











“Pull environment of migration in the EU countries: Migration vector from Ukraine”

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PULL ENVIRONMENT OF MIGRATION IN THE EU COUNTRIES: MIGRATION VECTOR FROM UKRAINE

Abstract

The growing Ukrainian migration towards EU countries determines the need for evaluation of pull factors shaping their environment to regulate these processes better. The study aims to assess the EU's pull environment attracting migrants, and evaluate the elasticity of Ukrainian total and labor migration to the change of social and economic factors in EU countries. The data are collected for the period from 2005 to 2018. The method involves weighting the indicators and sub-indices with the following calculating partial and integral indices of the pull environment of migration for selected EU countries (the Czech Republic, Germany, Hungary, Poland, Italy, Portugal, Greece, and Spain) and the EU-28. During 2005–2018, the integral level of pull environment of migration in the EU-28 was above average, whereas the most attractive countries for external migrants were Germany, the Czech Republic, Spain, and Italy. In terms of the intensity of total migration from Ukraine in 2018, Poland (236.06 departures per 1,000 Ukrainians), Hungary (73.6), Germany (12.6), and Italy (7.3) are among the main destinations. While the intensity of Ukrainian migration is high, its growth rate depends on the time lag (different elasticities in the medium and long run). The integral analysis of the pull environment has a practical value allowing to conduct migration intensity and elasticity evaluation, as well as the cross-country pull-factor analysis (pull strength) for substantiating the improvement of regulatory and methodological provisions of migration policies for both Ukraine and the hosting EU states.

Keywords pull factors, external migration, elasticity, pull strength, the EU, Ukraine

JEL Classification F22, R11

INTRODUCTION

In many EU countries, there is a decline in the population due to falling birth rates and aging. This problem is partially compensated by internal population movement, as well as immigration (conditionally controlled processes). Moreover, the migration of people from Africa and the Middle East to Europe remains active. At the same time, the situation, on one hand, is dynamic and, on the other hand, has a high level of importance in the context of sustainable development of the EU and its regions. The aforementioned highlights the necessity of developing information and analytical support for migration environment (as a basis for making management decisions within the migration policy of the EU), as the implementation of this support helps to model scenarios of changes in the immigration intensity to the EU and, more importantly, in the focus of each country.

Today there is no generally accepted method of assessing the pull environment of external migration activity of the population (with a full range of economic, political, social, spiritual, cultural, institutional, and territorial factors), which makes it impossible to introduce systematic monitoring, comprehensive analysis and modeling of

these processes. Harmonization of statistical data of EU countries and Ukraine for performing methodologically correct calculations and comparisons within individual countries and the EU remains a big problem. Dynamic comparisons have also been problematic due to different compositions of the EU over the last decade.

1. LITERATURE REVIEW

The “push-pull” migration theory has become the basis of many modern academic publications. It views migration because of the relative attractiveness of countries of destination and origin, while the obstacles that increase with the distance between these countries are regarded as a constraint on migration processes (Kazlauskienė & Rinkevičius, 2006; Landesmann et al., 2015; Moral-Pajares & Jiménez-Jiménez, 2014; Pusch & Aydın, 2012).

Migration processes in Ukraine, in terms of their vectors, structure, and scale, have been thoroughly studied over the last 30 years. A detailed historical review of these processes was carried out by Drbohlav and Jaroszewicz (2016), who singled out certain periods of labor migration activity of the population of Ukraine. They emphasize a change from the eastern to the western vector in relation to the countries of employment for Ukrainian migrants. This was facilitated both by the deterioration of the macroeconomic and political situation in Ukraine since 2014 due to Russian aggression (push factors) and by the fact that European countries, especially Poland, introduced an active policy on attracting foreign labor and student-age population from abroad (pull factors).

Abdou (2020) and Fassi and Lucarelli (2021) stress the emergence of new pull factors that contribute to Ukrainian labor migration to the EU. For instance, in 2019, the Czech Republic increased quotas for workers from Ukraine from 19.6 thousand to 40.0 thousand units. Since 2020, Germany has significantly relaxed the laws on the employment of specialists (including non-professional occupations) from beyond the EU. Against a background of the demographic crisis, Poland continues to remove restrictions on Ukrainian workers, actively opening up access to its labor markets and educational services (replacement migration policy).

Kupets (2016), Ihnatenko et al. (2019), and Pietnoczka (2018) studied Ukraine’s European in-

tegration behavior and the impact of ratification of the Association Agreement with the EU on various spheres of life, including migration activity of the population of Ukraine. Although there is an opinion that Ukraine is not ready to join the EU due to significant economic and social disparities compared to European countries (Van Mol et al., 2018), it is worth agreeing on the need to develop joint practices and initiatives in the field of migration policy to meet Ukraine–EU socio-economic interests (Habchak & Dubis, 2019; Vasylytsiv et al., 2019; Wunderlich, 2012). This could be one of the steps towards European integration for Ukraine.

Kostrыtsia and Burlay (2020) confirmed that Ukrainian labor migration to European countries is often conditioned by disparities in national labor markets and general economic divergence. Moreover, the impact of the current migration situation in Ukraine on socio-economic parameters of the country’s development is analyzed by Bilan (2017), Didkivska (2020), Fedyuk and Kindler (2016), Ilyash (2015), Jaroszewicz and Kaźmierkiewicz (2014), Libanova (2019a, 2019b), Lücke and Saha (2019), and Pozniak (2012), who focus on the transformation of the domestic labor market and employment sector. At the same time, a strategic vision of changes in the national economy of Ukraine, modeling its development under increasing labor migration is presented by Heyets (2016), Melnyk et al. (2019), Sadova (2019), Melnyk et al. (2021), and Skripnichenko (2007).

This paper is devoted to the push-pull factors analysis based on calculating the integral index of the environment, in which modern migration processes are formed. Based on the literature review, models of the dependence of the population migration intensity on the push environment in Ukraine and its regions are widely described (Levytska et al., 2020; Mulska et al., 2020). The next stage is to study the pull environment of EU countries in the context of their attractiveness for Ukrainian labor migrants.

2. AIMS

The study aims to assess the EU's pull environment attracting migrants, and evaluate the elasticity of Ukrainian total and labor migration to the change of social and economic factors in EU countries. This stands for determining the level of intensity of external migration in sending countries, whose citizens migrate to the EU (namely, Ukraine). In addition, this paper identifies the elasticity of pull-push ties to provide a methodological basis for modeling the volume of potential migration to the EU and the structure of immigrant distribution by countries depending on expected changes in socio-economic development in EU countries. Thus, the study aims to investigate whether there is a relationship between the strength of the pull environment in EU countries (i.e. the level of attractiveness of a country for external migrants) and the intensity of total and labor migration to the EU from countries where its level is high (including Ukraine). Moreover, whether there is significant (confirmed by the results of economic and mathematical modeling and statistically important) elasticity of such a relationship.

3. METHODOLOGY

To assess the pull environment of migration, 39 indicators were selected by an expert method and divided into 5 groups (Appendix A): medical and demographic stability, social security and social development, labor market and employment, living standards, and economic development of the country.

This paper uses macro-data from the European Statistical Office and national statistics to assess social and economic indicators of Ukraine's and the EU's development. The method of calculating the integral index of the pull environment involves seven stages.

