

# DYNAMIC MODELLING OF MIGRATION FLOWS IN UKRAINE IN THE CONTEXT OF GLOBALIZATION

Alina Novik<sup>1,a,\*</sup>, Iryna Lukianenko<sup>2,b</sup>

<sup>1</sup>National University of Kyiv-Mohyla Academy, Faculty of Economics, Department of Finance, 2  
Skovorody Str., Kyiv 04070, Ukraine

<sup>2</sup>National University of Kyiv-Mohyla Academy, Faculty of Economics, Department of Finance, 2  
Skovorody Str., Kyiv 04070, Ukraine

<sup>a</sup>novikaj@ukma.edu.ua, <sup>b</sup>iryna.lukianenko@ukma.edu.ua

\*Corresponding author

**Abstract.** Due to the processes of globalization in the world, there is an increase in the population's inclination to migrate abroad. At the same time, there is the insufficient number of scientific work on this subject using mathematical tools, which promotes the need for in-depth study and search of new ways of regulating the problem of external migration in Ukraine and in the world. Solving the objectives of the proposed study is a contribution to the study of the problems of large migratory flows and problems arising from their ineffective regulation, and it also corresponds to the world and national priorities of science development. Based on the theories of migration, previously obtained results and new data, the new dynamic process simulation model of external migration flows in Ukraine will be created. The main factors, impact of which on the regulation of mobility in Ukraine will be evaluated not only qualitatively but also quantitatively are: the ratio of wages in Ukraine and recipient countries, differences in the level of GDP per capita, the possibility of purchase (rental) housing, differences in the level of marginal propensity to consume, etc. Based on the created simulation model, a scenario analysis is carried out and the main problems of the current regulation of migration flow existing in Ukraine are identified.

**Keywords:** migration, dynamic modelling, globalization, economic development

**JEL Classification:** F22, F63, F66, O15.

## 1. Introduction

Migration processes have become one of the biggest challenges of the XXI century. Voluntary and forced migration was accompanied by human development throughout its existence but nowadays the volume of migration reached the largest scale. It is obvious that intensity of migration will grow, which requires new approaches to research. Current situation requires assessment, forecasting and searching new ways for the implementation of proper management of migration processes in the world and in Ukraine particularly.

The dynamics of the Ukrainian migration processes and their development prospects play an important role in regulating of macroeconomic stabilization, reducing of social tension and discovering the measures for possible negative social-economic processes in the long and medium term. Accordingly, the system research of functional and development features of migration become more topical. The search of adequate mathematical tools for complex nonlinear dynamic relationships evaluation and identifying the opportunities of labor mobility

as an important social-economic subsystem in Employment regulation in Ukraine is crucial for job creation, preventing the unemployment, improving the competitiveness and investment attractiveness by strengthening of human capital on regional and state level, which is extremely important during crisis period, which characterizing not only by economical but also by political instability (Steinberg, 2017).

Migration Policy in Ukraine remains unregulated and ineffective. Ukrainian society labor migration appears in negative light because of the social and demographic consequences. While European Union and developed countries are struggling with regulation of the amount of immigrants, Ukraine faces the reverse problems of “brain drain” and loosing working age population. According to multiple researches, the main reason for leaving is the higher level of salaries in the nearest countries, such as Poland, Romania, Hungary, Czech Republic, and Slovakia . The working age population of these countries often travels further to the west - Germany, France, Great Britain. These countries manage to maintain economic growth, including through the workforce from neighboring countries outside the EU, and a large part of the labor migrants comes from Ukraine. The tendency of the last years shows that the amount of Ukrainian students who migrate abroad increased, which means that the most productive population is leaving the country, which leads to the slowdown of the reforms and potential economic growth (Commander et al., 2013).

According to the forecast of State Statistic Committee, in the coming years, migration processes in Ukraine will intensify due to the high demand for skilled labor, and in a few decades, the staff shortage in Ukraine will threaten the economic security of the state. However, due to the insufficient level of economic growth, the lack of skilled workers is not critical.

