025). Relationships between human development, economic growth, and environmental condition: The case of South Korea. *Environmental Economics, 16*(2), 73-83. https://doi.org/10.21511/ee.16(2).2025.06

21. Hakobyan, A., & Margaryan, Z. (2025). Impact of the Russian-Ukrainian armed conflict on the financial performance of Armenia's banking sector. *Banks and Bank Systems, 20*(1), 334-345. https://doi.org/10.21511/bbs.20(1).2025.27

22. Hosny, A. (2020). *Remittance Concentration and Volatility: Evidence from 72 Developing Countries* (IMF Working Papers, 2020/015). https://doi.org/10.5089/9781513525884.001.a001

23. Huang, X. (2020). Immigration and Economic Resilience in the Great Recession. *Urban Studies, 58*(9), 1885-1905. https://doi.org/10.1177/0042098020925407

24. International Labour Organization (ILO). (2024a). *ILO Global Estimates on International Migrant Workers*. Retrieved from https://www.ilo.org/sites/default/files/2024-12/MIGRANT%20%E2%80%93%20ILO%20Global%20Estimates%20on%20International%20Migrant%20Workers_WEB_0.pdf

25. International Labour Organization (ILO). (2024b). *World Employment and Social Outlook*. https://doi.org/10.54394/hqae1085

26. International Monetary Fund (IMF). (2024). *Sustaining the recovery* (IMF Annual Report 2024). Retrieved from https://www.imf.org/external/pubs/ft/ar/2024/infocus/sustaining-the-recovery/

27. Kálmán, B.G., Vasa, L., & Malatyinszki, S. (2025). Sustainable economic goals based on determinants of resource productivity in the Netherlands and Hungary. *Environmental Economics, 16*(1), 114-128. https://doi.org/10.21511/ee.16(1).2025.09

28. Kuzior, A., Koibichuk, V., Drozd, S., Grytsyshen, D., & Vasylieva, T. (2023). Determinants of labor productivity in the USA. *Problems and Perspectives in Management, 21*(4), 724-739. https://doi.org/10.21511/ppm.21(4).2023.54

29. Kuzior, A., Liakisheva, A., Denysiuk, I., Oliinyk, H., & Honchar, L. (2020). Social Risks of International Labour Migration in the Context of Global Challenges. *Journal of Risk and Financial Management, 13*(9), 197. https://doi.org/10.3390/jrfm13090197

30. Kuzior, A., Vysochyna, A., Augustyniak, W., & Remsei, S. (2024). Forecasting of macroeconomic stability post-pandemic recovery: The case of European countries. *Journal of International Studies, 17*(4), 56-79. https://doi.org/10.14254/2071-8330.2024/17-4/4

31. Letunovska, N., & Boliukh, V. (2023). Countries' Vulnerability to COVID-19 Depending on the Health Behaviour Patterns of the Population. *Health Economics and Management Review, 4*(1), 103-112. https://doi.org/10.21272/hem.2023.1-10

32. Lyeonov, S., Saher, L., Vakulenko, I., & Bilan, Y. (2025a). Exploring the Nexus of migration, financial environments, and sustainability: A bibliometric insight into global research trends. *Green Finance, 7*(2), 247-287. https://doi.org/10.3934/gf.2025010

33. Lyeonov, S., Sheliemina, N., Szpakowska, Z., & Bács, Z. (2025b). How vulnerable employment and public health quality shape labour productivity: A comparative study of European economies. *Journal of International Studies, 18*(1), 232-253. https://doi.org/10.14254/2071-8330.2025/18-1/14

34. Mishchuk, H., Oliinyk, O., & Bilan, Y. (2024). Brain gain and country's resilience: A dependency analysis exemplified by OECD countries. *Equilibrium. Quarterly Journal of Economics and Economic Policy, 19*(2), 591-621. https://doi.org/10.24136/eq.3096

35. Mukhtarova, N., Nurtazina, R., Krawczyk, D., Barvinok, V., Vorontsova, A., Vasić, S., & Vasylieva, T. (2024). Interconnections in the education-migration-labor market chain in Central and Eastern Europe. *Problems and Perspectives in Management, 22*(4), 470-486. https://doi.org/10.21511/ppm.22(4).2024.35