1. Data standardization. To form homogeneous time series, the values of the indicators are normalized for each group within the selected set of countries using formula (1) for indicators-stimulators and formula (2) for indicators-destimulators:

$$a_{it}^{sn} = \frac{x_{it}^n}{x_{\max t}^N}, \quad (1)$$

$$a_{it}^{dn} = \frac{x_{\min t}^N}{x_{it}^n}, \quad (2)$$

where a_{it}^{sn} , a_{it}^{dn} are normalized values of the i -th indicator-stimulator and destimulator of the n -th country in the t -time interval; x_{it}^n is the initial value of the i -th indicator of the n -th country; $x_{\max t}^N$, $x_{\min t}^N$ are the maximum and minimum value of the i -th indicator in the t -time interval within the N -th set of countries.

2. Determination of weighting coefficient of the i -th indicator within the k -th group (w_{in}^k) of the n -th country is carried out using principal component analysis.
3. Calculations of the weighting coefficients of the indicators within the k -th group of the pull environment of migration are performed by formula (3):

$$\gamma_{it}^{nk} = a_{it}^{w_{in}^k}, \quad (3)$$

where γ_{it}^{nk} is the weighting coefficient of the i -th indicator within the k -th group of the n -th country in the t -time interval.

4. Construction of time series of indices of the groups of the indicators representing the pull environment of migration using a multiplicative approach:

$$Z_{kt}^n = \prod \gamma_{it}^{nk}, \quad (4)$$

where Z_{kt}^n is the index of the k -th group of the indicators of the n -th country in the t -time interval.

5. Determination of the weighting coefficient of the k -th group of the indicators (w_n^k) of the n -th country on the basis of calculating the principal component value.
6. Calculation of the weighting group coefficients (Y_k^n) (see stage 3).
7. Construction of the integral index of the pull environment of migration by formula (5):

$$I_m^{pull} = \prod Y_k^n, \quad (5)$$

where I_m^{pull} is the integral index of the pull environment of migration of the n -th country in the t -time interval.

The level of intensity of external total migration of the population is calculated as a ratio of the number of departures abroad to the number of population in the country of migrants' origin (formula 6).

$$Instens_{jt}^z = \frac{D_t^j}{P_t^j}, \quad (6)$$

where $Instens_{jt}^z$ is the level of intensity of external total migration in the t -time interval; D_t^j is the total number of departures of citizens from the j -th country abroad in the t -time interval; P_t^j is the number of the population of the j -th country in the t -time interval.

The level of intensity of external labor migration is calculated as the ratio of the number of officially employed migrants from the j -th country in the n -th country to the number of departures of citizens from the j -th country abroad.

$$Instens_{jnt}^l = \frac{L_{jt}^n}{D_{jt}^n}, \quad (7)$$

where $Instens_{jnt}^l$ is the level of intensity of external labor migration from the j -th country to the n -th country in the t -time interval; L_{jt}^n is the total number of officially employed migrants from the j -th country in the n -th country in the t -time interval; D_{jt}^n is the total number of departures from the j -th country to the n -th country in the t -time interval.

This study uses the concept of the strength of the pull environment of migration as the level of attractiveness of a country for external migrants, which is conditioned by the overall effectiveness of pull factors in this country. The influence of the pull environment strength of the n -th country for previous periods on the level of intensity of external total migration from the j -th country and on the level of intensity of external labor migration based on the coefficients of elasticity for the n -th destination country is presented using a lag model (Vector Autoregression Model) (8) and (9).

$$Instens_t^z = a + b_1 I_{t-p}^{pull\ n}, \quad (8)$$

$$Instens_t^l = a + b_1 I_{t-p}^{pull\ n}, \quad (9)$$

where p is lag; $I_{t-p}^{pull\ n}$ is the integral index of the pull environment of migration of the n -th country in the $(t - p)$ lag.

After analyzing the elasticity of migration from Ukraine to EU countries, the degree of its sensitivity to changes in the pull environment factors in the analyzed EU countries was established, which is confirmed by the necessary parameters of statistical significance of the obtained results.

4. RESULTS

In the EU, there is a fall in the birth rate, which is a threat to demographic reproduction and significantly reduces the level of demographic security. In line with current global trends, the aging of the nation and depopulation are major problems in many EU countries, which compensate for the low birth rate by immigration (substitution effect). Accordingly, qualitative demographic characteristics, in particular, the health of the population (for the EU-28, the weighting coefficient of this indicator is 6.06%), are important in the process of creating the pull environment of migration. A low morbidity rate and improvement in the health of the population, especially the young population of working age, are indicators of attractiveness of the environment for life and, as a result, they become pull factors in immigration flows to countries, including to those with better health care systems. Moreover, EU countries are an attractive area for immigration from countries in the east of Europe due to the growing dynamics of one of the key indicators of human development – “life expectancy at birth” (its significance is 13.79% for the EU-28).

The impact of the nation's family and cultural values on the level of attractiveness of the migration environment should also be considered. The effective fulfillment of reproductive, educational, communicative, economic, and household functions of a family contributes to the formation of social capital in the process of increasing the volume of immigration.

The percentage of social services coverage testifies to the level of social security, social responsibility of the state to citizens, the implementation of the principles of providing vulnerable categories of the population with appropriate social benefits, the formation of “safety cushions” in case of disability or other force majeure circumstances. For example, the Czech Republic is particularly attractive to immigrants, as the role of pension benefits is a priority of a modern social policy of the country, and for Germany, the social security of the unemployed is a big strategic challenge (the weighting coefficient is 13.86%). Italy is characterized by the highest level of significance of the indicator “the share of general government expenditures on social security” (13.09%).

A place of work (guaranteed official employment), spread of full and formal employment, decent working conditions, and a high level of pay, of course, lay a socio-economic basis for a high level of strength of the pull environment of migration. The unemployment rate among the population of working age, the rate of forced part-time employment, the share of workers employed to do work in hazardous conditions, and the level of workplace injuries are important indicators of the migration environment, the positive dynamics of which suggest a low level of attractiveness of employment for labor immigrants. Against a background of simultaneous intensification of problems with demographic reproduction and aging of the population, the shortage of workers in the labor markets of the EU is growing. The weighting coefficients of all indicators for the sample of EU countries are presented in Appendix B.

Improvement in the socio-economic situation in EU countries, an increase in guarantees of stable employment, and decent living standards encourage migrants to look for a more highly paid job or get an education (often on a free of charge basis). Accordingly, with a rise in incomes of the local population, low growth rates of household expenditures, high opportunities for savings due to high living standards, and the strengthening of other pull factors, the attractiveness of EU countries as countries of potential employment or permanent residence increases.

The economic development of EU countries is a priority factor in choosing a potential country

of immigration, and macroeconomic stability is a stimulus to the growth of the pull environment strength. EU countries with a high level of socio-economic growth are key players in the competition for workers and highly qualified personnel. The stability of the economic and political systems of the destination country is a significant pull factor in emigration from countries characterized by high levels of corruption, social inequality, and destructive economic changes. The impact of economic stability on the volume of labor immigration is determined by the high probability of obtaining the desired income and achieving a significant labor effect through self-realization and professional development. The probability of receiving stable incomes is higher in countries with a high level of economic development and implemented structural reforms, and vice versa – it is lower if there is an economic recession in the country.

For Poland, as the country with the largest volumes of external labor migrants from Ukraine, during the entire analyzed period (2005–2018), the indicators (factors) of the group “medical and demographic stability” are the most important in the context of the country’s attractiveness for immigration. It means that Poland is largely attractive to migrant workers not so much because of the expectation of high employment and income or quality social security but in the context of good health care and life expectancy. The index of this group in 2018 was 0.6928 and its value was the highest (among other components) in the entire analyzed period. Appendix C shows the calculated values of the indices for the analyzed countries of the EU and EU-28 in general by groups of the indicators of the pull environment of migration in 2005–2018. The factors of the group “social security and social development” were the least attractive for migration – 0.3858 in 2018. Moreover, the average annual growth rate of group indices was negative, which is evidence of further weakening of this component of the environment. Obviously, this may be due to a high level of social security in Poland but compared to other EU countries this level is slightly lower. At the same time, the largest number of Ukrainian labor migrants in this country indicates that this component does not have a critical influence when deciding on migration. It is worth mentioning that other components of

the pull environment, in particular, labor market and employment, living standards, and economic development, are at about the same average level. In dynamics, their values are growing, especially those of the labor market and employment.