## 2. Body of paper

For four years from 2013 to 2017 the number of economically active population aged 15 to 70 years in Ukraine decreased from almost 21 million to 18 million. During the same period, the number of employees fell by 2 million, and the self-employed by 2,5 million people. In general, the economically active part of the population does not reach 50%. According to expert estimates, today up to 5 million Ukrainian are working abroad. More workers go abroad to Poland, the Czech Republic, and Hungary. In terms of globalization and raise of opportunities it is also important to measure occupational mobility, which became topical recently. It is important factor to take into consideration when it comes to the decision which destination to choose (Robinson, 2018). In addition, firms in the countries of destination also tend to hire more skilled workers, which become much more important in economies where ideas drive technological progress. When the home-grown talent pool is insufficient, the ability to attract high-skilled migrants is crucial for improving the quality of a country’s workforce and its innovative capacity (Delogu et al., 2018).

The International Organization of Migration assesses the possible potential increase in the number of international labor migrants in the short term by 41%. Among potential labor migrants, almost half are between the ages of 18 and 29. It is among these young people that the number of long-term labor migrants decided not to return to Ukraine, almost twice as much as among people aged 45 to 65 years. An additional risk for the Ukrainian labor market is an increase in the number of students studying abroad.

Different parts of the literature have focused on income or wealth mobility, wage mobility, educational mobility, mobility in terms of social class. As a consequence of this diversity, the measurement of mobility is an intellectual problem that has been addressed from many different standpoints. (Cowell & Flachaire, 2018). There are several theories according to which the

reasons to migrate are described by sociological, economic and geographical factors. Today the most popular theory of migration among both domestic and foreign scholars is a neoclassical macro economic theory, according to which labor migration caused by geographical difference between supply and demand for labor. And this explanation applies to international and internal migration. H. Chen determines the last one as a copy or duplicate of international migration (Chen, 2012). According to this concept, the countries (regions) with excess labor observed low wages, while regions with insufficient workforce characterized by high wages. Wages serves as the main factor pushing in the regions of origin of migrants and the main factor of attraction in the regions of arrival. As a result of migration reduced labor supply and wage increases in capital in poor countries, while rich countries to capital there are conflicting processes. (Parey et al., 2017). Under the provisions of neoclassical macroeconomics, eliminating the pay gap leads to the end of the movement of labor between countries (regions). This argument does not work, because migration, like any other social processes, characterized by inertia and occurs even after disappearing of the reasons that caused it (Davis, 1988). Investment flows moving in the opposite direction of flow of migrant workers, in particular from countries rich in capital to the poor. A factor that attracts investments have increased, by international standards, the rate of capital gains in poor countries. Movement of capital also includes human capital, i.e. the movement of highly skilled workers from the rich to the poor countries to the capital, hoping to get high profits from their skills in human capital in poor surroundings (Kolesnikova et al., 2017).

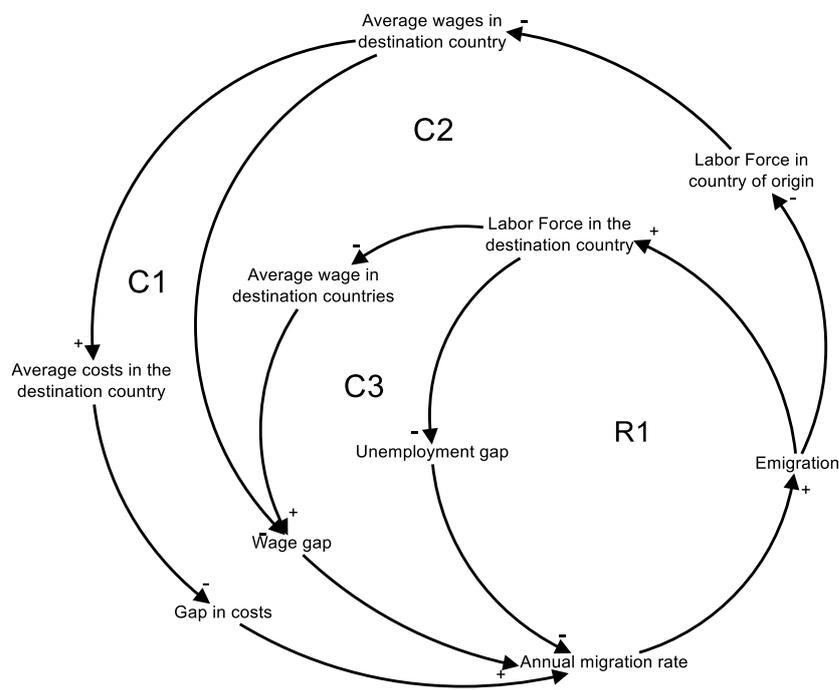
Among other factors influencing the decision to migrate, it was shown that the well-being of migrants correlates negatively to the increase in GDP in their home countries (Akay et al., 2017). The average immigrant from a middle-income or poor country increases their wage by a factor of two to three upon migration. This wage gain is small relative to the underlying gap in GDP per worker. It means that switching countries accounts for 40% of cross-country income differences, while human capital accounts for 60% (Hendricks et al., 2018).