36. Mustafa, D.I., Alzebdieh, R.M., Abdullatif, M., & Akef Al Majali, S. (2024). Intellectual capital and firm performance of Jordanian financial institutions. *Banks and Bank Systems, 19*(3), 9-22. https://doi.org/10.21511/bbs.19(3).2024.02

37. Muyambri, B. (2025). Socio-Economic Challenges for Human Capital Development in Chile and Nigeria: A View Through the Perspective of Natural Resource Rents, Economic Growth, Foreign Direct Investment and Inflation. *SocioEconomic Challenges, 9*(3), 186-206. https://doi.org/10.61093/sec.9(3).186-206.2025

38. Neagu, I. C., & Schiff, M. (2009). *Remittance Stability, Cyclicality and Stabilizing Impact in Developing Countries* (Policy Research Working Paper No. WPS5077). World Bank. Development Economics Research Group. https://doi.org/10.1596/1813-9450-5077

39. Nikšić Radić, M., & Bogdan, S. (2024). Intricate nexus of FDI, remittances, emigration, tourism and growth: Navigating economic landscape of Croatia. *Equilibrium. Quarterly Journal of Economics and Economic Policy, 19*(3), 871-911. https://doi.org/10.24136/eq.2769

40. Oliinyk, O., Mishchuk, H., Samoliuk, N., & Bilan, Y. (2025). Bridging the divide: Addressing social tensions between internally displaced persons and host communities during wartime in Ukraine. *Problems and Perspectives in Management, 23*(3), 645-657. https://doi.org/10.21511/ppm.23(3).2025.46

41. Posheliuzhnyi, V. (2025). Demographic risks in the context of a full-scale war in Ukraine. *Social and Labour Relations: Theory and Practice, 14*(1), 52-62. https://doi.org/10.21511/slrtp.14(1).2024.05

42. Pozovna, I., Duranowski, W., Pankiv, O., Kalenyuk, I., & Fomenko, S. (2025). Transformation of Stock Market Threats into Investment Opportunities: Modelling the Dependence of the Indian and Vietnamese Stock Markets on the US-China Trade War. *Financial Markets, Institutions and Risks, 9*(2), 90-111. https://doi.org/10.61093/fmir.9(2).90-111.2025

43. Pozovna, I., Hałuszko, K., & Polishchuk, A. (2023). Modelling structural relations between financial, social-economic and healthcare factors. *Health Economics and Management Review, 4*(4), 107-119. https://doi.org/10.61093/hem.2023.4-09

44. Privara, A. (2025). Wired for stability: The role of infrastructure and Fintech in migrant employment. *Equilibrium. Quarterly Journal of Economics and Economic Policy, 20*(1), 285-325. https://doi.org/10.24136/eq.3573

45. Ratha, D., Chandra, V., Kim, E. J., Plaza, S., & Mahmood, A. (2024). *Remittances slowed in 2023, expected to grow faster in 2024.* World Bank. Retrieved from https://documents1.worldbank.org/curated/en/099714008132436612/pdf/IDU1a9cf73b51fcad1425a1a0dd1cc8f2f3331ce.pdf

46. Ratha, D., Mohapatra, S., & Silwal, A. (2010). *Outlook for Remittance Flows 2010-11: Remittance Flows to Developing Countries Remained Resilient in 2009, Expected to Recover During 2010-11* (Migration and Development Brief No. 10). World Bank. Retrieved from https://openknowledge.worldbank.org/entities/publication/e4c8ab6b-eae7-519f-a591-c3cb7cc0a15d

47. Ratha, D., Plaza, S., Kim, E. J., Chandra, V., Kurasha, N., & Pradhan, B. (2023*). Migration and Development Brief 38: Remittances Remain Resilient But Are Slowing.* KNOMAD, World Bank. Retrieved from https://documents1.worldbank.org/curated/en/099755208142498760/pdf/IDU-88f10cd7-ae72-48f1-b63b-6ef304800a43.pdf.