Comparisons of the values of the indices of the pull environment in Poland and the EU-28 make it possible to identify both similarities and different characteristics. In the case of the EU-28, the values of the indices of the group “medical and demographic stability” were the highest, and the values for the groups “labor market and employment”, “living standards and economic development of the country” were relatively average. However, there is some controversy between the groups “social security and social development” (the values of its indices for the EU-28 are high and second only to the group “medical and demographic stability”) and “economic development of the country”. This suggests that the level of attractiveness of the migration environment in the EU is higher on average than in Poland, and the fact that Ukrainians choose the latter to attain their migration goals is additionally conditioned by other internal factors. It should be noted that the values of the indices of such groups as “labor market and employment”, “living standards” and “economic development of the country” in the EU-28 for 2005–2018 increased (the growth rates are 113.5%, 101.8%, and 107.9% respectively). The same components of the environment are characterized by positive average annual growth rates. This is evidence of further improvement in the pull environment of migration in the EU in the areas of employment and income of the population, the general macroeconomic situation, and stability.

It should be added that the values of the indices by the group “medical and demographic stability” were the highest for all analyzed EU countries. Accordingly, the pan-European level of the health care system, support for human development, and, consequently, the achievement of a significant life expectancy, are high. However, there are quite important differences in other components of the pull environment in the studied countries. For example, the values of the indices for the group “social security and social development” in countries such as the Czech Republic, Greece, Hungary, and Poland, were significantly lower than the

same values of Germany, Italy, Portugal, and Spain. Obviously, for those categories of the population with different levels of social vulnerability this feature has an impact on deciding to migrate because there is no close correlation between the values of the indices of this component and the values of the component “living standards”. For instance, in the Czech Republic, Hungary, Poland, and Portugal, where levels of social security and social development are lower, the indicators of living standards are significantly higher.

There is slight differentiation in the level of indices of the component “labor market and employment” of the pull environment of migration. While in most countries, this indicator is at an average level, in Hungary, Portugal, and Spain it is at a much lower level. Thus, in these countries, the decision on labor migration is either supported by other factors (as opposed to the ability to find a job and have a high level of wages and wealth), or there are specifics in occupational niches of employment, or other types of migration prevail. The values of the indices for the group “economic development of the country” were quite high, and the value of this indicator for the Czech Republic in 2018 was 0.7298 and had a high annual growth rate (0.57). The situation is somewhat similar in Hungary, Portugal, and Spain, which means that in these countries, there is a tendency towards strengthening the role of economic growth in the structure of factors attracting migrants. Instead, the situation is the opposite for Greece, where this group of indicators is the least influential and continues to become weaker (in 2005–2018, the group index decreased by 7.5%).

It is essential to note that the level of significance of the group that demonstrates the highest values of the indices of the pull environment of migration – namely, “medical and demographic stability” is one of the highest (Figure 1), so it had a positive effect on ensuring high values of integral indices. In general, for the EU-28, the significance of this group was 24.27% and it was much higher in comparison to other components of the environment, especially in countries such as Spain, Portugal, Hungary, and Greece.

Overall, the values of social security and the social sphere development (22.91%) and labor market

Source: Authors' calculations based on State Statistics Service of Ukraine (n.d.).

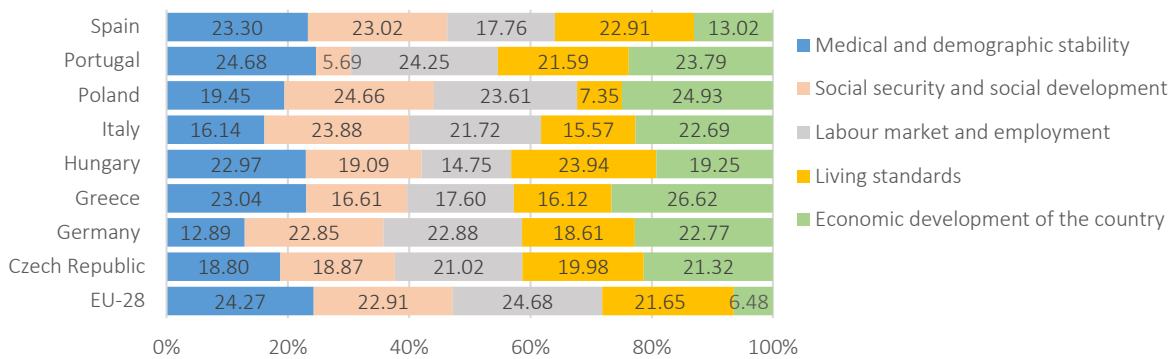


Figure 1. Significance of the components of the pull environment of migration (five groups of indicators) in some EU countries

and employment (24.68%) were also important for the EU-28 in the structure of significance of the components of the pull environment of migration. It is obvious that these characteristics of the environment, together with medical and demographic stability, determine the attractiveness of EU countries for immigration to the greatest extent, and therefore, they are crucial in the context of their support within the necessary migration policy and socio-economic policy in general.

The group “living standards” is also quite important (21.65% on average in the EU) and largely determines the quality of the pull environment of countries such as Spain, Portugal, Hungary, and the Czech Republic, which is due to the high standard of living in these countries and confirms the fact that this is one of the most essential factors in deciding to emigrate to these countries.

It is important to pay attention to the low significance of the component “economic development of the country”. For the EU-28, the value was 6.48%, while in the countries chosen for the sample of the study, the situation is opposite, and the role of this component is one of the leading ones. For example, the coefficients of its significance are almost the highest in the Czech Republic, Germany, Greece, Italy, Poland, and Portugal. Therefore, it is stated that for migrants from Ukraine the level of economic development of the country is still of high importance, compared to immigrants to the EU from other countries. The calculations made it possible to identify the integral level of the pull environment of migration in the EU-28 as above average. For instance, the corresponding coefficient in 2018 was 0.5822 (Appendix C) and, at the same

time, had a steady tendency to insignificant, but stable growth during 2005–2018 (the average annual growth rate was 0.2485, and the growth rate of the integral index in 2018 compared to 2005 was 105.9%).

It should be noted that among the analyzed EU countries, the values of integral indices were mostly inferior to the same indicator for the EU-28, which indicates a somewhat lower level of attractiveness of the environment of these countries for immigration. Therefore, for Ukrainians, there are both identified and additional motivating factors in deciding to migrate to these countries. Among the selected countries, Germany and the Czech Republic had the values of the integral index (0.6089 and 0.5878, respectively) that exceeded this indicator for the EU-28. The Czech Republic is one of the countries where the volume of Ukrainian migration is one of the largest, and its growth rate is one of the highest, whilst Germany has high values of labor migration from Ukraine (Appendix D). This gives grounds for concluding that the level of the pull environment of migration largely determines the vector of migration of Ukrainians, although there are other factors, which need to be identified and studied in additional sociological research and expert surveys.