### 3. Methodology

**System dynamics.** For labor market analysis the system dynamics method was chosen as one, which allows do describe quite simple the complex systems over time, depending on the structure elements and the interaction between them. For the modeling purpose and for simplification the data about Ukrainian-Poland migration was taken. The main purpose of the model was to show how do people make decisions about migration, and what are the main factors which drive the high migration rate. According to the data, the main factor for changing the place of living is higher salary in the destination country. Among the other factors are higher standards of living, lower level of corruption, and lower level of unemployment. The main concept lays in the using of reference wages, unemployment rate and cost ratio in Ukraine and Poland (Foroni et al., 2018). As a result of the modeling, the scenario analysis was conducted, which showed that the best way of keeping human capital in Ukraine is increasing the wage for works and creating new workplaces for reducing unemployment inside the country (Lull, 2018).

**The variables which are used in the study:** the information about the amount of emigration per year, immigration per year, the rates of emigration of Ukrainians to Poland, unemployment rates, cost of living, age of migrants, wages in both countries, level of shadow wages, education of migrants (also with division of emigrants and immigrants), the amount of remittances, the channels of remittances, the amount of average wage in the countries of emigration and immigration.

Figure 1. Causal-Loop Diagram of Migration Flows



Source: built by authors on the basis of economic theory

There are 4 feedback loops in the model, C1-C3 are counteracting, and R1 is a reinforcing feedback loop. The main idea of the model is illustrated on the figure 1. The higher emigration in the country lowers labor force in country of origin, which makes people to move and increase the labor force in the destination country. As a result, the average wage in destination country will decrease based on the economic theory, and at the same time due to a lower pressure on the labor market in the country of origin, the wage gap will be lowered, which will lead in the future to slowing down the rate of emigration, and the economies of two countries will tend to equilibrate.

The main problems of high emigration among Ukrainians, which were identified, are low wages, low standards of living, high unemployment rate, high marginal propensity to consume, and big part of shadowed wage. For changing the situation, based on previous research, the first thing which should be done by government is to increase wage, make it 'white'. The increase in wage may become a reason for lowering the out-migration rate and will increase the return flow to a country of origin (Lessem, 2018). and increase standards of living in the country, which start to implement in life with new reform in medicine in the country, to support the creation and functioning of small and medium-sized business, which will lower the unemployment in the country.

#### 4. Conclusion

This paper is an output of the science project on modelling migration for obtaining a PhD degree. An analysis of the results shows that the main issue in the high level of emigration are low wages level in Ukraine, high unemployment rate, and low standards of living. The stabilization of migration flows is crucial for improving economic security and stability, and should be considered as one of the main points of regulation of the labor market. Based on the

model, in context of globalization migration is a positive issue, as it helps to reduce the pressure on the labor market in the country of origin, provides destination countries with qualified or needed workers, and helps to stimulate economic growth of both countries.

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