48. Saher, L., Vakulenko, I., & Oleksich, Zh. (2025). What Makes Growth Inclusive? ClusterBased Insights for EU Member States. *Business Ethics and Leadership, 9*(3), 275-289. https://doi.org/10.61093/bel.9(3).275-289.2025

49. Saydaliyev, H. B., Chin, L., & Mohamed, A. (2020). Remittance inflow and economic development: interaction with financial inclusion and human capital. *Migration and Development, 11*(3), 1-18. https://doi.org/10.1080/21632324.2020.1839215

50. Shkuropadska, D., Lebedeva, L., Shtunder, I., Ozhelevskaya, T., & Khrustalova, V. (2024). The impact of demographic resilience on the economic development of countries (on the example of the Visegrad group countries). *Financial and Credit Activity Problems of Theory and Practice, 1*(54), 552-563. https://doi.org/10.55643/fcaptp.1.54.2024.4279

51. Shutaleva, A., Martyushev, N. V., Starostin, A., Salgiriev, A., Vlasova, O. A., Grinek, A. V., Nikonova, Z., & Savchenko, I. (2022). Migration Potential of Students and Development of Human Capital. *Education Sciences, 12*(5), 324-324. https://doi.org/10.3390/educsci12050324

52. Sirkeci, I., Cohen, J. H., & Ratha, D. (Eds.). (2012). *Migration and Remittances during the Global Financial Crisis and Beyond*. The World Bank with external contributions. Retrieved from https://documents1.worldbank.org/curated/en/701621468149081927/pdf/693130PUB0publ067926B09780821388266.pdf

53. Tsaurai, K., & Aboagye Danquah, D. (2025). The role of human capital and financial development in boosting FDI in emerging economies. *Investment Management and Financial Innovations, 22*(2), 254-267. https://doi.org/10.21511/imfi.22(2).2025.20

54. Tsymbal, L., & Demediuk, A. (2025). Economic Security of Ukraine Under War: A Foreign Trade Perspective. *Safety and Security Advances, 1*(1), 63-78. https://doi.org/10.61093/ssa.1(1).63-78.2025

55. Tutar, H., Mutlu, H. T., & Kantarcıoğlu N., Łakomy-Zinowik, M. (2024). Analysis of migration to Turkey through macroeconomic indicators: Evidence from



http://dx.doi.org/10.21511/kpm.09(2).2025.19

the period 2004-2024. *Economics and Sociology, 17*(4), 257-271. https://doi.org/10.14254/2071-789X.2024/17-4/14

56. Wahba, M., El Haddad, E., Ragheb, M., & Assem, A. (2025). Resilience of the Port Industry to Socioeconomic Challenges: The Role of Human Capital. *SocioEconomic Challenges, 9*(2), 316-339. https://doi.org/10.61093/sec.9(2).316-339.2025

57. World Bank. (2020). *COVID-19 and Human Capital. Europe and Central Asia Economic Update (Fall)*. Washington, DC: World Bank. https://doi.org/10.1596/978-1-4648-1643-7

58. World Bank. (2022). *Learning losses: What to do about the heavy cost of COVID-19 on children, youth, and future productivity.* Retrieved from https://openknowledge.worldbank.org/entities/publication/e4c8ab6b-eae7-519f-a591-c3cb7cc0a15dhttps://thedocs.worldbank.org/en/doc/e52f55322528903b27f-1b7e61238e416-0200022022/related/WBG-LearningLosses-flier-10-09-22-e-version.pdf

59. Yehorova, Y., & Drozd, S. (2024). Determinants of Human Capital Development and Macroeconomic Freedoms: DEA Modelling. *Business Ethics and Leadership, 8*(1), 203-219. https://doi.org/10.61093/bel.8(1).203-219.2024

60. Zatonatskiy, D., Leonov, S., Cieśliński, W., & Vasa, L. (2024). Determinants of global migration: The impact of ESG investments and foreign direct investment. *Economics and Sociology*, 17(1), 215-235. https://doi.org/10.14254/2071-789X.2024/17-1/14

61. Zozulinskyy, A. (2024). The Financial, Economic and Social Consequences of the Russo-Ukrainian War: Bibliometric Analysis. *Financial Markets, Institutions and Risks, 8*(3), 134-162. https://doi.org/10.61093/fmir.8(3).134-162.2024”