Greece, Hungary, and Poland were included in the group of countries with lower values of the integral index of the pull environment of migration in 2018. At the same time, for Greece, the pull environment of migration weakened mainly due to the low level of “living standards” and “economic development of the country”, while for Hungary and Poland such weak components were “labor market

and employment” and “social security and social development” respectively. Thus, a rise in the migration policy effectiveness in terms of improving the environment for attracting migrants closely correlates with the implementation of measures aimed at improving the values of the indicators (factors) of the pull environment of migration in these EU countries.

It is necessary to add that in 2005–2018 the values of the integral index deteriorated only for Greece and Portugal. On the contrary, Poland was characterized by the highest growth rates (132.5%) preceding the Czech Republic (121.7%), Italy (115.5%), Hungary (113.7%), and Germany (113.2%). The volume of migration from Ukraine to these countries has been growing in recent years, which generally confirms the hypothesis that there is a relationship between the attractiveness of the socio-economic environment of a country and the intensity of the migration vector from other countries.

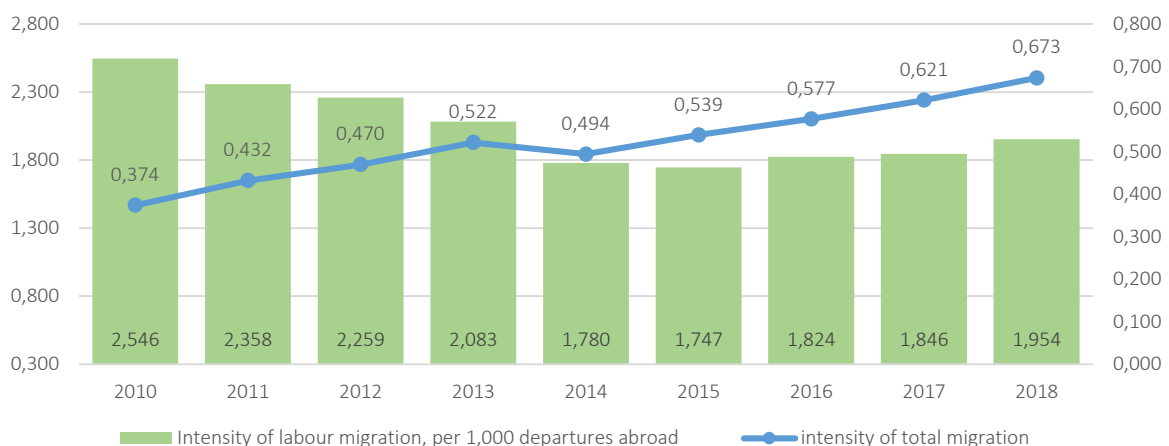
Actually, using the data shown in Figure 2 it can be argued that the intensity of total migration from Ukraine is increasing. If, during the period from 2010 to 2014, the indicator of the intensity of labor migration from Ukraine (per 1,000 departures abroad) decreased, then, starting from 2016, there was a tendency towards its steady increase. The impetus for this was the political and economic instability of 2014–2015 and long-last-

ing socio-economic stagnation, which continues to this day. In addition, the expansion of opportunities for official employment of Ukrainian citizens in the EU also explains the dynamics of labor migration.

On the other hand, the intensity of total migration from Ukraine during the period 2010–2018 (except 2014) had only an upward trend. During 2010–2018, the indicator rose from 0.374 to 0.673. Thus, Ukraine remains a country with high migration activity, which continues to grow. A higher percentage of migrant workers from Ukraine is typical of EU countries and, in the short term, one should expect a further increase in the intensity of migration of Ukrainians to the EU.

In terms of the intensity of total migration from Ukraine, Poland predominates (236.06 departures per 1,000 people of Ukraine in 2018) (Appendix D). Hungary (73.6), Germany (12.6), and Italy (7.3) are also characterized by high values of the indicators. The intensity of total migration from Ukraine in 2010–2018 rose in all analyzed countries (except for the Czech Republic). The growth rates became especially high in the case of Spain (by 4.9 times), Poland (by 2.7 times), Italy (by 2.6 times), Hungary (188.2%), and Germany (144.8%). This confirms the high and steadily growing migration activity of the population of Ukraine towards the EU and the analyzed countries in particular.

Source: State Border Guard Service of Ukraine (n.d.), State Migration Service of Ukraine (n.d.).



Note: The intensity of total migration is calculated within the EU-28; the intensity of labor migration is calculated using the most visited EU countries by the population of Ukraine as an example (the Czech Republic, Germany, Greece, Hungary, Italy, Poland, Portugal, and Spain).

Figure 2. Intensity of total and labor migration of the population from Ukraine to the EU, 2010–2018

It should be noted that the Ukrainian vector has not yet become a leader in the system of labor immigration to the EU. The values of the intensity of labor migration from Ukraine (per 1,000 departures to the country of destination) to Greece (47.7 people) and Germany (18.4 people) were significant. However, in the rest of the analyzed countries, the intensity of labor migration from Ukraine remains lower – in the range of 0.3 to 2.7 officially employed people per 1,000 departures. Besides, in the dynamics for 2010–2018, the intensity of labor migration from Ukraine to Germany and Poland increased significantly (by 185.9% and 178.6%, respectively).

Based on the results of calculating the coefficients of elasticity with a two-year lag, the degree of sensitivity of the emigration intensity of the population (from Ukraine to the analyzed EU countries) to changes in the factors of the pull environment in the analyzed EU countries was found. In particular, the groups of countries with high and moderate sensitivity, different nature, and duration of impact were identified (Appendix E).

For instance, it was found that a rise in the integral index of the pull environment of migration in the Czech Republic by 1% provides an increase in the intensity of total migration from Ukraine to the Czech Republic by 58.7 departures per 1,000 people during the first year. However, a further increase in the index of the pull environment of migration leads to a decrease in the intensity of migration from Ukraine by 109.9 departures next year. As for the elasticity of external labor migration, opposite trends were identified. In the first-time lag, there is a fall in the intensity of labor migration from Ukraine to the Czech Republic (by 74.2 officially employed people per 1,000 departures); in the second time lag, there is a rise in the intensity of labor migration by 151.6 people. Such changes in the elasticity of labor migration in relation to the factors of the pull environment can be explained by the fact that the country's socio-economic development often correlates with increasing difficulties regarding its accessibility for migrants (complicated visa requirements and migration conditions, migrant employment requirements, training of foreigners). This may be a factor hindering immigration to such a country in the short run. Nevertheless, the adaptability of po-

tential migrants to the new conditions contributes to the further intensification of migration flows to the country, where the socio-economic environment is developing. The ratios of the coefficients of the elasticity of labor migration from Ukraine to the change in the pull environment in Germany and Portugal are similar. The situation with the total migration of the population from Ukraine to Italy may also develop under a similar scenario.

5. DISCUSSION

The study confirmed a statistically significant relationship between the strength of the pull environment (based on the integral pull indices) in the EU and the intensity of migration to the EU from Ukraine as a country with a high level of external migration and orientation towards EU countries. It was established that the country's attractiveness for external migrants is largely determined by high parameters of medical and demographic stability, as well as the improvement in the values of the indicators of the labor market and employment, living standards, and economic growth. The significance of the indicator "economic development of the country" for the EU-28 is substantially lower. It was found that the integral level of the pull environment of migration in the EU-28 is high, while, in the countries that dominate in terms of external migration from Ukraine, it is lower. In 2018, only the Czech Republic and Germany had the integral indicators, which were higher than the average in the EU.

The volume of population migration from Ukraine is increasing. In 2018, the intensity of total migration from Ukraine to Poland, Hungary, and Germany was the highest, whereas Greece and Germany were the most attractive to Ukrainian migrant workers. The coefficients of elasticity of migration from Ukraine to changes in the factors of the pull environment in EU countries were calculated. A direct positive impact of improving the pull environment on the growth of total external migration is observed in the migration systems Ukraine-Germany and Ukraine-Spain; external labor migration is growing only within the system Ukraine-Poland. The reverse nature of the sensitivity of migration to the pull environment of the recipient countries is due to trends in the

socio-economic development of EU countries and the immigration policy of each of them, in particular, in terms of employment regulation.

It was evidenced that to stimulate an increase in migration from Ukraine to the analyzed EU countries, host countries within their migration policy should adopt measures aimed at improving the parameters of social security and social development (Poland, Hungary, Greece, and the Czech Republic); developing the labor market and improving employment (Portugal, Spain, and Hungary); raising living standards and strengthening economic development (Greece). In addition, the level of attractiveness of the environment (in the medium and long run) will rise, if an active policy of smart-oriented development of EU regions is further implemented for convergence of social and economic development of territo-

ries. The promotion of positive practices in sending countries, which are attractive to EU countries in terms of growth of potential migration activity, will also help to improve the level of attractiveness of the environment.

For the migration policy of Ukraine, it is important to introduce monitoring of the pull environment of migration in EU countries to predict the dynamics of the total and country-specific intensity of external migration of the population; to track the impact of push factors on the intensity of external migration, as well as to direct migration flows towards countries with a better socio-economic environment, including for the growth of human and labor potential of migrants; to monitor the trends and nature of the movement of migrants for timely re-emigration and employment in Ukraine.

CONCLUSION

The intensive migration of Ukrainians towards EU countries is caused not only by an economic gap, social vulnerability, and political instability in Ukraine but also by continuous improvement of social and economic conditions in the EU based on cohesion policy. The more attractive the environment, the stronger the pull factors of migration. These relations are obvious but still insufficiently studied.

The significance of the results consists in the fact that today there are no methodological approaches that would combine the following aspects: first, the analysis of the environment pulling migrants to the EU; second, the level of intensity of external migration in donor countries providing migrants for the EU; third, the degree of elasticity of the pull-push bonds. To bridge this methodological gap, a new scientific approach to a comprehensive assessment of the environment of attracting migrants to EU countries has been substantiated and approbated. This approach was used to determine the level of intensity of total and labor migration and analyze the elasticity of the intensity of total and labor migration from Ukraine to changes in the integral indices of the pull environment of migration in EU countries.

The applied significance of the results of this study is that EU countries, in which the number of Ukrainian labor migrants is the largest, were selected for the analysis (Poland, the Czech Republic, Hungary, Spain, Italy, Portugal, Germany, and Greece). Such an approach allowed modeling migration relationships existing today in the most developed segments of the Ukraine-EU migration system. In addition, the calculations also include data for the EU-28.

The analysis conducted on the basis of the developed methodological approach is an important element of migration policy tools, as it helps rank EU countries by the level of attractiveness for immigration, determine the distribution of potential migrants, and forecast migration flows to EU countries.

Further development of methodological and applied support of the migration policy involves the creation of a comprehensive approach to forecasting changes in the volume and intensity of immigration to the EU depending on changes in a socio-economic situation in each country of the EU.

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APPENDIX A

Table A1. Indicators of the pull environment of population migration

Source: Compiled by the authors.

Indicators	Quantitative expression	Impact on immigration	Marking
Medical and demographic stability			
Total fertility rate	Per 1,000 people	S	X _{1,1}
Total mortality rate		D	X _{1,2}
Average life expectancy at birth	Years	S	X _{1,3}
Marriage rate	Number of registered marriages per 1,000 people	S	X _{1,4}
Morbidity of the adult population	% of people 16 years old and older with chronic diseases	D	X _{1,5}
Level of urbanization	% of urban residents in the structure of the permanent population	S	X _{1,6}
Demographic burden*	%	S	X _{1,7}
Social security and social development			
Child benefits	Per child, euros	S	X _{2,1}
Unemployment benefits	Per capita, euros	S	X _{2,2}
Share of social contributions of employers	% of GDP	S	X _{2,3}
Amount of pension provision	Per pensioner, euros	S	X _{2,4}
Health care benefits	Per capita, euros	S	X _{2,5}
Social security payments		S	X _{2,6}
Share of expenditure of the general state budget: on health care	% of GDP	S	X _{2,7}
on education		S	X _{2,8}
on social security		S	X _{2,9}
Labor market and employment			
Proportion of young people aged 15-24 not involved in education and not employed in the official labor market	% to the population of this age	S	X _{3,1}
Employment rate of the population aged 15-64	% of the population of this age	S	X _{3,2}
Employment rate of foreigners aged 15-64	% of the foreign population of non-residents of this age	S	X _{3,3}
Level of forced part-time employment at the age of 15-64	% of total part-time employment of the population	D	X _{3,4}
Average annual real wages	On average per employee, euros	S	X _{3,5}
Level of workplace injuries (standardized indicator)	Cases per 100,000 employees	D	X _{3,6}
Self-employed workers aged 15-64	Per 10,000 residents	S	X _{3,7}
Living standards			
Adjusted real gross income	Per household, euro	S	X _{4,1}
Real cost of food and soft drinks	Based on the PPP of one resident	D	X _{4,2}
Quintile share ratio of total population income	%	D	X _{4,3}
Total housing costs	Based on the PPP of one household	D	X _{4,4}
Gini coefficient of income concentration	Rank [0; 100]	S	X _{4,5}
Crime rate, including violence, vandalism, etc.	%	D	X _{4,6}
Duration of a working day at a day job	% to the total number of working hours	S	X _{4,7}
Level of environmental problems, air pollution, garbage problems, etc.	%	D	X _{4,8}
Economic development of the country			
Real GDP	Per person, euros	S	X _{5,1}
Level of gross government debt	% of GDP	D	X _{5,2}
Share of renewable energy sources	% of total energy consumption	S	X _{5,3}
Share of high technology exports	% of total exports	S	X _{5,4}
Consumer price index (basic of 2015)		D	X _{5,5}
Level of e-commerce promotion for business (the digital market development)	% of the total number of enterprises	S	X _{5,6}
Share of investment in institutional development	% of GDP	S	X _{5,7}
Number of small businesses	Units per 10,000 people	S	X _{5,8}

Note: * means the demographic burden is calculated as the ratio of persons of pre-working age (0-14 years) and post-working age (65 years and older) to the number of persons of working age (15-64 years). The growth of this indicator promotes replacement migration by attracting foreign human resources; S – indicator-stimulator; D – indicator-destimulator; indicators are selected by an expert method.

APPENDIX B

Table B1. Weighting coefficients of indicator significance of the migration pull environment

Source: Authors' calculations based on Eurostat database.

Group	Indicator	$w_{in}^k, \%$								
		Czech Republic	Germany	Greece	Hungary	Italy	Poland	Portugal	Spain	EU-28
w_{in}^1										
Medical and demographic stability	$X_{1,1}$	6.16	15.40	14.16	8.49	16.34	4.15	15.63	15.95	7.90
	$X_{1,2}$	9.46	15.55	14.66	14.16	13.49	14.92	13.13	10.05	15.59
	$X_{1,3}$	18.57	14.08	14.81	10.28	15.24	16.57	15.73	16.26	13.79
	$X_{1,4}$	6.17	14.87	13.01	18.68	13.91	14.82	15.09	13.15	7.58
	$X_{1,5}$	19.57	13.28	13.63	17.14	11.50	17.30	16.26	13.02	6.06
	$X_{1,6}$	19.89	12.84	14.67	12.42	13.16	16.95	8.47	15.11	10.65
	$X_{1,7}$	20.18	13.98	15.07	18.84	16.37	15.29	15.69	16.46	16.04
w_{in}^2										
Social security and social development	$X_{2,1}$	12.20	13.69	9.94	13.61	12.41	13.47	7.45	12.16	7.90
	$X_{2,2}$	9.52	11.43	15.59	6.52	12.90	6.09	0.80	8.50	15.59
	$X_{2,3}$	14.89	10.39	16.85	10.51	11.81	12.55	8.58	13.92	13.79
	$X_{2,4}$	14.93	12.27	1.40	6.71	12.66	14.78	15.41	12.11	7.58
	$X_{2,5}$	11.43	13.86	18.35	10.14	10.99	15.09	9.11	0.78	6.06
	$X_{2,6}$	14.38	13.72	5.79	15.75	13.32	14.76	15.89	14.82	10.65
	$X_{2,7}$	13.44	12.66	17.36	12.59	0.29	4.70	15.04	13.63	16.04
	$X_{2,8}$	0.36	6.67	3.75	14.89	12.54	15.06	14.63	9.07	6.65
	$X_{2,9}$	8.84	5.32	10.97	9.27	13.09	3.50	13.11	15.00	15.75
w_{in}^3										
Labor market and employment	$X_{3,1}$	13.77	15.35	12.52	18.65	14.68	16.14	8.66	11.80	7.71
	$X_{3,2}$	15.84	15.73	15.24	7.11	10.30	16.89	13.81	14.49	16.36
	$X_{3,3}$	14.82	15.53	15.20	2.88	15.36	16.81	16.61	15.25	7.97
	$X_{3,4}$	13.02	15.14	15.25	24.06	15.46	12.67	16.65	14.87	12.50
	$X_{3,5}$	16.50	15.86	12.94	3.07	15.08	16.09	14.77	13.87	19.53
	$X_{3,6}$	14.38	13.96	13.33	23.48	14.57	12.55	14.23	14.85	17.70
	$X_{3,7}$	11.68	8.43	15.52	20.75	14.56	8.84	15.28	14.87	18.23
w_{in}^4										
Living standards	$X_{4,1}$	13.33	14.30	1.38	16.18	6.81	13.82	11.60	7.38	14.56
	$X_{4,2}$	13.54	14.27	7.50	15.31	11.45	13.52	14.88	9.77	15.06
	$X_{4,3}$	13.01	10.25	22.37	15.39	15.07	14.04	14.44	12.39	14.73
	$X_{4,4}$	11.39	9.99	1.83	1.99	15.24	13.73	10.82	12.03	7.54
	$X_{4,5}$	10.93	10.64	8.19	4.66	12.36	13.78	14.32	13.49	7.93
	$X_{4,6}$	12.05	14.17	20.84	15.81	8.05	14.20	12.69	15.47	12.39
	$X_{4,7}$	12.51	14.08	16.89	14.01	13.67	14.19	6.42	15.77	14.89
	$X_{4,8}$	13.24	12.31	20.99	16.65	17.35	2.71	14.84	13.70	12.90
w_{in}^5										
Economic development of the country	$X_{5,1}$	9.86	14.72	16.46	6.97	11.70	14.77	1.89	4.81	10.47
	$X_{5,2}$	12.31	1.52	16.63	12.16	13.22	12.01	16.94	14.02	13.33
	$X_{5,3}$	13.89	15.40	16.40	15.30	13.15	15.39	14.95	13.84	14.76
	$X_{5,4}$	9.79	13.48	8.68	12.54	11.43	14.68	13.79	13.18	7.52
	$X_{5,5}$	14.00	15.33	15.34	15.35	12.91	15.29	16.18	13.63	14.57
	$X_{5,6}$	13.61	13.62	7.73	14.66	11.35	14.64	2.88	13.40	14.28
	$X_{5,7}$	13.32	10.88	16.63	8.86	13.02	10.95	16.50	14.08	11.73
	$X_{5,8}$	13.22	15.05	2.13	14.17	13.22	2.27	16.88	13.04	13.34

APPENDIX C

Table C1. Time series of the indices for groups of indicators (Z_{kt}^n) and integral indices (I_{tn}^{pull}) of the pull environment of migration in EU countries

Source: Authors' calculations based on Eurostat database and formulas (4) and (5).

Countries	Indices	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	The average annual rate, %	2018/2005, %
Czech Republic	Z_{1t}^1	0.6959	0.7008	0.7190	0.7204	0.7047	0.7146	0.7050	0.7150	0.7141	0.7257	0.7192	0.7251	0.7295	0.7297	0.2600	104.86
	Z_{2t}^1	0.3593	0.3793	0.4035	0.4099	0.4556	0.4467	0.4362	0.4372	0.4425	0.4444	0.4465	0.4461	0.4518	0.4670	0.2600	129.97
	Z_{3t}^1	0.3614	0.3566	0.3666	0.3844	0.4093	0.4214	0.4301	0.4353	0.4471	0.4268	0.4360	0.4525	0.4852	0.5161	0.8285	142.81
	Z_{4t}^1	0.4676	0.4677	0.4777	0.4676	0.4624	0.4824	0.4862	0.4954	0.4810	0.4927	0.5031	0.5044	0.5329	0.5423	1.1900	115.98
	Z_{5t}^1	0.6252	0.6304	0.6542	0.6607	0.6524	0.6660	0.6907	0.6854	0.6852	0.7038	0.7060	0.7168	0.7124	0.7298	0.5746	116.73
	$I_{t(1)}^{pull}$	0.4832	0.4883	0.5054	0.5111	0.5236	0.5330	0.5365	0.5406	0.5416	0.5441	0.5487	0.5559	0.5716	0.5878	0.8046	121.65
Germany	Z_{1t}^2	0.7433	0.7361	0.7414	0.7493	0.7462	0.7512	0.7480	0.7380	0.7300	0.7436	0.7300	0.7421	0.7340	0.7361	0.8046	99.03
	Z_{2t}^2	0.6925	0.7008	0.6992	0.7048	0.7696	0.7823	0.7723	0.7754	0.7864	0.7976	0.8133	0.8173	0.8296	0.8500	-0.0554	122.74
	Z_{3t}^2	0.3968	0.3879	0.3924	0.3906	0.4197	0.4168	0.4312	0.4372	0.4332	0.4421	0.4454	0.4617	0.4637	0.4716	1.2115	118.85
	Z_{4t}^2	0.5549	0.5026	0.5162	0.5072	0.5117	0.5328	0.5202	0.5251	0.5137	0.5131	0.4979	0.4903	0.4780	0.4793	0.5754	86.38
	Z_{5t}^2	0.4602	0.4863	0.5179	0.5212	0.5475	0.5623	0.5651	0.5845	0.5812	0.6016	0.6151	0.6228	0.6189	0.6153	-0.5815	133.70
	$I_{t(2)}^{pull}$	0.5379	0.5328	0.5448	0.5450	0.5723	0.5819	0.5824	0.5894	0.5860	0.5966	0.5985	0.6054	0.6035	0.6089	0.5462	113.20
Greece	Z_{1t}^3	0.7724	0.8001	0.7960	0.7856	0.7970	0.7905	0.7837	0.7660	0.7628	0.7768	0.7774	0.7769	0.7733	0.7753	1.1931	100.38
	Z_{2t}^3	0.4439	0.4532	0.4730	0.5086	0.5306	0.5226	0.4938	0.4522	0.4294	0.4064	0.4087	0.4111	0.4100	0.4105	0.0223	92.48
	Z_{3t}^3	0.4326	0.4313	0.4359	0.4472	0.4842	0.4930	0.4811	0.4679	0.4518	0.5202	0.4819	0.4844	0.4863	0.4845	-0.2569	112.00
	Z_{4t}^3	0.4567	0.4569	0.4227	0.4077	0.3809	0.3586	0.3547	0.3554	0.3600	0.3826	0.4133	0.4213	0.3990	0.3936	0.3992	86.18
	Z_{5t}^3	0.4154	0.4272	0.4402	0.4272	0.4310	0.4042	0.3642	0.3577	0.3528	0.3657	0.3625	0.3807	0.3893	0.3842	-0.4854	92.49
	$I_{t(3)}^{pull}$	0.4955	0.5048	0.5064	0.5063	0.5143	0.5001	0.4780	0.4642	0.4562	0.4745	0.4734	0.4820	0.4802	0.4775	-0.1385	96.37
Hungary	Z_{1t}^4	0.6312	0.6474	0.6307	0.6276	0.6223	0.6171	0.6174	0.6324	0.6334	0.6431	0.6468	0.6719	0.6848	0.6861	-0.2400	108.70
	Z_{2t}^4	0.4218	0.4352	0.4256	0.4334	0.4397	0.4445	0.4366	0.4094	0.4066	0.4045	0.4164	0.4034	0.4024	0.4085	0.4223	96.85
	Z_{3t}^4	0.3403	0.3231	0.3255	0.3259	0.3541	0.3325	0.3275	0.3326	0.3381	0.3291	0.3269	0.3243	0.3416	0.3589	-0.1023	105.47
	Z_{4t}^4	0.3529	0.3674	0.3492	0.3476	0.3529	0.3625	0.3617	0.3674	0.3620	0.3632	0.3836	0.3862	0.4216	0.4909	0.1431	139.10
	Z_{5t}^4	0.4517	0.4449	0.4525	0.4563	0.4933	0.4975	0.5142	0.5036	0.5037	0.4934	0.5083	0.5127	0.5240	0.5239	1.0615	115.98
	$I_{t(4)}^{pull}$	0.4353	0.4400	0.4321	0.4334	0.4474	0.4469	0.4471	0.4449	0.4440	0.4420	0.4530	0.4552	0.4722	0.4949	0.4585	113.69
Italy	Z_{1t}^5	0.8187	0.8238	0.8303	0.8228	0.8142	0.8065	0.7783	0.7837	0.7708	0.7699	0.7556	0.8035	0.7960	0.7840	0.5554	95.76
	Z_{2t}^5	0.4633	0.4833	0.5499	0.5640	0.6014	0.5974	0.5945	0.5972	0.6111	0.6262	0.6492	0.6603	0.6584	0.6744	-0.2669	145.56
	Z_{3t}^5	0.3918	0.3989	0.3978	0.4040	0.3974	0.3998	0.4034	0.4118	0.4059	0.4059	0.4086	0.4081	0.4120	0.4083	1.6238	104.21
	Z_{4t}^5	0.4434	0.4403	0.4474	0.4466	0.4421	0.4660	0.4460	0.4464	0.4426	0.4358	0.4359	0.4552	0.4891	0.4924	0.1269	111.05
	Z_{5t}^5	0.4117	0.4131	0.4382	0.4266	0.4400	0.4361	0.4313	0.4299	0.4376	0.4335	0.4541	0.4634	0.4709	0.4833	0.3769	117.39
	$I_{t(5)}^{pull}$	0.4736	0.4806	0.5039	0.5047	0.5125	0.5148	0.5075	0.5105	0.5117	0.5123	0.5214	0.5346	0.5426	0.5471	0.5654	115.52

Table C1 (cont.). Time series of the indices for groups of indicators (Z_{kt}^n) and integral indices (I_{tn}^{pull}) of the pull environment of migration in EU countries

Countries	Indices	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	The average annual rate, %	2018/2005, %
Poland	Z_{1t}^6	0.7042	0.7102	0.7187	0.7293	0.7176	0.7093	0.6959	0.7007	0.6861	0.7000	0.6885	0.6963	0.6899	0.6928	0.5508	98.38
	Z_{2t}^6	0.2402	0.2481	0.2525	0.2769	0.2927	0.3028	0.2968	0.3024	0.3157	0.3167	0.3317	0.3597	0.3761	0.3858	-0.0877	160.62
	Z_{3t}^6	0.3657	0.3714	0.4094	0.4278	0.3955	0.4172	0.4299	0.4299	0.4280	0.4389	0.4355	0.4405	0.4669	0.4866	1.1200	133.06
	Z_{4t}^6	0.5066	0.5078	0.5051	0.4992	0.5031	0.5098	0.4957	0.4963	0.4920	0.4956	0.5036	0.5032	0.5048	0.5067	0.9300	100.02
	Z_{5t}^6	0.3117	0.3133	0.3284	0.3691	0.3831	0.3926	0.3903	0.4072	0.4125	0.4396	0.4489	0.4465	0.4424	0.4653	0.0008	149.28
	$I_{t(6)}^{pull}$	0.3686	0.3740	0.3897	0.4156	0.4164	0.4272	0.4251	0.4322	0.4357	0.4476	0.4534	0.4641	0.4739	0.4882	0.9200	132.45
Portugal	Z_{1t}^7	0.7534	0.7557	0.7430	0.7373	0.7208	0.7251	0.7106	0.6831	0.6633	0.6614	0.6614	0.6654	0.6697	0.6763	1.1815	89.77
	Z_{2t}^7	0.5540	0.5577	0.5529	0.5651	0.6099	0.6084	0.5830	0.5677	0.5859	0.5784	0.5743	0.5666	0.5647	0.5731	-0.5931	103.45
	Z_{3t}^7	0.3475	0.3442	0.3384	0.3351	0.3419	0.3360	0.3253	0.3200	0.3151	0.3128	0.3089	0.3133	0.3162	0.3185	0.1469	91.65
	Z_{4t}^7	0.5293	0.5226	0.4937	0.5224	0.5124	0.5348	0.5712	0.5701	0.5456	0.5716	0.5712	0.5975	0.6055	0.6172	-0.2231	116.61
	Z_{5t}^7	0.5991	0.5890	0.6007	0.5932	0.5319	0.4961	0.4713	0.4455	0.4410	0.4529	0.4663	0.4761	0.4862	0.4841	0.6762	80.80
	$I_{t(7)}^{pull}$	0.5385	0.5342	0.5255	0.5288	0.5149	0.5097	0.5030	0.4886	0.4784	0.4847	0.4864	0.4956	0.5013	0.5054	-0.2546	93.85
Spain	Z_{1t}^8	0.8111	0.8169	0.8083	0.7922	0.7731	0.7743	0.7914	0.7755	0.7487	0.7609	0.7505	0.7619	0.7612	0.7359	-0.8846	90.73
	Z_{2t}^8	0.5198	0.5333	0.5436	0.5720	0.6334	0.6266	0.6273	0.6225	0.6254	0.6187	0.6150	0.6067	0.6045	0.6191	-0.5785	119.10
	Z_{3t}^8	0.3405	0.3409	0.3530	0.3513	0.3473	0.3425	0.3362	0.3375	0.3341	0.3284	0.3323	0.3338	0.3328	0.3362	0.7638	98.74
	Z_{4t}^8	0.5405	0.5468	0.5549	0.5802	0.5668	0.6153	0.6326	0.6460	0.6025	0.6192	0.6258	0.6172	0.6508	0.6073	-0.0331	112.36
	Z_{5t}^8	0.4140	0.4613	0.4962	0.5000	0.4983	0.4984	0.4690	0.4643	0.4604	0.4776	0.4872	0.5072	0.5112	0.5083	0.5138	122.78
	$I_{t(8)}^{pull}$	0.5239	0.5369	0.5483	0.5579	0.5635	0.5716	0.5719	0.5706	0.5559	0.5611	0.5625	0.5643	0.5709	0.5612	0.2869	107.12
EU-28	Z_{1t}^9	0.7816	0.7795	0.7781	0.7764	0.7688	0.7667	0.7604	0.7559	0.7492	0.7565	0.7458	0.7538	0.7443	0.7418	0.7254	94.91
	Z_{2t}^9	0.6383	0.6536	0.6519	0.6514	0.7150	0.7190	0.7127	0.7177	0.7247	0.7204	0.7208	0.7161	0.7129	0.7268	-0.3062	113.86
	Z_{3t}^9	0.3810	0.3832	0.3893	0.3976	0.4090	0.4086	0.4124	0.4192	0.4155	0.4186	0.4226	0.4247	0.4257	0.4324	0.6808	113.49
	Z_{4t}^9	0.4817	0.4721	0.4708	0.4778	0.4729	0.4886	0.4879	0.4952	0.4867	0.4898	0.4894	0.4921	0.4973	0.4903	0.3954	101.79
	Z_{5t}^9	0.5478	0.5541	0.5771	0.5797	0.5673	0.5689	0.5361	0.5439	0.5418	0.5539	0.5736	0.5863	0.5901	0.5913	0.0662	107.94
	$I_{t(9)}^{pull}$	0.5499	0.5513	0.5540	0.5585	0.5710	0.5754	0.5721	0.5769	0.5733	0.5766	0.5772	0.5801	0.5796	0.5822	0.2485	105.87

Note: The value of the integral index of the pull environment of migration varies in the range (0; 1). The positive dynamics of the index indicate an increase in the level of attractiveness of the country for external migrants.

APPENDIX D

Table D1. Intensity of population migration from Ukraine to selected EU countries, 2010–2018

Source: State Border Guard Service of Ukraine (n.d.), State Migration Service of Ukraine (n.d.).

Destination countries	Years								
	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total migration*									
Czech Republic	2.407	3.332	6.573	3.742	1.876	1.229	1.053	1.729	2.089
Germany	8.652	8.148	8.385	8.293	6.828	6.883	6.994	8.129	12.606
Greece	1.508	2.201	2.729	4.494	3.399	2.407	2.301	2.504	3.218
Hungary	39.132	37.845	38.624	41.723	47.386	56.889	67.748	73.238	73.580
Italy	2.678	3.070	3.403	4.250	3.849	2.708	2.946	4.126	7.341
Poland	87.858	112.132	126.816	154.066	168.906	221.741	236.974	244.462	236.061
Portugal	0.170	0.174	0.178	0.182	0.186	0.201	0.212	0.224	0.205
Spain	0.807	1.615	2.063	2.649	2.204	1.437	2.130	2.667	3.916
Labor migration**									
Czech Republic	0.262	0.098	0.060	0.018	0.117	0.853	1.577	1.154	1.016
Germany	9.978	11.048	17.208	25.211	25.518	28.337	29.271	26.806	18.408
Greece	129.452	92.539	69.719	38.570	42.399	59.983	58.866	57.586	47.723
Hungary	0.103	0.111	0.114	0.110	0.101	0.093	0.081	0.080	0.085
Italy	5.004	5.087	3.240	2.484	2.408	4.620	1.778	1.352	0.809
Poland	0.599	0.602	0.472	0.312	0.451	0.647	0.938	0.967	1.067
Portugal	0.513	0.628	0.246	0.362	0.591	0.463	0.221	0.223	0.259
Spain	15.363	9.822	7.851	4.227	3.935	7.569	4.448	3.779	2.741

Note: * means per 1,000 people of Ukraine; ** means calculated based on data on the number of citizens of Ukraine who temporarily worked abroad, employed by business entities that have the appropriate license; per 1,000 departures abroad.

APPENDIX E

Table E1. Intensity elasticity of Ukrainian total and labor migration in relation to the change of social and economic pull factors in EU countries

Source: Authors' calculations.

		Integral pull index								
		Czech Republic	Germany	Greece	Hungary	Italy	Poland	Portugal	Spain	
Intensity	Total migration	c	13.5387 (13.5485) [-0.9993]	2.261338 (1.79501) [1.25979]	-4.288832 (4.75350) [-0.90225]	-2.041649 (2.40327) [-0.84953]	7.674008 (8.12674) [0.94429]	1.849915 (1.98323) [0.93278]	-0.92764 (0.3380) [-2.7438]	6.934924 (6.44000) [1.07685]
		(1)	58.6919 (105.480) [0.5564]	13.60387 (13.6776) [0.9946]	-9.522720 (9.51263) [-1.00106]	-1.480214 (2.60665) [-0.56786]	-1.542409 (13.1533) [-0.11726]	15.34212 (5.91942) [2.59183]	1.52246 (1.5643) [0.9732]	18.69996 (17.0878) [1.09434]
		(2)	-109.9088 (152.188) [-0.72219]	1.856395 (13.5084) [0.13743]	-6.609334 (12.0404) [-0.54893]	-3.990426 (2.96737) [-1.34477]	2.309298 (1.94852) [1.18515]	-13.59614 (3.47416) [-3.91350]	-2.672597 (1.31962) [-2.02528]	8.655319 (19.1649) [0.45162]
	Adjusted R ²		0.84648	0.741602	0.631690	0.996801	0.866976	0.991049	0.928348	0.523944
	AIC		-12.56608	-1.993370	-1.423854	-5.925826	-1.809323	-4.973024	-5.135581	-0.428168
	Schwarz criterion		-12.64335	-2.032006	-1.462489	-5.964462	-1.847958	-5.011659	-5.174216	0.050619
	Labor migration	c	20.19495 (18.2946) [1.10387]	13.07560 (4.57556) [2.85770]	1.154335 (1.39613) [0.82681]	0.662693 (1.78866) [0.37050]	-34.32394 (6.61784) [-5.18658]	10.59708 (1.47305) [7.19398]	-7.321376 (1.86772) [-3.91996]	0.597091 (5.48096) [0.10894]
		(1)	-74.22012 (156.488) [-0.4742]	-3.107196 (4.05136) [-0.76695]	4.124924 (3.84425) [1.07301]	-3.050718 (3.71748) [-0.82064]	16.16123 (7.57823) [2.13259]	7.880504 (3.84028) [2.05206]	-15.51258 (6.55763) [-2.36558]	10.97032 (12.3242) [0.89015]
		(2)	151.5619 (205.266) [0.7383]	3.444413 (1.08354) [3.17885]	-0.782108 (5.46974) [-0.14299]	-0.709213 (0.72121) [-0.98336]	-5.217743 (2.03566) [-2.56317]	17.67433 (5.82113) [3.03624]	2.082060 (5.53822) [0.37594]	-8.559968 (18.3631) [-0.46615]
	Adjusted R ²		0.683838	0.924128	0.941333	0.990382	0.956088	0.994806	0.852158	0.625855
AIC		1.845494	-3.802052	-4.613505	-6.254709	-2.698791	-3.528537	-1.518882	-1.776755	
Schwarz criterion		1.806858	-3.840688	-4.652140	-6.293345	-2.737427	-3.567173	-1.557517	-1.815391	

Note: Standard error is in (); t-statistics is in []. AIC is for Akaike information criterion.